### **IEEE P802.11Wireless LANs**

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| TGme Alternative Comment Resolution on LB270 WUR Comments |
| Date: 2023-03-08 |
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**Abstract**

The document provides comment resolutions for CIDs: 3068, 3071, 3072, 3095, 3278, 3283, 3458

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| **CID** | **Commenter** | **Clause** | **Page/Line** | **Comment** | **Proposed Change** | **Resolution** |
| 3068 | Sean Coffey | 30.1 | 4579/54 | "The WUR PHY uses the multi-carrier on-off keying (MC-OOK) modulation for WUR-Sync and WUR-Data fields. MC-OOK is on-off keying, modulated with a multicarrier signal". This is descriptive, not normative. Is there any normative statement that says that the WUR PHY shall use a multicarrier signal? The following sentence says that the multicarrier signal "should" be generated by using 13 contiguous carriers. But "should" implies that it is permissible to generate the signal some other way, i.e., that a compliant WUR PHY might not use 13 contiguous carriers, and indeed (it seems) might not use multicarrier keying at all. If so, the first sentence here is misleading. (Note that the proposed change mirrors the last sentence in the paragraph: "The subcarrier coefficients may take values from the BPSK, QPSK, 16-QAM, 64-QAM, or 256-QAM constellation symbols.") | Change "The WUR PHY uses" to "The WUR PHY may use". | **Accepted** |
| 3071 | Sean Coffey | 30.3.8 | 4596/46 | "This general representation holds for WUR-Sync and WUR-Data fields, and the field specific parameters are provided in Table 30-5". Again, this is descriptive, i.e., it describes something as being true, but not normative, i.e., saying that it has to be true. There do not seem to be normative statements anywhere in the clause that say this has to be true. The previous sentence says that the baseband signal "should" be obtained by taking the IDFT of a set of subcarrier coefficients. This implies that it is permissible for a compliant device to obtain the baseband signal some other way. This is very confusing, bordering on misleading. | Change " This general representation holds for WUR-Sync and WUR-Data fields, and the field specific parameters are provided in Table 30-5 (Field specific parameter values for the MC-OOK symbols in WUR-Sync and WUR-Data fields(11ba))" to "When the baseband signal is generated in this way, the field specific parameters are as shown in Table 30-5 (Field specific parameters for the MC-OOK symbols in WUR-Sync and WUR-Data fields when the baseband signal is generated by taking the IDFT of 13 contiguous subcarriers)". Also, change the title of Table 30-5 (4597.37) to "Field specific parameters for the MC-OOK symbols in WUR-Sync and WUR-Data fields when the baseband signal is generated by taking the IDFT of 13 contiguous subcarriers". | **Accepted** |
| 3072 | Sean Coffey | 30.3.8 | 4598/1 | The discussion in this section up to here is very unclear on what a WUR signal is. Elements of the signal are called MC-OOK, without any requirement that they are generated by a multi-carrier signal. A mathematical description of a multi-carrier signal is provided, without any requirement that the WUR signal is constructed in this way (there's a "should", but this implies "may do something else"). This is an important issue, because subclause 30.3.13.1 (Receiver minimum input sensitivity) imposes normative requirements on the receiver: it has to be able to receive (any) WUR PPDU with specified reliability at the given levels. For that requirement to have any meaning, there has to be adequate notice of the range of different transmitted signals that the receiver might encounter. This should (at the very least) be spelled out in a note. | Add a second note: "NOTE 2--The transmitter's baseband signal is not required to correspond to the IDFT of subcarrier coefficients derived from the stated constellations, and is not required to match the description in Equation (30-3). The only normative requirements that apply to the WUR-Sync and WUR-Data fields are provided in subclauses 30.3.12.1 (Transmit spectrum mask), 30.3.12.2 (Spectral flatness), 30.3.12.3 (Transmit center frequency and symbol clock frequency tolerance) and 30.3.12.4 (Transmit On and Off Symbols power ratio). For the avoidance of doubt, elements of WUR PPDUs that are labeled "MC-OOK" in this clause are not required to be "multi-carrier". | **Accepted** |
| 3095 | Joe Levy | 3.2 | 218/43 | The definition of MC-OOK symbol is confusing and is not sufficient: The definition is self-referential and MC-OOK symbols are not normatively defined. The 802.11 specification normatively defines the OOK modulation that may be generated using an MC-OOK implementation. But calling these symbols these symbols "MC-OOK symbols" is confusing and incorrect. | Delete the definition | **Rejected**The MC-OOK terminology is descriptive and is useful for the reader and is a preferred method of implementation. |
| 3278 | Mark Rison | 30.3.4 | 4588/56 | "With the 4 us duration MC-OOK On and Off Symbols, the PPDU should meet the Correlation test definedin 30.3.12.5 (Correlation test on MC-OOK symbols)." -- this should be a "shall" else there may be interop issues | Change "should" to "shall" at the referenced location and at line 4 | **Revised**There are sentences for both the 2 us and the 4 us cases, and so both sentences need to be changed.Make the changes as shown in document 11-23/0334r0 |
| 3283 | Mark Rison | 30 |  | MC-OOK is just an example way of generating waveforms, but the actual requirements on the OOK used for WUR are not specified | Add a subclause defining the "shall"s for WUR PPDUs, and then give MC-OOK as the "should" way to generate them | **Rejected**The shall’s are included in the standard and there is no reason to add a new clause. |
| 3458 | Mark Rison | 30 | 4579/1 | MC-OOK is a strange definition. Is MC-OOK symbol different than regular OOK symbols, particularly the definition of MC-OOK OFF symbol sounds rather strange. | Make the changes shown in 22/1035r1 | **Rejected**The MC-OOK terminology is descriptive and is useful for the reader and is a preferred method of implementation. |

**Proposed Resolutions**

* Introduction

The WUR PHY may use (#3068) the multicarrier on-off keying (MC-OOK) modulation for (#1128)WUR-Sync and WUR-Data fields. MC-OOK is defined as an on-off keying, modulated with a multicarrier signal.

* Mathematical description of signals

When the baseband signal is generated in this way the field specific parameters are provided in Table 30-5 (Field specific parameter values for the MC-OOK symbols in WUR-Sync and WUR-Data fields).

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| * Field specific parameter values for the MC-OOK symbols in WUR-Sync and WUR-Data fields when the baseband signal is generated by taking the IDFT of 13 contiguous subcarriers
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NOTE—The expression in equation (30-3) is provided for a single 20 MHz WUR channel.

NOTE 2--The transmitter's baseband signal is not required to correspond to the IDFT of subcarrier coefficients derived from the stated constellations, and is not required to match the description in Equation (30-3). The only normative requirements that apply to the WUR-Sync and WUR-Data fields are provided in subclauses 30.3.12.1 (Transmit spectrum mask), 30.3.12.2 (Spectral flatness), 30.3.12.3 (Transmit center frequency and symbol clock frequency tolerance) and 30.3.12.4 (Transmit On and Off Symbols power ratio). For the avoidance of doubt, elements of WUR PPDUs that are labeled "MC-OOK" in this clause are not required to be "multi-carrier".

* WUR Basic PPDU waveform generation for WUR-Sync field and WUR-Data field with WUR HDR

With the 2 µs duration MC-OOK On and Off Symbols, the PPDU shall meet the Correlation test defined in 30.3.12.5 (Correlation test on MC-OOK symbols).

With the 4 µs duration MC-OOK On and Off Symbols, the PPDU shall meet the Correlation test defined in 30.3.12.5 (Correlation test on MC-OOK symbols).