IEEE P802.11
Wireless LANs

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| Proposed Spec Text for WUR FDMA Operation |
| Date: 2018-05-03 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Yongho Seok | MediaTek Inc. | 2840 Junction Ave, San Jose, CA 95134 |  | yongho.seok@mediatek.com  |
| Jianhan Liu | MediaTek Inc. |  |  |  |
| Alfred Asterjadhi | Qualcomm Inc. |  |  |  |
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Abstract

This submission proposes spec for WUR FDMA operation for the following portions of the SFD:

1. [Assigned D0.3] The concept of FDMA transmission scheme is shown below.





* Each 20MHz only contains one 4MHz sub-channel for wake-up signal transmission.
* Similar to 11ax’s 20MHz only operation, one wake-up receiver can stay in one of the sub-channel in wide bandwidth.

[Motion, March 2018, see [8] [28]]

Revisions:

* Rev 0: Initial version of the document.

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

***TGba Editor: Editing instructions preceded by “TGba Editor” are instructions to the TGba editor to modify existing material in the TGba draft. As a result of adopting the changes, the TGba editor will execute the instructions rather than copy them to the TGba Draft.***

3.2 Definitions specific to IEEE 802.11

***TGba Editor: Insert the following definitions maintaining alphabetical order:***

**wake-up radio (WUR) beacon channel:** A channel in which the WUR beacons are transmitted.

* WUR Mode element

***TGba Editor: Insert the below row into Table 9-262c (Subfields of WUR Parameters field from WUR AP):***

|  |
| --- |
| * Subfields of WUR Parameters field from WUR AP
 |
| **Subfield** | **Definition** | **Encoding** |
| WUR Wake-up Channel Offset | Indicates the channel offset to be transmitted the WUR Wake-up frame relative to the WUR beacon channel (see 31.6 (WUR FDMA Operation)).   | Set to 0 if the WUR Wake-up frames are to be transmitted in the same 20 MHz channel relative to the WUR beacon channel.Set to 1 if the WUR Wake-up frames are to be transmitted in 1st upper 20MHz channel relative to the WUR beacon channel.Set to 2 if the WUR Wake-up frames are to be transmitted in 1st lower 20MHz channel relative to the WUR beacon channel.Set to 3 if the WUR Wake-up frames are to be transmitted in 2nd upper 20MHz channel relative to the WUR beacon channel.Set to 4 if the WUR Wake-up frames are to be transmitted in 2nd lower 20MHz channel relative to the WUR beacon channel.Set to 5 if the WUR Wake-up frames are to be transmitted in 3rd upper 20MHz channel relative to the WUR beacon channel.Set to 6 if the WUR Wake-up frames are to be transmitted in 3rd lower 20MHz channel relative to the WUR beacon channel.The value 7 is reserved.  |

***TGba Editor: Insert the below row into Table 9-262d (Subfields of WUR Parameters field from WUR non-AP STA):***

|  |
| --- |
| * Subfields of the WUR Parameters field from WUR non-AP STA
 |
| **Subfield** | **Definition** | **Encoding** |
| WUR Channel Switching | Indicates whether the WUR channel switching capability for receiving WUR Beacon and WUR Wake-up frames that are transmitted in each different channels is enabled or disabled. (see 31.6 (WUR FDMA Operation)).  | Set to 0 if the WUR channel switching capability is disabled. Set to 1 if the WUR channel switching capability is enabled. |

31.3.2 WUR Beacon generation

***TGba Editor: Change this subclause as the following:***

The AP shall define the timing for WUR by transmitting WUR Beacon frames according to dot11WBeaconPeriod. This defines a series of TWBTTs exactly dot11WBeaconPeriod TUs apart. At each TWBTT, the AP shall schedule a WUR Beacon frame on the WUR beacon channel indicated by the WUR Operating Class and WUR Channel fields in the WUR Operation element as the next frame for transmission according to the medium access rules specified in Clause 10 except that one of the following conditions is met:

**31.4 WUR duty cycle operation**

***TGba Editor: Change this subclause as the following:***

WUR duty cycle operation is determined by three parameters: WUR channel, starting point, on duration, and duty cycle period as shown in Figure 31-1 (WUR Duty Cycle). WUR channel is the channel on which a WUR non-AP STA in WURx awake state listens, and is determined by the WUR Operating Class and WUR Channel fields in the WUR Operation element except when the the received WUR Channel Switching subfield of the WUR Mode element is not set to 0. In which case, WUR channel is determined according to 31.6 (WUR FDMA Operation). On duration determines the time that a WUR non-AP STA is in WURx awake state for each WUR duty cycle schedule. Duty cycle period determines the elapsed time between the start times of two successive WUR duty cycle schedules. Starting point is the start time of one WUR duty cycle schedule and is decided by the WUR AP. How to indicate the starting point is TBD.WUR duty cycle operation reduces the required amount of time that a WUR non-AP STA utilizing WUR Mode needs to be in WURx awake state after the PCR component of the WUR non-AP STA enters doze state (see 31.5 (Power management with WUR)) and allows WUR AP to manage WUR activity in the BSS by scheduling WUR non-AP STA to receive WUR frame at different times.

***TGba Editor: Insert the following subclause after 31.5 (Power management with WUR).***

**31.6 WUR FDMA Operation**

A WUR non-AP STA whose dot11WURChannelSwitchActivated is false shall set the WUR Channel Switching subfield of the WUR Parameters field of the WUR Mode element that it transmits to 0. Otherwise, a WUR non-AP STA shall set the WUR Channel Switching subfield of the WUR Parameters field of the WUR Mode element that it transmits to 1.

When a WUR AP receives a WUR Mode element of which the WUR Channel Switching subfield of the WUR Parameters field is equal to 0, the WUR AP shall set the WUR Wake-up Channel Offset subfield of the WUR Parameters field of the WUR Mode element that it transmits to 0. Otherwise, the WUR AP shall set the WUR Wake-up Channel Offset subfield of the WUR Parameters field of the WUR Mode element that it transmits to any value, subject to the te negotiated WUR duty cycle schedule does not overlapp with the TWBTTs at which the WUR AP schedules for transmission WUR Beacon frames.

When a WUR non-AP STA receives a WUR Mode element of which the WUR Wake-up Channel Offset subfield of the WUR Parameters field is not equal to 0, the WUR channel on which a WUR non-AP STA in WURx awake state listens is determined as one of the following:

—1st upper 20MHz channel relative to the WUR beacon channel if the WUR Wake-up Channel Offset subfield is 1.

—1st lower 20MHz channel relative to the WUR beacon channel if the WUR Wake-up Channel Offset subfield is 2.

—2nd upper 20MHz channel relative to the WUR beacon channel if the WUR Wake-up Channel Offset subfield is 3.

—2nd lower 20MHz channel relative to the WUR beacon channel if the WUR Wake-up Channel Offset subfield is 4.

—3rd upper 20MHz channel relative to the WUR beacon channel if the WUR Wake-up Channel Offset subfield is 5.

—3rd lower 20MHz channel relative to the WUR beacon channel if the WUR Wake-up Channel Offset subfield is 6.

***TGba editor: Change Annex C as the following:***

**Annex C (normative)**

**ASN.1 encoding of the MAC and PHY MIB**

**C.3 MIB Detail**

Dot11StationConfigEntry ::= SEQUENCE

{

 …

dot11FILSActivated(11ai) TruthValue(11ai),

dot11S1GOptionImplemented(11ah) TruthValue(11ah),

dot11WURChannelSwitchActivated TruthValue

}

…

dot11WURChannelSwitchActivated OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by an external management entity or the SME. Changes take

effect as soon as practical in the implementation.

This attribute when true, indicates that the capability of the STA to swtich the WUR channel for receiving WUR Beacon and WUR Wake-up frames that are transmitted in different channels is enabled (see 31.6 (WUR FDMA operation)). The capability is disabled otherwise."

DEFVAL { false }

::= { dot11StationConfigEntry <ANA>}

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-- \* End of dot11StationConfigTable TABLE

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