IEEE P802.11  
Wireless LANs

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| 802.11  IEEE P802.11ba D4.0 Mandatory Draft Review (MDR) Report | | | | |
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| Yunsong Yang |  |  |  |  |
| Mark Hamilton |  |  |  |  |

**Abstract**

This document contains the report of the TGba Mandatory Draft Review.

r0: section headings, initial assignements.

r2: added findings from Yunsong, Rojan, Po-Kai and Robert (ANA).

# Introduction

## Purpose of this document

This document is the report from the group of volunteers that participated in the P802.11ba/D4.0 mandatory draft review.

This document contains recommendations for changes to the P802.11ba draft to bring it into improved compliance to IEEE-SA and WG11 style.

The recommended changes need to be reviewed by TGba and approved, or ownership of the issues taken by TGba.

## Process / references

The MDR process is described in:

* 11-11/615r5 – Mandatory Draft Review process

And references:

* 11-09/1034r14 – 802.11 Editorial Style Guide

A setup meeting was held, and review topics identified and assigned to volunteers. The volunteers provided their review comments, which have been compiled into this document, with some editorial changes.

## Acknowledgements

The 802.11 technical editors (Robert Stacey and Peter Ecclesine) gratefully acknowledge the work and contribution of:

* Minyoung Park
* Po-Kai Huang
* Yongho Seok
* Rajan Chitrakar
* Yunsong Yang
* Mark Hamilton

# Findings

## Style

### Style Gude 2.1 – Frames

Po-Kai

[001] 69.43 change “WUR AP List” in Figure 9-780m to “WUR AP Parameters List”

[002] 69.49 change “The WUR AP Count field specifies the number of WUR AP Parameters subfields that are included in the WUR AP List field, minus one. 0 indicates that one WUR AP Parameters subfield is present.” to “The WUR AP Count field specifies the number of WUR AP Parameters subfields that are included in the WUR AP Parameters List field, minus one. 0 indicates that one WUR AP Parameters subfield is present.”

### Style Guide 2.2 – Naming Frames

Po-Kai

No findings.

### Style Guide 2.2 – true/false

Po-Kai

No findings.

### Style Guide 2.3 – “is set to”

Po-Kai

[001] 68.64 change “This field is set to 1 to indicate that LDR is recommended to be used for individually or group addressed WUR Wake-up frames transmitted to the WUR non-AP STA. This field is set to 2 to indicate that HDR is recommended to be used for individually or group addressed WUR Wake-up frames transmitted to the WUR non-AP STA. 3 is reserved.” to “The Recommended WUR Wake-up Frame Rate field is set to 1 to indicate that LDR is recommended to be used for individually or group addressed WUR Wake-up frames transmitted to the WUR non-AP STA. The Recommended WUR Wake-up Frame Rate field is set to 2 to indicate that HDR is recommended to be used for individually or group addressed WUR Wake-up frames transmitted to the WUR non-AP STA. 3 is reserved.”

### Information Elements/Subelements

Po-Kai

#### Style Guide 2.4.1 – Information Elements/subelements – Naming

No findings.

#### Style Guide 2.4.2 – Definition Conventions

No findings.

### Style Guide 2.5 – Removal of functions and features

Po-Kai

No findings.

### Style Guide 2.6 – Capitalization

Po-Kai

[001] 23.5 change “**Wake-up radio (WUR) temporal key (WTK):** A temporal key used to protect individually addressed WUR Wake-up frames.” to “**wake-up radio (WUR) temporal key (WTK):** A temporal key used to protect individually addressed WUR Wake-up frames.”

[002] 42.51 change “**6.3.123 WUR Mode Setup**” to “**6.3.123 WUR mode setup**”

[003] 42.56 change “The following MLME primitives support the signaling of WUR Mode Setup procedure described in 29.8.2 (WUR mode setup).” to “The following MLME primitives support the signaling of WUR mode setup procedure described in 29.8.2 (WUR mode setup).”

[004] 43.13 change “Specifies the address of the peer MAC entity with which to perform the WUR Mode Setup request/ response procedure.” to “Specifies the address of the peer MAC entity with which to perform the WUR mode setup request/ response procedure.”

[005] 43.21 change “The dialog token to identify the WUR Mode Setup request/response transaction.” to “The dialog token to identify the WUR mode setup request/response transaction.”

[006] 43.26 change “Specifies the proposed service parameters for the WUR Mode Setup request” to “Specifies the proposed service parameters for the WUR mode setup request”

[007] 44.5 change “Specifies the address of the peer MAC entity with which to perform the WUR Mode Setup request/ response procedure.” to “Specifies the address of the peer MAC entity with which to perform the WUR mode setup request/ response procedure.”

[008] 44.12 change “The dialog token to identify the WUR Mode Setup request/response transaction.” to “The dialog token to identify the WUR mode setup request/response transaction.”

[009] 44.17 change “Specifies the proposed service parameters for the WUR Mode Setup request” to “Specifies the proposed service parameters for the WUR mode setup request”

[010] 45.12 change “The dialog token to identify the WUR Mode Setup request/response transaction.” to “The dialog token to identify the WUR mode setup request/response transaction.”

[011] 45.16 change “Specifies the proposed service parameters for the WUR Mode Setup request” to “Specifies the proposed service parameters for the WUR mode setup request”

[012] 46.45 change “**6.3.124 WUR Mode Teardown**” to “**6.3.124 WUR mode teardown**”

[013] 46.50 change “The following MLME primitives support the signaling of WUR Mode Teardown procedure described in 29.8.2 (WUR mode setup).” to “The following MLME primitives support the signaling of WUR mode teardown procedure described in 29.8.2 (WUR mode setup).”

[014] 46.6 change “The dialog token to identify the WUR Mode Setup request/response transaction.” to “The dialog token to identify the WUR mode setup request/response transaction.”

[015] 46.11 change “Specifies the proposed service parameters for the WUR Mode Setup response.” to “Specifies the proposed service parameters for the WUR mode setup response.”

[016] 47.9 change “Specifies the address of the peer MAC entity with which to perform the WUR Mode Teardown procedure.” to “Specifies the address of the peer MAC entity with which to perform the WUR mode teardown procedure.”

[017] 47.24 change “The STA then attempts to transmit this frame to the peer entity with which it performed the WUR Mode Setup request/response procedure.” to “The STA then attempts to transmit this frame to the peer entity with which it performed the WUR mode setup request/response procedure.”

[018] 47.49 change “Specifies the address of the peer MAC entity with which to perform the WUR Mode Teardown procedure.” to “Specifies the address of the peer MAC entity with which to perform the WUR mode teardown procedure.”

[019] 112.7 change “A WUR non-AP STA establishes WUR duty cycle operation with the WUR AP to which it is associated through WUR Mode Setup as described in 29.8.2 (WUR mode setup).” to “A WUR non-AP STA establishes WUR duty cycle operation with the WUR AP to which it is associated through WUR mode setup as described in 29.8.2 (WUR mode setup).”

[020] 112.20 change “In the response frame sent by the WUR AP during a WUR Mode Setup (see 29.8.2 (WUR mode setup)),” to “In the response frame sent by the WUR AP during a WUR mode setup (see 29.8.2 (WUR mode setup)),”

[021] 112.53 change “In the request frame sent by the WUR non-AP STA during a WUR Mode Setup” to “In the request frame sent by the WUR non-AP STA during a WUR mode setup”

[022] 127.62 change “If the most recently received WUR Operation element has the Common PN subfield equal to 0, the WTPN or WIPN may be updated explicitly through a secure WUR Mode Setup request/response exchange as described in 29.10.3.3 (WUR PN update procedure).” to “If the most recently received WUR Operation element has the Common PN subfield equal to 0, the WTPN or WIPN may be updated explicitly through a secure WUR mode setup request/response exchange as described in 29.10.3.3 (WUR PN update procedure).”

[023] 130.1 change “**29.12 WUR Discovery**” to “**29.12 WUR discovery**”

[024] 179.11 change “"This is a capability variable. This attribute when true, indicates that for an AP, the AP is capable of transmitting WUR Discovery frames, and for a non-AP STA, the non-AP STA is capable of WUR Discovery procedure (i.e., receiving WUR Discovery frames)(see 29.12 (WUR Discovery)).” to “"This is a capability variable. This attribute when true, indicates that for an AP, the AP is capable of transmitting WUR Discovery frames, and for a non-AP STA, the non-AP STA is capable of WUR discovery procedure (i.e., receiving WUR Discovery frames)(see 29.12 (WUR Discovery)).”

[025] 170.32 change “**30.5 Parameters for WUR Data Rates**” to “**30.5 Parameters for WUR data rates**”

[026] 162.1 change “**30.3.12.5 Correlation Test on MC-OOK Symbols**” to “**30.3.12.5 Correlation test on MC-OOK symbols**”

[27] 141.64 change “the PPDU should meet the Correlation Test defined in 30.3.12.5 (Correlation Test on MC-OOK Symbols).” to “the PPDU should meet the correlation test defined in 30.3.12.5 (Correlation Test on MC-OOK Symbols).”

[28] 142.45 change “the PPDU should meet the Correlation Test defined in 30.3.12.5 (Correlation Test on MC-OOK Symbols).” to “the PPDU should meet the correlation test defined in 30.3.12.5 (Correlation Test on MC-OOK Symbols).”

[029] MC-OOK On symbol/On Symbol are used in the following instances. However, capitalization “On” is not allowed in the editorial guide. Note that change “On” to “on” may confuse the reader on the meaning of the “on” as a proposition. Revise the editoral guide to allow the usage of On symbol.

21.52

141.42

141.56

141.63

142.26

142.38

142.45

143.29

150.30

150.32

151.20

157.64

158.1

158.2

161.51

161.56

161.60

167.36 Figure 3-17

181.30

181.33

181.50

181.60

182.1

182.14

182.18

182.42

182.52

182.59

[030] MC-OOK Off symbol/Off Symbol are used in the following instances. However, capitalization “Off” is not allowed in the editorial guide. Note that change “Off” to “off” may confuse the reader on the meaning of the “off” as a proposition. Revise the editoral guide to allow the usage of Off symbol.

21.53

141.60

141.64

142.41

142.45

151.54

157.64

158.1

158.2

161.52

161.56

161.61

167.36 Figure 3-17

[31] 161.48 change “**Transmit On and Off power ratio**” to “**Transmit On and Off symbols power ratio**”

[32] 161.64 change “For FDMA transmission, the above requirement on the transmit On and Off power ratio applies to each 20 MHz channel.” to “For FDMA transmission, the above requirement on the transmit On and Off symbols power ratio applies to each 20 MHz channel.”

[33] 68.21 change “Indicates the preferred On Duration that the WUR power state of the WUR non AP STA is in the WUR awake state for each WUR duty cycle period (see 29.7 (WUR duty cycle operation)).” to “Indicates the preferred on duration that the WUR power state of the WUR non AP STA is in the WUR awake state for each WUR duty cycle period (see 29.7 (WUR duty cycle operation)).”

[34] 150.50 change “duty cycle from On-Off Keying.” to “duty cycle from OOK.”

[35] 140.20 Figure 30-4 change “Sync-bit” to “WUR-Sync”

[36] 146.55 change “Sync-bit sequence generation: Generate the Sync-bit sequence according to the WUR\_DATARATE as described in 30.3.9.3 (WUR-Sync field)” to ” WUR-Sync sequence generation: Generate the WUR-Sync sequence according to the WUR\_DATARATE as described in 30.3.9.3 (WUR-Sync field)”

[37] 146.58 change “Waveform generation: Generate the MC-OOK waveform by using either On-WG or Off-WG according to the Sync-bit. The samples in Off-WG have zero energy. Sync-bit duration *TSync* is 2 µs. Symbol randomization and per-transmit-chain CSD is applied within the waveform generation step” to “Waveform generation: Generate the MC-OOK waveform by using either On-WG or Off-WG according to the WUR-Sync bit. The samples in Off-WG have zero energy. WUR-Sync bit duration *TSync* is 2 µs. Symbol randomization and per-transmit-chain CSD is applied within the waveform generation step”

[38] 147.22 change “Sync-bit sequence generation and WUR encoder for each 20 MHz subchannel: Generate the Syncbit sequence according to the WUR\_DATARATE as described in 30.3.9.3 (WUR-Sync field) and WUR encoded bits, which follow the Sync-bit sequence according to the input bits as described in 30.3.10 (WUR-Data field) for each 20 MHz subchannel.” to ” WUR-Sync sequence generation and WUR encoder for each 20 MHz subchannel: Generate the WUR-Sync sequence according to the WUR\_DATARATE as described in 30.3.9.3 (WUR-Sync field) and WUR encoded bits, which follow the WUR-Sync sequence according to the input bits as described in 30.3.10 (WUR-Data field) for each 20 MHz subchannel.”

[39] 147.28 change “Waveform generation for the WUR-Sync field: Generate the MC-OOK waveform for the WURSync field by using either On-WG or Off-WG according to the Sync-bit for each 20 MHz subchannel. The samples in Off-WG have zero energy. Each Sync-bit duration, *TSync* is 2 µs.” to ”Waveform generation for the WUR-Sync field: Generate the MC-OOK waveform for the WURSync field by using either On-WG or Off-WG according to the WUR-Sync bit for each 20 MHz subchannel. The samples in Off-WG have zero energy. Each WUR-Sync bit duration, *TSync* is 2 µs.”

[40] 156.52 change “The Sync-bit sequence is constructed by concatenating two copies of the 32-bit sequence *W*,” to ” The WUR-Sync sequence is constructed by concatenating two copies of the 32-bit sequence *W*,”

[41] 156.64 change “This Sync-bit sequence is used to construct the WUR-Sync field” to ” This WUR-Sync sequence is used to construct the WUR-Sync field”

[42] 157.4 change “The Sync-bit sequence” to ” The WUR-Sync sequence”

[43] 157.15 change “This Sync-bit sequence” to ” This WUR-Sync sequence”

[44] 140.39 change “the Sync bit sequence” to ” the WUR-Sync sequence”

[45] 168.42 change “If a valid Sync sequence is detected, WUR PHY issue” to “If a valid WUR-Sync sequence is detected, WUR PHY issue”

[46] 168.44 change “If the Sync sequence detection fails,” to ” If the WUR-Sync sequence detection fails,”

### Style Guide 2.7 – Terminology: frame vs packet vs PPDU vs MPDU

Po-Kai

[001] 78.40 change “WUR MPDU” to “WUR frame”

### Style Guide 2.8 – Use of verbs & problematic words

Rojan

#### normative, non-normative, ensure

P110.49 change “NOTE—To achieve this requirement of scheduling a WUR Beacon frame, the WUR AP suspends any pending transmissions until the WUR Beacon frame has been transmitted.” to “NOTE—To achieve this requirement of scheduling a WUR Beacon frame, the WUR AP might suspend any pending transmissions until the WUR Beacon frame has been transmitted.”

P123.49 change “A WUR non-AP STA shall identify the appropriate WIGTK and associated state based on the Key ID subfield of the received protected broadcast or group addressed FL WUR Wake-up frames. If no such WIGTK exists, silently drop the frame and terminate BIP processing for this reception.” to “A WUR non-AP STA shall identify the appropriate WIGTK and associated state based on the Key ID subfield of the received protected broadcast or group addressed FL WUR Wake-up frames. If no such WIGTK exists, the WUR non-AP STA shall silently drop the frame and terminate BIP processing for this reception.”

P126.6 change “NOTE 1—Before the adjusted value of the received partial TSF timestamp is set as the value of bit position 9 to 16 of the temporary timestamp, the temporary timestamp may be further compensated for a clock drift offset between the WUR AP and the WUR non-AP STA, which is determined by multiplying the estimated clock drift by the time between receiving the latest TSF from the WUR AP and the time at which the WUR frame is received from the WUR AP, where the estimated clock draft is determined based on two or more received TSF values from the WUR AP and comparing these to the internal TSF at the WUR non-AP STA.” to “NOTE 1—Before the adjusted value of the received partial TSF timestamp is set as the value of bit position 9 to 16 of the temporary timestamp, the temporary timestamp can be further compensated for a clock drift offset between the WUR AP and the WUR non-AP STA, which is determined by multiplying the estimated clock drift by the time between receiving the latest TSF from the WUR AP and the time at which the WUR frame is received from the WUR AP, where the estimated clock draft is determined based on two or more received TSF values from the WUR AP and comparing these to the internal TSF at the WUR non-AP STA.”

P130.64 change “NOTE—A WUR non-AP STA may perform WUR scanning at any time except during any active WUR Duty cycle schedule agreed between the WUR non-AP STA and the WUR AP.” to “NOTE—A WUR non-AP STA can perform WUR scanning at any time except during any active WUR Duty cycle schedule agreed between the WUR non-AP STA and the WUR AP.”

P159.184 change “NOTE 3—For rules regarding TX center frequency leakage levels, the power measured at the center of transmission BW using resolution BW 312.5 kHz shall not exceed P-17.5, where P is the transmit power per antenna in dBm during transmission of the L-SIG field.” to “NOTE 3—For rules regarding TX center frequency leakage levels, the power measured at the center of transmission BW using resolution BW 312.5 kHz cannot not exceed P-17.5, where P is the transmit power per antenna in dBm during transmission of the L-SIG field.”

P159.51 change “For a WUR FDMA PPDU, the spectrum mask within each 20 MHz subchannel will be the same as the spectrum mask of 20 MHz WUR Basic PPDU as defined above. The spectrum outside the WUR FDMA PPDU channel bandwidth will be the same as spectrum mask of 40 MHz or 80 MHz as defined in 21.3.17.1 (Transmit spectrum mask).” to “For a WUR FDMA PPDU, the spectrum mask within each 20 MHz subchannel is the same as the spectrum mask of 20 MHz WUR Basic PPDU as defined above. The spectrum outside the WUR FDMA PPDU channel bandwidth is the same as spectrum mask of 40 MHz or 80 MHz as defined in 21.3.17.1 (Transmit spectrum mask).”

P118.46 change “The WUR non-AP STA may not wake up to receive Beacon frame if the WUR non-AP STA is in PS mode (see 11.2.3.1 (General)).” to “The WUR non-AP STA may skip the reception of Beacon frame if the WUR non-AP STA is in PS mode (see 11.2.3.1 (General)).”

P118.49 change “The existing negotiated service periods between WUR AP and WUR non-AP STA for the WUR non-AP STA’s schedule are suspended, and the WUR non-AP STA may not be in the awake state (see 11.2.1 (General)) during the negotiated service periods until the schedule is resumed as described below:” to “The existing negotiated service periods between WUR AP and WUR non-AP STA for the WUR non-AP STA’s schedule are suspended, and the WUR non-AP STA may be in the doze state (see 11.2.1 (General)) during the negotiated service periods until the schedule is resumed as described below:”

#### which/that

No issues found.

#### articles

P25.24 change “A WUR PPDU carries a WUR frame. A WUR AP transmits a WUR PPDU to a single WUR non-AP STAor multiple WUR non-AP STAs, and the five types of WUR frames provide the following functions:” to “A WUR PPDU carries a WUR frame. A WUR AP transmits a WUR PPDU to a single WUR non-AP STAor multiple WUR non-AP STAs, and five types of WUR frames are defined that provide the following functions:”

P25.27 change “The WUR Beacon frame is used to maintain timing synchronization between a WUR non-AP STA and a WUR AP that is transmitting the WUR Beacon frame and enables the WUR duty cycle operation.” to “WUR Beacon frames are used to maintain timing synchronization between a WUR non-AP STA and a WUR AP that is transmitting the WUR Beacon frames and enable the WUR duty cycle operation.”

P25.31 change “The WUR Wake-up frame provides notification to one or more WUR non-AP STA(s) that a WUR AP has buffered data for the WUR non-AP STA(s), which enables the WUR non-AP STAs to remain in power save for longer periods of time when there is no data to receive and enables the WUR non-AP STAs to react promptly to incoming traffic and critical update of BSS parameters.” to “WUR Wake-up frames provide notification to one or more WUR non-AP STA(s) that a WUR AP has buffered data for the WUR non-AP STA(s), which enables the WUR non-AP STAs to remain in power save for longer periods of time when there is no data to receive and enables the WUR non-AP STAs to react promptly to incoming traffic and critical update of BSS parameters.”

P25.36 change “The WUR Short Wake-up frame is a shortened version of the WUR Wake-up frame.” to “WUR Short Wake-up frames are shortened version of WUR Wake-up frames.”

P25.38 change “The WUR Discovery frame supports the discovery of WUR APs by a WUR non-AP STA at low power consumption.” to “WUR Discovery frames support the discovery of WUR APs by a WUR non-AP STA at low power consumption.”

P25.40 change “The WUR Vendor Specific frame supports vendor specific operations.” to “WUR Vendor Specific frames support vendor specific operations.”

P74.49 “The WUR Short Wake-up frame is defined in 9.10.3.5 (WUR Short Wake-up frame format).” to “The format of a WUR Short Wake-up frame is defined in 9.10.3.5 (WUR Short Wake-up frame format).”

P105.33 change “The WUR primary channel is the channel in which a WUR AP transmits WUR Beacon frames (see 29.6.2 (WUR Beacon generation)).” to “A WUR primary channel is the channel in which a WUR AP transmits WUR Beacon frames (see 29.6.2 (WUR Beacon generation)).”

P108.34 change “The WUR AP shall randomly select the starting value of the WUR group ID space from the identifier’s space. All WUR group IDs shall not match any of the WUR IDs, transmitter ID, and nontransmitter IDs (if any).” to “A WUR AP shall randomly select the starting value of the WUR group ID space from the identifier’s space. All WUR group IDs shall not match any of the WUR IDs, transmitter ID, and nontransmitter IDs (if any).”

P108.48 change “The WUR AP shall indicate the WUR group IDs assigned to a WUR non-AP STA in the WUR Group ID List subfield of the WUR Parameters field of the WUR Mode element that is sent to the WUR non-AP STA.” to “A WUR AP shall indicate the WUR group IDs assigned to a WUR non-AP STA in the WUR Group ID List subfield of the WUR Parameters field of the WUR Mode element that is sent to the WUR non-AP STA.”

P110.13 change “The WUR AP shall define the timing for the WUR operations by transmitting WUR Beacon frames according to dot11WURBeaconPeriod and the Offset of TWBTT subfield of the WUR Operation element that the WUR AP transmits.” to “A WUR AP shall define the timing for the WUR operations by transmitting WUR Beacon frames according to dot11WURBeaconPeriod and the Offset of TWBTT subfield of the WUR Operation element that the WUR AP transmits.”

P111.18 change “Upon receiving a WUR Beacon frame with a valid FCS and transmitter ID that matches the transmitter ID of the WUR AP to which the WUR non-AP STA is associated if dot11MultiBSSIDImplemented is false or the transmitter ID of the WUR AP corresponding to the transmitted BSSID of the multiple BSSID set, where the WUR AP to which the WUR non-AP STA is associated is a member, if dot11MultiBSSIDImplemented is true (see 29.5.3 (Transmitter ID)), a WUR non-AP STA shall update its TSF timer according to the algorithm described below.” to “Upon receiving a WUR Beacon frame with a valid FCS and transmitter ID that matches the transmitter ID of the WUR AP to which a WUR non-AP STA is associated if dot11MultiBSSIDImplemented is false or the transmitter ID of the WUR AP corresponding to the transmitted BSSID of the multiple BSSID set, where the WUR AP to which the WUR non-AP STA is associated is a member, if dot11MultiBSSIDImplemented is true (see 29.5.3 (Transmitter ID)), the WUR non-AP STA shall update its TSF timer according to the algorithm described below.”

P117.29 change “A WUR AP shall schedule for transmission a WUR Wake-up frame for the WUR non-AP STA during an on duration that is negotiated with the WUR non-AP STA to notify the WUR non-AP STA that the WUR AP intends to have operation with the WUR non-AP STA as described in 29.9.2 (WUR AP operation) and 29.9.3 (WUR non-AP STA operation) if the WUR non-AP STA is in the doze state (see 11.2.1 (General)).” to “The WUR AP shall schedule for transmission a WUR Wake-up frame for the WUR non-AP STA during an on duration that is negotiated with the WUR non-AP STA to notify the WUR non-AP STA that the WUR AP intends to have operation with the WUR non-AP STA as described in 29.9.2 (WUR AP operation) and 29.9.3 (WUR non-AP STA operation) if the WUR non-AP STA is in the doze state (see 11.2.1 (General)).”

P117.38 change “A WUR AP shall schedule for transmission a WUR Beacon frame during an on duration that is negotiated with the WUR non-AP STA as a keep-alive WUR frame if the WUR AP does not schedule for transmission a WUR Wake-up frame for the WUR non-AP STA during that on duration and the WUR non-AP STA has requested the transmission of keep-alive WUR frames during a successful WUR mode setup (see 29.8.2 (WUR mode setup)).” to “The WUR AP shall schedule for transmission a WUR Beacon frame during an on duration that is negotiated with the WUR non-AP STA as a keep-alive WUR frame if the WUR AP does not schedule for transmission a WUR Wake-up frame for the WUR non-AP STA during that on duration and the WUR non-AP STA has requested the transmission of keep-alive WUR frames during a successful WUR mode setup (see 29.8.2 (WUR mode setup)).”

P117.44 change “The existing negotiated service periods between WUR AP and WUR non-AP STA for the WUR non-AP STA’s schedule are suspended, i.e., the WUR non-AP STA is not required to be in the awake state (see 11.2.1 (General)) during the existing negotiated service period:” to “The existing negotiated service periods between the WUR AP and the WUR non-AP STA for the WUR non-AP STA’s schedule are suspended, i.e., the WUR non-AP STA is not required to be in the awake state (see 11.2.1 (General)) during the existing negotiated service period:”

P119.37 change “If the WUR AP and the WUR non-AP STA support traffic filtering service (TFS) as specified in 11.22.12 (TFS Procedures), then the WUR AP and the WUR non-AP STA may reuse existing traffic filter sets to control the WUR Wake-up frame transmission as described in 29.9.2 (WUR AP operation).” to “If a WUR AP and an associated WUR non-AP STA support traffic filtering service (TFS) as specified in 11.22.12 (TFS Procedures), then the WUR AP and the WUR non-AP STA may reuse existing traffic filter sets to control the WUR Wake-up frame transmission as described in 29.9.2 (WUR AP operation).”

P119.42 change “The WUR AP may transmit a WUR Wake-up frame to an associated WUR non-AP STA to indicate that individually addressed BU(s) are available for the non-AP STA. The WUR Wake-up frame shall satisfy any of the conditions below:” to “A WUR AP may transmit a WUR Wake-up frame to an associated WUR non-AP STA to indicate that individually addressed BU(s) are available for the non-AP STA. The WUR Wake-up frame shall satisfy any of the conditions below:”

P119.57 change “The WUR AP may transmit a broadcast addressed WUR Wake-up frame (see 29.5.3 (Transmitter ID) and 29.5.6 (Nontransmitter ID)) with the Group Addressed BU subfield of the Miscellaneous subfield equal to 1 to indicate that group addressed BU(s) of the WUR AP (see 11.2.3.4 (TIM types)) are available for all the associated WUR non-AP STA(s).” to “A WUR AP may transmit a broadcast addressed WUR Wake-up frame (see 29.5.3 (Transmitter ID) and 29.5.6 (Nontransmitter ID)) with the Group Addressed BU subfield of the Miscellaneous subfield equal to 1 to indicate that group addressed BU(s) of the WUR AP (see 11.2.3.4 (TIM types)) are available for all the associated WUR non-AP STA(s).”

P119.64 change “The WUR AP may transmit a broadcast addressed WUR Wake-up frame (see 29.5.3 (Transmitter ID) and 29.5.6 (Nontransmitter ID)) to associated WUR non-AP STA(s) to indicate that a critical update to the BSS parameters of the WUR AP has occurred for the associated WUR non-AP STA (see 29.9.2 (WUR AP operation)). ” to “A WUR AP may transmit a broadcast addressed WUR Wake-up frame (see 29.5.3 (Transmitter ID) and 29.5.6 (Nontransmitter ID)) to associated WUR non-AP STA(s) to indicate that a critical update to the BSS parameters of the WUR AP has occurred for the associated WUR non-AP STA (see 29.9.2 (WUR AP operation)).”

P122.61 change “WUR frame protection shall be considered as successfully negotiated between the WUR AP and the WUR non-AP STA if management frame protection is negotiated, both parties set the Protected WUR Frame Support subfield to 1 in their respective RSNXEs in the (re)association procedure, and it is successfully verified that the WUR Frame Protection Support subfield is equal to 1 in the Extended RSN Capabilities field in the RSNXE received during the 4-way handshake, FT 4-way handshake, FT fast BSS transition protocol, or (re)association procedure of FILS authentication. Otherwise, WUR frame protection shall not be considered as successfully negotiated.” to “WUR frame protection shall be considered as successfully negotiated between a WUR AP and a WUR non-AP STA if management frame protection is negotiated, both parties set the Protected WUR Frame Support subfield to 1 in their respective RSNXEs in the (re)association procedure, and it is successfully verified that the WUR Frame Protection Support subfield is equal to 1 in the Extended RSN Capabilities field in the RSNXE received during the 4-way handshake, FT 4-way handshake, FT fast BSS transition protocol, or (re)association procedure of FILS authentication. Otherwise, WUR frame protection shall not be considered as successfully negotiated.”

P123.54 change “The WUR AP shall set the Protected subfield of the Frame Control field of transmitted WUR Wake-up frames to 1 if the WUR frame is protected; otherwise the WUR AP shall set the Protected subfield of the Frame Control field of the WUR frame to 0.” to “A WUR AP shall set the Protected subfield of the Frame Control field of transmitted WUR Wake-up frames to 1 if the WUR frame is protected; otherwise the WUR AP shall set the Protected subfield of the Frame Control field of the WUR frame to 0.”

P123.64 change “The WUR AP shall protect the WUR Wake-up frame using the BIP protocol as defined in 12.5.4 (Broadcast/multicast integrity protocol (BIP)) except that:” to “A WUR AP that transmits a protected WUR Wake-up frame shall protect the WUR Wake-up frame using the BIP protocol as defined in 12.5.4 (Broadcast/multicast integrity protocol (BIP)) except that:”

P1128.7 change “If the most recently transmitted WUR Operation element has the Common PN subfield equal to 0, a WUR AP may indicate the PN maintained by the WUR AP to the WUR non-AP by including one or more WUR PN Update elements in the WUR Mode Setup frame with the Action Type in WUR Mode element equal to “Enter WUR Mode Response.”” to “If the most recently transmitted WUR Operation element has the Common PN subfield equal to 0, a WUR AP may indicate the PN maintained by the WUR AP to a WUR non-AP by including one or more WUR PN Update elements in the WUR Mode Setup frame with the Action Type in WUR Mode element equal to “Enter WUR Mode Response.””

P128.13 change “If the most recently received WUR Operation element has the Common PN subfield equal to 0, the WUR non-AP STA that receives a WUR Mode Setup frame that includes a WUR PN Update element shall update the locally stored PN value corresponding to the Key ID indicated in the Key Info field to the received PN value.” to “If the most recently received WUR Operation element has the Common PN subfield equal to 0, a WUR non-AP STA that receives a WUR Mode Setup frame that includes a WUR PN Update element shall update the locally stored PN value corresponding to the Key ID indicated in the Key Info field to the received PN value.”

P128.19 change “The WUR non-AP STA may request a PN update by sending a WUR Mode Setup frame with Action Type field of the carrying WUR Mode element equal to “Enter WUR Mode Request” and includes a WUR PN Update element that indicates a Key ID corresponding to a integrity key currently used by the WUR non-AP STA and optionally includes the corresponding locally stored PN.” to “A WUR non-AP STA may request a PN update by sending a WUR Mode Setup frame with Action Type field of the carrying WUR Mode element equal to “Enter WUR Mode Request” and includes a WUR PN Update element that indicates a Key ID corresponding to a integrity key currently used by the WUR non-AP STA and optionally includes the corresponding locally stored PN.”

P129.25 change “The WUR AP may send multiple WUR Wake-up frames in a WUR FDMA PPDU.” to “A WUR AP may send multiple WUR Wake-up frames in a WUR FDMA PPDU.”

P129.31 change “Transmit the 40 MHz WUR FDMA PPDU in the WUR primary 40 MHz channel if the following conditions are met:” to “Transmit a 40 MHz WUR FDMA PPDU in the WUR primary 40 MHz channel if the following conditions are met:”

P129.40 change “Transmit the 80 MHz WUR FDMA PPDU on the WUR 80 MHz channel if the following conditions are met:” to “Transmit an 80 MHz WUR FDMA PPDU on the WUR 80 MHz channel if the following conditions are met:”

P129.49 change “Transmit the 80 MHz subchannel punctured WUR FDMA PPDU on the WUR 80 MHz channel if the following conditions are met:” to “Transmit an 80 MHz subchannel punctured WUR FDMA PPDU on the WUR 80 MHz channel if the following conditions are met:”

P129.24 change “Otherwise, a WUR AP shall not transmit WUR Short Wake-up frames to the WUR non-AP STA and the WUR non-AP STA shall ignore received WUR Short Wake-up frames with a matching WUR ID and FCS.” to “Otherwise, a WUR AP shall not transmit WUR Short Wake-up frames to a WUR non-AP STA and the WUR non-AP STA shall ignore received WUR Short Wake-up frames with a matching WUR ID and FCS.”

P140.57 change “WUR-Sync field is given in 30.3.4.1 (WUR Basic PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field).” to “The WUR-Sync field is given in 30.3.4.1 (WUR Basic PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field).”

P143.29 change “MC-OOK On symbol for 20 MHz WUR waveform should be generated according to 30.3.4.1 (WUR Basic PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field) or 30.3.4.2 (WUR Basic PPDU waveform generation for low data rate WUR-Data field) depending on WUR\_DATARATE.” to “The MC-OOK On symbol for the 20 MHz WUR waveform should be generated according to 30.3.4.1 (WUR Basic PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field) or 30.3.4.2 (WUR Basic PPDU waveform generation for low data rate WUR-Data field) depending on WUR\_DATARATE.”

P150.29 change “WUR-Sync and WUR-Data fields comprises of MC-OOK symbols as described in 30.3.9.3 (WUR-Sync field) and 30.3.10 (WUR-Data field), respectively.” to “The WUR-Sync and WUR-Data fields comprises of MC-OOK symbols as described in 30.3.9.3 (WUR-Sync field) and 30.3.10 (WUR-Data field), respectively.”

P165.28 change “Transmission may be prematurely terminated by the MAC through the PHY-TXEND.request primitive.” to “A transmission may be prematurely terminated by the MAC through the PHY-TXEND.request primitive.”

P165.31 change “WUR transmission is terminated by receiving a PHY-TXEND.request primitive.” to “A WUR transmission is terminated by receiving a PHY-TXEND.request primitive.”

P169.7 change “For WUR Basic PPDU, the value of the TXTIME parameter shall be calculated as follows:” to “For a WUR Basic PPDU, the value of the TXTIME parameter shall be calculated as follows:”

P169.36 change “The value of PSDU\_LENGTH parameter is calculated as follows:” to “The value of the PSDU\_LENGTH parameter is calculated as follows:”

P169.62 change “The value of the TXTIME parameter for WUR FDMA transmission shall be calculated as follows:” to “The value of the TXTIME parameter for a WUR FDMA transmission shall be calculated as follows:”

#### missing nouns

No issues found.

#### unnecessary nouns

No issues found.

#### unicast and multicast

No issues found.

### Style Guide 2.9 – Numbers

Rojan

No issues found.

### Style Guide 2.10 – Maths operators and relations

Rojan

No issues found.

### Style Guide 2.11 – Hyphenation

Rojan

P139.60 change “In FDMA transmission, the WUR transmission on each non-punctured 20 MHz subchannel has equal duration of transmission, and if the duration of WUR transmission on any of the non-punctured 20 MHz subchannels is shorter than the length indicated by the LENGTH field described in 30.4.1 (TXTIME and PSDU length calculation), then padding is used such that WUR transmissions on each non-punctured 20 MHz subchannel always have the length indicated by the LENGTH field in the L-SIG.” to “In FDMA transmission, the WUR transmission on each nonpunctured 20 MHz subchannel has equal duration of transmission, and if the duration of WUR transmission on any of the nonpunctured 20 MHz subchannels is shorter than the length indicated by the LENGTH field described in 30.4.1 (TXTIME and PSDU length calculation), then padding is used such that WUR transmissions on each nonpunctured 20 MHz subchannel always have the length indicated by the LENGTH field in the L-SIG.”

P147.38 change “Append the padding on non-punctured 20 MHz subchannel: If the duration of WUR transmission on any non-punctured 20 MHz subchannel is shorter than the indicated L\_LENGTH as described in 30.4.1 (TXTIME and PSDU length calculation), generate the padding according to 30.3.11 (WUR Padding field for a WUR FDMA PPDU) to align the length indicated by the LENGTH field in the L-SIG, and the padding is not applied to the punctured 20 MHz subchannel.” to “Append the padding on nonpunctured 20 MHz subchannel: If the duration of WUR transmission on any nonpunctured 20 MHz subchannel is shorter than the indicated L\_LENGTH as described in 30.4.1 (TXTIME and PSDU length calculation), generate the padding according to 30.3.11 (WUR Padding field for a WUR FDMA PPDU) to align the length indicated by the LENGTH field in the L-SIG, and the padding is not applied to the punctured 20 MHz subchannel.”

### Style Guide 2.12 – References to SAP primitives

Rojan

No issues found.

### Style Guide 2.13 – References to the contents of a field/subfield

Rojan

No issues found.

### Style Guide 2.14 – References to MIB variables/attributes

Mark

### Style Guide 2.15 – Hanging Paragraphs

Rojan

P74.51 9.10.2 (General WUR frame format) includes both text and child subclauses.

P75.45 9.10.2.1.1 (Frame Control field) is the single child subclause of 9.10.2.1 (MAC Header). The other fields of the MAC Header, namely 9.10.2.2 (ID field) and 9.10.2.3 (Type Dependent Control field) are listed as separate subclauses instead of child subclauses.

The easiest way to resolve the above two issues is to follow the style used for the main radio MAC frames (9.2): Change subclause 9.10.2.1 (MAC Header) to 9.10.3 (Frame fields). Change 9.10.2.1.1 (Frame Control field) to 9.10.3.1. Change 9.10.2.2, 9.10.2.3, 9.10.2.4, 9.10.2.5 to 9.10.3.2, 9.10.3.3, 9.10.3.4 and 9.10.3.5 respectively. Replace the reference to 9.10.2.1 (MAC Header) with references to individual subclauses of the MAC Header fields. Update references to 9.10.2.1.1, 9.10.2.2, 9.10.2.3, 9.10.2.4, 9.10.2.5 throughout the draft. Change 9.10.3 to 9.10.4.

### Style Guide 2.16 – Abbreviations

Rojan

P23.17 delete ID identifier. ID is already widely used in REVmd. Also, ID is not used as a standalone term in D4.0, but only in names of fields (e.g. ID field) or names of identifiers (e.g. WUR ID, WUR Group ID).

P23.21 delete OOK on-off identifier. OOK is not used on its own in D4.0, always used as MC-OOK.

P23.24 delete SGID starting WUR group identifier. Acronym is not used in D4.0.

P74.36 change “9.10 MAC frame format for Wake-up Radio (WUR) frames” to “9.10 MAC frame format for WUR frames”

P75.36 change “A WUR frame that does not have a Frame Body field is referred to as a fixed-length (FL) WUR frame. A WUR frame that has a Frame Body field is referred to as a variable-length (VL) WUR frame.” to “A WUR frame that does not have a Frame Body field is referred to as a FL WUR frame. A WUR frame that has a Frame Body field is referred to as a VL WUR frame.”

P105.8 change “29. Wake-Up Radio (WUR) MAC specification” to “29. WUR MAC specification”

P133.1 change “Wake-Up Radio (WUR) PHY” to “WUR PHY”

P133.37 change “The WUR PHY provides support for data rates of 62.5 kb/s and 250 kb/s. LDR (low data rate) indicates 62.5 kb/s, and HDR (high data rate) indicates 250 kb/s.” to “The WUR PHY provides support for data rates of 62.5 kb/s and 250 kb/s. LDR indicates 62.5 kb/s, and HDR indicates 250 kb/s.”

P133.61 change “Transmission of a WUR Basic PPDU with 20 MHz channel width, low data rate, and single stream.” to “Transmission of a WUR Basic PPDU with 20 MHz channel width, LDR, and single stream.”

P133.62 change “Transmission of a WUR Basic PPDU with 20 MHz channel width, high data rate, and single stream.” to “Transmission of a WUR Basic PPDU with 20 MHz channel width, HDR, and single stream.”

P134.3 change “Reception of a WUR Basic PPDU with 20 MHz channel width, low data rate, and single stream.” to “Reception of a WUR Basic PPDU with 20 MHz channel width, LDR, and single stream.”

P134.12 change “Reception of a WUR Basic PPDU with 20 MHz channel width, high data rate, and single stream.” to “Reception of a WUR Basic PPDU with 20 MHz channel width, HDR, and single stream.”

P136.36 change “LDR indicates WUR low data rate for the data rate 62.5 kb/s. HDR indicates WUR high data rate for the data rate 250 kb/s.” to “LDR indicates WUR LDR for the data rate 62.5 kb/s. HDR indicates WUR HDR for the data rate 250 kb/s.”

P141.11 change “30.3.4.1 WUR Basic PPDU waveform generation for WUR-Sync field and high data rate WUR-Data field” to “30.3.4.1 WUR Basic PPDU waveform generation for WUR-Sync field and HDR WUR-Data field”

P141.37 change “Figure 30-6—An example of an On-WG for the WUR-Sync and high data rate WUR-Data fields” to “Figure 30-6—An example of an On-WG for the WUR-Sync and HDR WUR-Data fields”

P142.23 change “Figure 30-7—An example of an On-WG for the low data rate WUR-Data fields” to “Figure 30-7—An example of an On-WG for the LDR WUR-Data fields”

P147.7 change “The output of WUR encoder determines whether to take samples from On-WG or Off-WG. Each symbol duration, TSym=TSYM-HDR is 2 μs for high data rate, and TSym=TSYM-LDR is 4 μs for low data rate.” to “The output of WUR encoder determines whether to take samples from On-WG or Off-WG. Each symbol duration, TSym=TSYM-HDR is 2 μs for HDR, and TSym=TSYM-LDR is 4 μs for LDR.”

P147.35 change “The samples in Off-WG have zero energy. Each symbol duration, TSym=TSYM-HDR is 2 μs for high data rate, and TSym=TSYM-LDR is 4 μs for low data rate.” to “The samples in Off-WG have zero energy. Each symbol duration, TSym=TSYM-HDR is 2 μs for HDR, and TSym=TSYM-LDR is 4 μs for LDR.”

P152.58 change “The WUR PHY supports two data rates for the WUR-Data field: (i) Low data rate of 62.5 kb/s. (ii) High data rate of 250 kb/s.” to “The WUR PHY supports two data rates for the WUR-Data field: (i) LDR of 62.5 kb/s. (ii) HDR of 250 kb/s.”

P152.64 change “To indicate low data rate (LDR) for the WUR-Data field of a WUR PPDU, a repeated sequence ([W W]) is transmitted.” to “To indicate LDR for the WUR-Data field of a WUR PPDU, a repeated sequence ([W W]) is transmitted.”

P153.23 change “To indicate high data rate (HDR) for the WUR-Data field of a WUR PPDU, a bitwise complement of the sequence W is transmitted.” to “To indicate HDR for the WUR-Data field of a WUR PPDU, a bitwise complement of the sequence W is transmitted.”

P156.49 change “30.3.9.3.3 WUR-Sync field for low data rate” to “30.3.9.3.3 WUR-Sync field for LDR”

P157.1 change “30.3.9.3.4 WUR-Sync field for high data rate” to “30.3.9.3.4 WUR-Sync field for HDR”

P157.32 change “30.3.10.2 WUR-Data field for low data rate and high data rate” to “30.3.10.2 WUR-Data field for LDR and HDR”

P133.51 change “The WUR PHY uses the multicarrier on-off keying (MC-OOK) modulation for the WUR-Sync and WUR-Data fields. MC-OOK is defined as an on-off keying, modulated with a multicarrier signal.” to “The WUR PHY uses the MC-OOK modulation for the WUR-Sync and WUR-Data fields. MC-OOK is defined as an on-off keying, modulated with a multicarrier signal.”

### Style Guide 2.17 – Format for code/pseudocode

Not applicable

### Style guide 3 – Style applicable to specific Clauses

#### Definitions (Clause 3)

Yunsong Yang

[1] At 22.41, spell out AP and STA in full on their first uses within the definition.

#### General Description (Clause 4)

Yunsong Yang

No issues found.

#### Frame formats (Clause 9) – shall or may?

Yunsong Yang

At 70.2 and 70.3, there are two instances of “may be”. I think they are OK as the sentence is not describing the behaviors. Alternatively, we can change them to “might be” or re-write the sentence in the style of “is either the WUR AP transmitting this WUR Discovery element itself or one of its neighboring WUR AP”.

#### SAP interfaces (Clause 6)

Yunsong Yang

1. At 32.12, 32.25, and 32.39, change “. Otherwise” to “; otherwise”.
2. At 49.61, change “Otherwise” to “otherwise”.

#### New top level clauses

Yunsong Yang

No issues found.

#### Annex A – Bibliography

Not applicable. There are neither normative nor informative references.

#### Annex B – PICS

Yunsong Yang

[1] At 171.56, all FT and FR Item numbers in the table under B.4.4.2 MAC frames are yet to be finalized. At least, move the red-text Editor’s Note on P173L13 to right below the Change instruction on P171L45.

#### Annex G – Frame exchange sequences

## ANA

Check for correct use of numbers against database.

Check names against database (update database if names have changed).

Robert Stacey

|  |  |  |  |
| --- | --- | --- | --- |
| **Resource** | **Value** | **Name** | **Status** |
| [Categories](file:///C:\Users\rjstacey\Documents\802.11\ANA\11-11-0270-rr-0000-ana-database.xls#'Categories'!A1) | 32 | WUR | OK |
| [dot11smt](file:///C:\Users\rjstacey\Documents\802.11\ANA\11-11-0270-rr-0000-ana-database.xls#'dot11smt'!A1) | 45 | dot11WURStationConfigTable | OK |
| [dot11StationConfigEntry](file:///C:\Users\rjstacey\Documents\802.11\ANA\11-11-0270-rr-0000-ana-database.xls#'dot11StationConfigEntry'!A1) | 186 | dot11WUROptionImplemented | OK |
| [Element ID Extension 1](file:///C:\Users\rjstacey\Documents\802.11\ANA\11-11-0270-rr-0000-ana-database.xls#'Element ID Extension 1'!A1) | 48 | WUR Capabilities | OK |
| [Element ID Extension 1](file:///C:\Users\rjstacey\Documents\802.11\ANA\11-11-0270-rr-0000-ana-database.xls#'Element ID Extension 1'!A1) | 49 | WUR Operation | OK |
| [Element ID Extension 1](file:///C:\Users\rjstacey\Documents\802.11\ANA\11-11-0270-rr-0000-ana-database.xls#'Element ID Extension 1'!A1) | 50 | WUR Mode | OK |
| [Element ID Extension 1](file:///C:\Users\rjstacey\Documents\802.11\ANA\11-11-0270-rr-0000-ana-database.xls#'Element ID Extension 1'!A1) | 51 | WUR Discovery | OK |
| [Element ID Extension 1](file:///C:\Users\rjstacey\Documents\802.11\ANA\11-11-0270-rr-0000-ana-database.xls#'Element ID Extension 1'!A1) | 87 | WUR Protection | OK |

Additional Actions:

## MIB

Conformance to 09/533r1 and 15/355r13 – Mark Hamilton

### Detailed proposed changes

Yongho – compile and check syntax

# Collateral findings

# IEEE-SA MEC

At the time of writing this report, the IEEE-SA mandatory editorial coordination (MEC) is ongoing. When complete, the findings will be added to this report.

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