### IEEE P802.11Wireless LANs

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| Draft Spect Text for FDMA WUR Generation |
| Date: 2018-05-08 |
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Abstract

This document proposes a draft spec text on FDMA WUR waveform generation. The spec text framework (Sections and sub-sections) is based on 11-18/152r5.

* Wake-Up Radio (WUR) PHY specification
* Introduction
* WUR PHY service interface

**32.2.1 Introduction**

**32.2.2 WUR\_TXVECTOR and WUR\_RXVECTOR parameters**

**32.2.3 WUR\_PHY-CONFIG\_VECTOR parameters**

* WUR PHY
* Introduction
* WUR PPDU format
* Transmitter block diagram

32.3.3.1 WUR-PPDU waveform generation for Sync field and high rate Data field

32.3.3.2 WUR-PPDU waveform generation for low rate Data field

32.3.3.3 WUR-PPDU waveform generation for FDMA transmission

**Channel 0**

**Manchester-**

**based encoder**

Channel 0

On-WG*iTX*

*TSym*

Analog

and RF

Window

…..

**Channel K-1**

**Manchester-**

**based encoder**

Channel K-1

On-WG*iTX*

**Off-WG**

*TSym*

Figure 32-CA WUR signal generator for FDMA transmission of the data field, where K can be 2, 4 or 8 according to 40 MHz, 80 MHz or 160 MHz FDMA transmission

Multicarrier based OOK (MC-OOK) ‘On’ symbol for 80 MHz FDMA WUR PPDU can be generated with 256-point IFFT, and sampling at 80 MHz with the following instructions for each individual 20 MHz Channel,

* For Channel 0 in Figure 32-CA, thirteen subcarriers (-103 ~ -91) of subcarrier spacing with 312.5 KHz for 80 MHz OFDM symbol can be occupied with a TBD sequence, but subcarrier -97 can be Null.
* For Channel 1 in Figure 32-CA, thirteen subcarriers (-39 ~ -27) of subcarrier spacing with 312.5 KHz for 80 MHz OFDM symbol can be occupied with a TBD sequence, but subcarrier -33 can be Null.
* For Channel 2 in Figure 32-CA, thirteen subcarriers (26 ~ 38) of subcarrier spacing with 312.5 KHz for 80 MHz OFDM symbol can be occupied with a TBD sequence, but subcarrier 32 can be Null.
* For Channel 3 in Figure 32-CA, thirteen subcarriers (90 ~ 102) of subcarrier spacing with 312.5 KHz for 80 MHz OFDM symbol can be occupied with a TBD sequence, but subcarrier 96 can be Null.

For 2 usec ‘On’ OOK, the first 128 samples of the 256-IFFT outputs are selected, the last 32 samples of those 128 samples are prepended to the 128 samples and ends up generating 160 samples, representing the MC-OOK 2 usec ‘On’ symbol.

For 4 usec ‘On’ OOK, the last 64 samples of the 256-IFFT outputs are prepended to the 256 samples and ends up generating 320 samples, representing the MC-OOK 4 usec ‘On’ symbol.

Whereas Multicarrier based OOK (MC-OOK) ‘On’ symbol for 40 MHz FDMA WUR PPDU can be generated with 128-point IFFT, and sampling at 40 MHz with the following instructions for each individual 20 MHz Channel,

* For Channel 0 in Figure 32-CA, thirteen subcarriers (-39 ~ -27) of subcarrier spacing with 312.5 KHz for 40 MHz OFDM symbol can be occupied with a TBD sequence, but subcarrier -33 can be Null.
* For Channel 1 in Figure 32-CA, thirteen subcarriers (26 ~ 38) of subcarrier spacing with 312.5 KHz for 40 MHz OFDM symbol can be occupied with a TBD sequence, but subcarrier 32 can be Null.

For 2 usec ‘On’ OOK, the first 64 samples of the 128-IFFT outputs are selected, the last 16 samples of those 64 samples are prepended to the 64 samples and ends up generating 80 samples, representing the MC-OOK 2 usec ‘On’ symbol.

For 4 usec ‘On’ OOK, the last 32 samples of the 128-IFFT outputs are prepended to the 128 samples and ends up generating 160 samples, representing the MC-OOK 4 usec ‘On’ symbol.

**32.3.4.1 General**

This subclause provides an overview of the WUR-PPDU encoding process.

See section TBD.

**32.3.4.2 Construction of the L-STF**

See section 21.3.4.2.

**32.3.4.3 Construction of the L-LTF**

See section 21.3.4.3.

**32.3.4.4 Construction of the L-SIG**

See section 21.3.4.4.

**32.3.4.5 Construction of the BPSK-Mark**

<Texts to be filled>

**32.3.4.6 Construction of the WUR-Sync**

<Texts to be filled>

**32.3.4.7 Construction of the WUR-Data**

Construct the WUR-Data waveform as follows.

1. Determine the WUR\_DATARATE from the WUR\_TXVECTOR.
2. Manchester based enoder: Pulse combination is determined according to the input bits as described in 32.3.9.
3. The output of Manchester based encoder determines which samples to take either from On-WG*iTX* or from Off-WG. The On-WG*iTX* or Off-WG is a type of buffer which stores corresponding waveform samples. The waveform samples stored in On-WG*iTX* are generated as in 32.3.3.1 or 32.3.3.2 depending on the WUR\_DATARATE. The samples in Off-WG have zero energy. Each symbol duration, *TSym* is 2 usec for high data rate (*TSYM-HDR*) and 4 usec for low data rate (*TSYM-LDR*).
4. Apply windowing as described in *TBD*.
5. Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal based on the center frequency of the desired channel.

**32.3.4.8 Construction of the WUR-Data for the multiband transmission**

Construct the WUR-Data waveform for the multiband transmission as follows.

1. Determine the WUR\_BANDWIDTH from the WUR\_TXVECTOR.
2. Determine the WUR\_DATARATE for each 20 MHz Channel from the WUR\_TXVECTOR.
3. Manchester based enoder for each 20 MHz Channel: Pulse combination is determined according to the input bits as described in 32.3.9.
4. The output of Manchester based encoder determines which samples to take either from On-WG*iTX* of each 20 MHz Channel or from Off-WG. The On-WG*iTX* or Off-WG is a type of buffer which stores corresponding waveform samples. The waveform samples stored in On-WG*iTX* of each each 20 MHz Channel are generated as in 32.3.3.3 depending on the WUR\_BANDWIDTH and the WUR\_DATARATE. The samples in Off-WG have zero energy. Each symbol duration, *TSym* is 2 usec for high data rate (*TSYM-HDR*) and 4 usec for low data rate (*TSYM-LDR*).
5. The outputs of the waveform generator for each 20 MHz Channel are added with the outputs of the other 20 MHz Channels, sample by sample.
6. Apply windowing as described in *TBD*.
7. Analog and RF: Upconvert the resulting complex baseband waveform associated with each transmit chain to an RF signal based on the center frequency of the desired channel.
* WUR Data Rates
* Timing related parameters
* Mathematical description of signals
* WUR PHY Preamble
* Introduction
* Non-WUR portion of WUR PHY preamble
* WUR-Sync field

**32.3.8.3.1 Introduction**

**32.3.8.3.2 Cyclic Shift for WUR-Sync Field**

TBD

**32.3.8.3.3 WUR-Sync Field for Low Data Rate**

**32.3.8.3.4 WUR-Sync Field for High Data Rate**

* WUR Data field
* WUR transmit specification
	+ - 1. Transmit spectrum mask
			2. Spectral flatness
			3. Transmit center frequency and symbol clock frequency tolerance
			4. Modulation accuracy
			5. Time of Departure accuracy

<Texts to be filled>

* WUR receiver specification

**32.3.11.1 Receiver minimum input sensitivity**

**32.3.11.2 Adjacent channel rejection**

**32.3.11.3 Nonadjacent channel rejection**

<Texts to be filled>

**32.3.11.4 Receiver maximum input level**

<Texts to be filled>

**32.3.11.5 CCA sensitivity**

<Texts to be filled>

* WUR transmit procedure

<Texts to be filled>

* WUR receive procedure

<Texts to be filled>

* WUR PLME

**32.4.1 Table of PHY MIB Attributes(suspending)**

**32.4.2 TXTIME and PSDU Length calculation**

**32.4.3 Table of time and length characteristics**

* Parameters for WUR-Data Rates