### IEEE P802.11Wireless LANs

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| PHY Comment resolution for Clause 31.2.4 |
| Date: 2019-04-24 |
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Abstract

This submission proposes resolutions for comments of TGba Draft D2.0 with the following CIDs: 2482, 2483, 2484, 2485, 2486, 2487, 2089, 2090, 2091, 2092, 2093, 2094, 2623, 2624, 2625, 2626, 2627, 2277, and 2278.

Note: All the cross-reference is with respect to TGba Draft 2.1

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| **CID** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 2482 | 90.40 | 31.2.4.1 | "can" is not a normative word to use in the draft. Also the WUR PHY clause needs to define one clear way to generate the On-waveform (or On-symbol). With the current description in the draft, there is no clear definition of the WUR signal in terms of the WUR signal bandwidth and cannot satisfy the minimum receive sensitivity defined in the draft. During the course of spec development, most of the simulation results on the receiver performance was done using the procedure defined in 31.2.4.1 and 31.2.4.2, which give confidence how the WUR receiver performs. | Change "can be" to "is". | Revised. Agree with the comment in principle. “can be” is replaced with “is”.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2482. |
| 2483 | 90.63 | 31.2.4.1 | "can" is not a normative word to use in the draft. | Change "can be" to "is". | Revised. Agree with the comment in principle. “can be” is replaced with “is”.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2483. |
| 2484 | 91.26 | 31.2.4.2 | "can" is not a normative word to use in the draft. Also the WUR PHY clause needs to define one clear way to generate the On-waveform (or On-symbol). With the current description in the draft, there is no clear definition of the WUR signal in terms of the WUR signal bandwidth and cannot satisfy the minimum receive sensitivity defined in the draft. During the course of spec development, most of the simulation results on the receiver performance was done using the procedure defined in 31.2.4.1 and 31.2.4.2, which give confidence how the WUR receiver performs. | Change "can be" to "is". | Revised. Agree with the comment in principle. “can be” is replaced with “is”.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2484. |
| 2485 | 91.43 | 31.2.4.2 | "can" is not a normative word to use in the draft. | Change "can be" to "is". | Revised. Agree with the comment in principle. “can be” is replaced with “is”.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2485. |
| 2486 | 92.29 | 31.2.4.3 | "can" is not a normative word to use in the draft. | Change "can be" to "is". | Revised. Agree with the comment in principle. “can be” is replaced with “is”.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2486. |
| 2487 | 92.33 | 31.2.4.3 | "can" is not a normative word to use in the draft. | Change "can be" to "is". | Revised. Agree with the comment in principle. “can be” is replaced with “are”.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2487. |
| 2089 | 90.41 | 31.2.4 | "can" is not a formal vocabulary in standard and instead 'may' should be used. | Change "can" to "may". | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2089. |
| 2090 | 90.64 | 31.2.4 | "can" is not a formal vocabulary in standard and instead 'may' should be used. | Change "can" to "may". | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2090. |
| 2091 | 91.26 | 31.2.4 | "can" is not a formal vocabulary in standard and instead 'may' should be used. | Change "can" to "may". | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2091. |
| 2092 | 91.43 | 31.2.4 | "can" is not a formal vocabulary in standard and instead 'may' should be used. | Change "can" to "may". | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2092. |
| 2093 | 92.30 | 31.2.4 | "can" is not a formal vocabulary in standard and instead 'may' should be used. | Change "can" to "may". | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2093. |
| 2094 | 92.33 | 31.2.4 | "can" is not a formal vocabulary in standard and instead 'may' should be used. | Change "can" to "may". | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “are”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2094. |
| 2623 | 90.40 | 31.2.4.1 | "can" is non-normative. Change "can be" to "may be" | As shown in the comment. | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2623. |
| 2624 | 90.64 | 31.2.4.1 | "can" is non-normative. Change "can be" to "may be" | As shown in the comment. | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2624. |
| 2625 | 91.26 | 31.2.4.2 | "can" is non-normative. Change "can be" to "may be" | As shown in the comment. | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2625. |
| 2626 | 91.43 | 31.2.4.2 | "can" is non-normative. Change "can be" to "may be" | As shown in the comment. | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2626. |
| 2627 | 92.29 | 31.2.4.3 | "can" is non-normative. Change "can be" to "may be" | As shown in the comment. | Revised.It is good to have one clear way of generating the waveform. “can be” is replaced with “is”. Added a text to clarify that the actual implementation may use other methods to generate the waveform.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2627. |
| 2277 | 73.33 | 32.2.3.3 | "can" is not a normative text. Please replace "can be" to "is". | "Picking up on comments made in the previous letter ballot on D1.0, the TG did not properbly address the issue raised in the comment, nor does the TG provide an indication that the text commented on has been deleted and hence the comment does not apply. (Note, page and line and sublause number refer to D1.0). In fact, as stated in the TGba minutes (11-19/226r0), the intend of the task group was to ""Move to resolve CIDs that have no approved resolution as rejected with a reason read ""TGba is unable to reach consensus on a resolution"" in the interest of releasing draft 2.0"". Also, the statement """"TGba is unable to reach consensus on a resolution"" was added to the motion text there was one person speaking against the motion."" was only added to the motion after objection to the original motion trying to reject comments in bulk with the reason of releasing a new LB.The TG is asked to give the original comment due consideration and debade the proposed comment resolution as included in 11-18/1794r10. The referenced document includes an actionable comment resolution." | Revised. Agree with the comment in principle. “can be” is replaced with “are”.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2277. |
| 2278 | 73.30 | 32.2.3.3 | "can" is not a normative text. Please replace "can be" to "is". | "Picking up on comments made in the previous letter ballot on D1.0, the TG did not properbly address the issue raised in the comment, nor does the TG provide an indication that the text commented on has been deleted and hence the comment does not apply. (Note, page and line and sublause number refer to D1.0). In fact, as stated in the TGba minutes (11-19/226r0), the intend of the task group was to ""Move to resolve CIDs that have no approved resolution as rejected with a reason read ""TGba is unable to reach consensus on a resolution"" in the interest of releasing draft 2.0"". Also, the statement """"TGba is unable to reach consensus on a resolution"" was added to the motion text there was one person speaking against the motion."" was only added to the motion after objection to the original motion trying to reject comments in bulk with the reason of releasing a new LB.The TG is asked to give the original comment due consideration and debade the proposed comment resolution as included in 11-18/1794r10. The referenced document includes an actionable comment resolution." | Revised. Agree with the comment in principle. “can be” is replaced with “is”.TGba Editor to make changes as shown in 802.11-19/0687r1 with CID #2278. |

**Discussion**: There are several “can” statements in 31.2.4.1 (WUR PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field), 31.2.4.2 (WUR PPDU waveform generation for low data rate WUR-Data field), and 31.2.4.3 (WUR PPDU WUR-Data field waveform generation for the FDMA transmission) which is not a normative text. The following sentences at the beginning of 31.2.4 (Transmitter block diagram) clearly state that the description in 31.2.4.1, 31.2.4.2 and 31.2.4.3 is an example way of generating the WUR PPDU waveforms and the actual waveform is implementation dependent.

“…. 31.2.4.1 (WUR PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field) through 31.2.4.4 (Symbol Randomizer and Per-antenna Cyclic Shift) show an example of transmitter block diagram for the WUR-Sync field and the WUR-Data field. The actual waveform generation of these fields is implementation dependent.”

“An example of an On-WG and an Off-WG for the WUR-Sync field is given in 31.2.4.1 (WUR PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field).”

“An example of an On/Off-WG for the HDR WUR-Data field and LDR WUR-Data field are given in 31.2.4.1 (WUR PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field) and 31.2.4.2 (WUR PPDU waveform generation for low data rate WUR-Data field), respectively.”

In the description of example waveform, we should provide a clear way of generation of the waveform. During the course of spec development, most of the simulation results on the receiver performance were done using the procedure defined in 31.2.4.1 and 31.2.4.2, which give confidence on the WUR receiver performance. For these reasons we suggest to replace “can be” with “is” in 31.2.4.1, 31.2.4.2 and 31.2.4.3. We propose to add a statement to clarify that the actual implementation may use other methods for the On-WG and Off-WG.

***TGba editor: Change the following paragraphs in 31.2.4.1 WUR PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field: (Track change on) (#2482, 2483, 2089, 2090, 2623, 2624)***

…………………………………….(several lines of text)…………………………………………..

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

* Thirteen subcarriers with subcarrier indices *k* = (-6, -5, … -1, 0, 1, 2, … 6) are used. Other subcarriers are null.
* The subcarriers with subcarrier indices *k* = (-5, -3, -1, 0, 1, 3, 5) are null.
* The non-zero subcarriers are selected from any of the following constellations: BPSK, QPSK, 16-QAM, 64-QAM, and 256-QAM.
* The first 32 values of the 64-point IDFT output are selected.
* Those 32 values are processed by the Symbol Randomizer as described in 31.2.4.4 (Symbol Randomizer and Per-antenna Cyclic Shift).
* The last 8 samples of those 32 samples are prepended to the 32 samples generating 40 samples, representing the MC-OOK 2 µs On symbol. This step corresponds to the GI Insertion in Figure 31-6 (An example of an On-WG for the WUR-Sync and high data rate WUR-Data fields).

For a single 20 MHz WUR channel, the 2 µs MC-OOK Off symbol is constructed by the Off-Waveform Generator (Off-WG) as zero for 2 µs.

The actual implementation of On-WG and Off-WG may use other methods to generate the MC-OOK On and Off symbols for WUR-Sync field and high data rate WUR-Data field.…………………………………….(several lines of text)…………………………………………..

***TGba editor: Change the following paragraphs in 31.2.4.2 WUR PPDU waveform generation for low data rate WUR-Data field: (Track change on) (#2484, 2485, 2091, 2092, 2625, 2626)***

…………………………………….(several lines of text)…………………………………………..

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

* Thirteen subcarriers with subcarrier indices *k* = (-6, -5, … -1, 0, 1, 2, … 6) are used. Other subcarriers are null.
* The DC subcarrier is null.
* The non-zero subcarriers are selected from any of the following constellations: BPSK, QPSK, 16-QAM, 64-QAM, and 256-QAM.
* The 64 values from the 64-point IDFT are processed by the Symbol Randomizer as described in 31.2.4.4 (Symbol Randomizer and Per-antenna Cyclic Shift).
* The last 16 values of the 64-point IDFT output are prepended to the 64 samples generating 80 samples, representing the 4 µs MC-OOK On symbol. This step corresponds to the GI Insertion in Figure 31-7 (An example of an On-WG for the low data rate WUR-Data fields).

For a single 20 MHz WUR channel the 4 µs MC-OOK Off symbol is constructed by the Off-Waveform Generator (Off-WG) as zero for 4 µs.

The actual implementation of On-WG and Off-WG may use other methods to generate the MC-OOK On and Off symbols for low data rate WUR-Data field.

…………………………………….(several lines of text)…………………………………………..

***TGba editor: Change the following paragraphs in 31.2.4.3 WUR PPDU WUR-Data field waveform generation for the FDMA transmission: (Track change on) (#2486, 2487, 2093, 2094, 2627, 2277, 2278)***

…………………………………….(several lines of text)…………………………………………..

MC-OOK ‘On’ symbol for 20 MHz WUR waveform is generated according to 31.2.4.1 (WUR PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field) or 31.2.4.2 (WUR PPDU waveform generation for low data rate WUR-Data field) depending on WUR\_DATARATE. The 40 MHz or 80 MHz WUR FDMA PPDU are generated by multiplexing multiple 20 MHz WUR waveforms in the corresponding channel as shown in Figure 31-8 (An example of a WUR-Data field signal generator for the FDMA transmission).

The actual implementation may use other methods to generate the WUR FDMA PPDU.

…………………………………….(several lines of text)…………………………………………..