### IEEE P802.11 Wireless LANs

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| 11ba D3.0 MAC Comment Resolution for WUR Power Management | | | | |
| Date: 2019-07-08 | | | | |
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Abstract

This submission proposes resolutions for comments of TGba Draft D3.0 with the following CIDs:

3034, 3171, 3135, 3160, 3122, 3123, 3310, 3299, 3300, 3302, 3202, 3200, 3149, 3082, 3298, 3083, 3084, 3085, 3150, 3152, 3153,

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revision based on the discussion in the teleconference call

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGba D3.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGba D3.0 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.***

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| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 3034 | Gaurav Patwardhan | 22.23 | 3.2 | WUR mode definition is unclear. | Change the definition from "A negotiation status between a WUR AP and a WUR non-AP STA such that the WUR non-AP STA alternates between the WUR awake state and the WUR doze state when the WUR non-AP STA is in the doze state." to "A negotiation status between a WUR AP and a WUR non-AP STA which determines the operational parameters with which the WUR non-AP STA alternates between WUR awake state and WUR doze state." | Revised –  Agree in principle with the commenter. After talking offline with the commenter, we revise as follows.  *A negotiation status between a WUR AP and a WUR non-AP STA in which the WUR power state of the WUR non-AP STA alternates between WUR awake state and WUR doze state based on the negotiated WUR parameters.*  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3034. |
| 3171 | Liwen Chu | 22.22 | 3 | It should be "......when non-AP STA is WUR mode". Also I assume that the WUR mode is a negotiation result. | As in comment. | Revised –  We have modified the definition as follows.  *A negotiation status between a WUR AP and a WUR non-AP STA in which the WUR power state of the WUR non-AP STA alternates between WUR awake state and WUR doze state based on the negotiated WUR parameters.*  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3171. |
| 3135 | Joseph Levy | 22.23 | 3.2 | This comment is a resubmittal of CID 2176 which was resolved in the previous ballot with a reference to 11/1494, however the commenter fails to understand how 11/1494 a document that is based on the "old" architecture when there was PCR and WURx entities were still in the specification, resolves this comment: "the WUR mode definition is very confusing as it provides 3 states - 2 that the WUR non-AP STA can be in and a 3 state "doze state". Which doesn't exist when the WUR mode is active." It is the commenter's understanding that a STA can only be in one state at any given time, hence the stating that the WUR awake and WUR doze states occur when the STA is in the doze state is both incorrect and confusing. The STA can only be in a single state at any given time, please see 11-19/0829r1. The statement that a STA is in a single state does not mean that there is a single state machine for the STA, it only means that any entity can only be in a single state at any given time (this state may be dependent on the state of multiple state machines). Lastly, the discussion provided in the resolution discussing if WUR is a power save (PS) mode or not, should be carefully considered. As a mode that relies on AP PS style buffering of PPDUs, uses the PS bit to initiate the mode, and is primarily designed to save power would seem to be a PS mode. | Replace the definition with: "A power save mode negotiated between a WUR AP and a WUR non-AP STA such that when the WUR non-AP STA is in power save mode with a negotiated WUR mode, the AP assumes the WUR non-AP STA alternates between the WUR awake state and the WUR doze state." | Revised –  We note that the WUR mode is not a new power save mode, which will complicate the transition of existing power save mode which only uses PM bit. Specifcially, if WUR mode is not PS mode, the exsiting power save protocol under PS mode can not be reused, and we have to redefine all the behaviour of existing power save protocols to control awake and doze.  Having several states to describe things is to clarify things rather than complicate things. The spec already have several states to describe different functionalities. For example, state in Figure 11-16 describes the association/RSNA stuatus. Powr state describes the capability of receiving non-WUR PPDUs. Define stauts based on another state is also allowed. For example, The current power save mode, active mode, and power state only happens when the STA is in state 3 of figure 11-16.  We do however, agree that we should focus the definition on the fact that WUR mode is a negotiation status. We revise as follows.  *A negotiation status between a WUR AP and a WUR non-AP STA in which the WUR power state of the WUR non-AP STA alternates between WUR awake state and WUR doze state based on the negotiated WUR parameters.*  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3135. |
| 3160 | Joseph Levy |  | 29 | This is a resubmission of CID 2222: "It needs to be made clear as to what WUR mode is. Is it the mode in which a WUR non-AP STA is in after WUR mode setup and before PS mode has been activated or is it when an non-AP STA is in WUR awake or WUR doze state?" The resolution: "It is clarified in 18/1494r4 that WUR mode is a negotiation status agreed between a WUR AP and a WUR non-AP STA. In WUR mode, the WUR non-AP STA follows WUR duty cycle schedule if the WUR non-AP STA is in doze state." does not seem to be responsive to the comment. The clarification in 18/1494r4 does not provide a clarification in the draft. Also 18/1494r4 is not in line with the current draft as it refers to PCR and WURx components which have been removed from the draft, hence the clarification in 18/1494r4 is not of any use relative to the current specification. Please resolve this comment in a meaningful way. | It is not clear to the commenter what WUR mode is. Please provide a useful definition of what WUR mode is and what the associated non-AP STA and AP behaviors are in WUR mode. If WUR mode is the mode in which a WUR non-AP STA and WUR AP have a configured set of WUR parameters, and is waiting to be "triggered" to start WUR power management, please state so. If a WUR mode is the mode where WUR power management is active, i.e. a WUR non-AP STA is assumed to cycle between WUR awake and WUR doze states, please state so. It can not be both. So which ever definition is correct, what is the other "mode" called - is it WRU Mode configured, WRU mode active, or something else. | Revised –  We note that the WUR mode is not a new power save mode, which will complicate the transition of existing power save mode which only uses PM bit. Specifcially, if WUR mode is not PS mode, the exsiting power save protocol under PS mode can not be reused, and we have to redefine all the behaviour of existing power save protocols to control awake and doze.  We do however, agree that we should focus the definition on the fact that WUR mode is a negotiation status. We revise as follows.  *A negotiation status between a WUR AP and a WUR non-AP STA in which the WUR power state of the WUR non-AP STA alternates between WUR awake state and WUR doze state based on the negotiated WUR parameters.*  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3160. |
| 3122 | Jian Yu | 116.23 | 29.8.3 | What does schedule a WUR Wake-up frame mean? Is it out of scope of this standard? | See comment | Rejected –  Scheduling a WUR Wake-up frame means that a WUR AP prepares a WUR Wake-up frame and goes thorugh EDCAF to send the frame.  We provide several examples that similar sentence has been used in the spec.  11ax D4.2  *To enable unscheduled opportunistic power save, an OPS AP shall schedule for transmission an OPS frame or a FILS Discovery frame with the RA field set to the broadcast address that includes a TIM element (see 9.4.2.5 (TIM element)) and an OPS element (see 9.4.2.251 (OPS element)).*  11ax D4.2  *The TWT scheduling AP shall schedule for transmission of a Trigger frame addressed to one or more TWT scheduled STAs during a trigger-enabled TWT SP.* |
| 3123 | Jian Yu | 116.31 | 29.8.3 | Somewhere it is saying: WUR non-AP STA is in the doze state, does it mean WURx is in WUR Doze state or mean the main radio is in doze state? | Clarify WUR non-AP STA's doze state with WUR Doze state | Revised –  We clarify the operation as follows.  When the state refers to the power state that controls the reception operation of non-WUR PPDU, we provide the reference to the baseline.  When the state refers to WUR power state that controls the reception operation of WUR PPDU, we use the following pharse.  The WUR power state of the WUR non-AP STA is in WUR awake/WUR doze state.  In addition to the clarification, we add the additional description before the definition of WUR power state to clarify the difference.  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3123. |
| 3310 | Tomoko Adachi | 116.37 | 29.8.3 | "... the WUR AP expects that the WUR non-AP STA is in the awake state at the earliest service period, which has end time larger than the received time of the frame plus the transition delay indicated by the WUR non-AP STA in the WUR Capabilities elements, ...". At least the WUR non-AP STA should be in the WUR awake state and does not need to be in the ordinary awake state, does it? | Change "awake state" to "WUR awake state". | Rejected–  We clarify that the referred phrase describes the functionality of the WUR non-AP STA to receive non-WUR PPDU. Hence, awake state is used. There is counter part of the phrase described as below.  *After the WUR non-AP STA receives a WUR Wake-up frame addressed to it from the WUR AP with an indication of individually addressed BU(s), the WUR non-AP STA shall be in the awake state at the earliest service period, which has end time larger than the received time of the frame plus the transition delay indicated by the WUR non-AP STA in the WUR Capabilities element, following the existing PS operation (e.g., individual TWT) agreed between the WUR AP and the WUR non-AP STA.* |
| 3299 | Stephen McCann | 117.15 | 29.8.4 | Within this sentence: "The WUR non-AP STA may be in the WUR doze state after the WUR non-AP STA completes a successful frame exchange with the WUR AP, which informs the WUR AP that the WUR non-AP STA is in the awake state", what is informing the WUR AP? Is this the WUR non-AP STA? | Change the sentence to "The WUR non-AP STA may be in the WUR doze state after it completes a successful frame exchange with the WUR AP. The exchange informs the WUR AP that the WUR non-AP STA was in the awake state." | Revised –  We revise the sentence with the following.  *The WUR non-AP STA may be in the WUR doze state after it completes a successful frame exchange with the WUR AP, and the frame exchange informs the WUR AP that the WUR non-AP STA was in the awake state.*  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3299. |
| 3300 | Stephen McCann | 117.15 | 29.8.4 | The sentence does make sense. | Change the sentence to "The WUR non-AP STA may be in the WUR doze state after it completes a successful frame exchange with the WUR AP. The exchange informs the WUR AP that the WUR non-AP STA was in the awake state." | Revised –  We revise the sentence with the following.  *The WUR non-AP STA may be in the WUR doze state after it completes a successful frame exchange with the WUR AP, and the frame exchange informs the WUR AP that the WUR non-AP STA is in the awake state.*  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3300. |
| 3302 | Stephen McCann | 117.2 | 29.8.4 | This definition implies that a WUR non-AP STA uses WUR mode when it enters a doze state. What happens when there is no WUR capable AP and why can the WUR non-AP STA not use PS mode in the doze state? | Add the following sentence to the end of the "Note 1" paragraph on page 117: "The WUR non-AP STA may also use PS mode in the doze state". | Revised –  We simply add “while in the PS mode after the doze state”  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3302. |
| 3202 | Mark Hamilton |  |  | How does WUR operation (WUR awake/WUR doze) affect block ack timeout, and thereby all the other operational modes that use Block Ack? Does the WUR AP suspend the block ack timeout while the non-AP STA is in WUR operation? | Add a statement (probably in 10.26.4) that a WUR AP does not apply the block ack timeout procedure to a non-AP STA in WUR mode and power save mode. | Rejected –  All the Block Ack operation are not touched as described below.  *A WUR STA supports the MAC and MLME functions defined in Clause 29 (Wake-Up Radio (WUR) MAC specification) in addition to the MAC functions defined in Clause 10 (MAC sublayer functional descrip­tion), the MLME functions defined in Clause 11, the security functions defined in Clause 12 (Security), and the HE MAC functions defined in Clause 26 if a WUR STA is an HE STA except when the functions in Clause 30 supersede the functions in Clause 10, Clause 11, Clause 12 or Clause 26.* |
| 3200 | Mark Hamilton | 22.25 | 3.2 | The AP does not know if a non-AP STA is in doze state or not. It only knows it is in power save mode (and it will assume it is in doze state at appropriate times). Thus, the whole WUR operation is valid when the non-AP STA is in power save mode (either awake state or doze state, as noted in the NOTE at the top of page 117), not only when it is in doze state. (Whether the non-AP STA happens to switch between doze state and awake state is of no concern to the WUR state machine, nor the WUR AP.) However, it should also be kept clear that the AP is to assume the STA is/might be in doze state the entire time it is in power save mode and WUR mode (as is already noted in subclause 29.9.3). | Change "doze state" (the second, non-"WUR" one) to "power save mode" at P22.25. Make the same change at P111.17, P112.32, P116.27, P116.30, P117.11, P117.13, P119.37, and P119.43. | Revised –  Agree in principle with the commenter. In the baseline, doze state of the non-AP STA is described based on the AP’s perspective or non-AP STA’s perspective. The following show two examples of descripbtion from the AP’s perspective. We revise the sentence allow this line from the AP’s perspective.  *A non-AP STA shall be in active mode upon (re)association, except that if the (re)association is performed*  *using the on-channel tunneling procedure defined in 11.32.5 (On-channel Tunneling (OCT) operation), then*  *the non-AP STA shall be considered to be in power save mode and in doze state upon (re)association on the BSS identified by the BSSID, Band ID, and Channel Number fields contained in the Multi-band element*  *transmitted in the On-channel Tunnel Request frame that carries the (Re)Association Request frame.(M70)*  *The TWT responding STA shall assume that the TWT requesting STA is in the doze state if the TWT requesting STA*  *is in a Power Save mode, the TWT SP has ended and the TWT responding STA has not received a frame from the TWT requesting STA that solicits a response that contains a nonzero Next TWT value.*  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3200. |
| 3149 | Joseph Levy |  |  | The draft seems to use the phrase "in the doze state" to indicate that a WRU configured WUR non-AP STA is actively in the WUR mode, e.g. assumed to be in WUR doze state or WUR awake state by the WUR AP. The use of "in the doze state" is very confusing and not a clear way of specifying the state of the WUR non-AP state. If a WUR configured WUR non-AP STA transitions into the "WUR mode" by sending a PPDU to the AP with Power Management subfield set to 1 (which I believe is the intent of the specification), then it should be stated. The phrase "in the doze state" should not be used, as it refers to a particular STA state in PS mode. The doze state is defined as the "STA is not able to transmit or receive and consumes very low power". While this in general is true for a STA in WUR mode regarding all non-WRU PPDUs, the STA is assumed to be able to receive WUR PPDUs when it is in WUR awake state. Hence it is not in doze state. The way the draft uses mode and state is not constant with the base line specification. If WUR does use the Power Management subfield to start WRU mode, it must state so. | The draft must be clear as to how the associated WUR non-AP STA changes its mode from active or power save mode to WUR mode. e.g. a statement similar to the following must be present in the specification: "A WUR STA that is associated with a WRU AP, that has a configured WUR mode and activates the WUR mode shall inform the AP of this fact using the Power Management subfield within the Frame Control field of transmitted frames. The STA shall remain in its mode until it informs the AP of a mode change via a frame exchange that includes an acknowledgment from the AP. Power management or WUR mode shall not change during any single frame exchange sequence, as described in Annex G. The draft should remove all uses of the phrase "in the doze state" as this state is a Power Management state, not a WUR state. Please see 11-19/0820r1 for additional discussion. | Revised -  We note that the WUR mode is not a new power save mode, which will complicate the transition of existing power save mode which only uses PM bit. Specifcially, if WUR mode is not PS mode, the exsiting power save protocol under PS mode can not be reused, and we have to redefine all the behaviour of existing power save protocols to control awake and doze.  Having several states to describe things is to clarify things rather than complicate things. The spec already have several states to describe different functionalities. For example, state in Figure 11-16 describes the association/RSNA stuatus. Powr state describes the capability of receiving non-WUR PPDUs. Define stauts based on another state is also allowed. For example, The current power save mode, active mode, and power state only happens when the STA is in state 3 of figure 11-16.  We do, however, agree that “in the doze state” should be clarified that this is from the perspective of the AP.  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3149. |
| 3082 | Graham Smith | 117.9 | 29.8.4 | "The WUR non-AP STA shall be in the WUR awake state during the WUR duty cycle schedule agreed between WUR AP and WUR non-AP STA if the WUR non-AP STA is in the doze state." Huh? Delete the last bit that just confuses the issue. You are really trying to say that the WUR doze/awake states are as agreed by the duty cycle, so why not just say that? | "The WUR non-AP STA shall be in the WUR awake state according to the WUR duty cycle schedule agreed between WUR AP and WUR non-AP STA." | Revised –  There has been discussion that if the WUR non-AP STA is considered to be awake by the WUR AP, then the WUR non-AP STA may still use WUR scanning to utilize the functionlaity of receiving WUR PPDU. Removing the sentence will remove the possibility of the above operation. We clarify that the doze state is from the perspective of WUR AP and say that in all the other case, the WUR power state may be in the WUR doze, which is up to the consideration of the WUR non-AP STA.  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3082. |
| 3298 | Stephen McCann | 117.11 | 29.8.4 | The sentence does not add anything to the document. It reads: "The WUR non-AP STA may be in the WUR doze state outside the WUR duty cycle schedule agreed between the WUR AP and the WUR non-AP STA if the WUR non-AP STA is in the doze state". When shortened this means "The device may be in the doze state, outside of the agreed duty cycle between the AP and the device, if the device is in the doze state", which in summary states "The device may be in the doze state, if the device is in the doze state." I think this is an statement of the obvious and is not required. | Delete the sentence | Revised –  We note that awake/doze and WUR awake/doze are different power states and control different functionality.  Awake/doze controls the functionality of receiving non-WUR PPDU. WUR awake/doze controls the functionality of receiving WUR PPDU.  However, we think that the sentence can be simplified by saying the following.  “Otherwise, the WUR non-AP STA may be in the WUR doze state.”  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3298. |
| 3083 | Graham Smith | 117.11 | 29.8.4 | "The WUR non-AP STA may be in the WUR doze state outside the WUR duty cycle schedule agreed between the WUR AP and the WUR non-AP STA if the WUR non-AP STA is in the doze state."If it is in the doze state then it is in the doze state - yes? What are you trying to say here, I really don't know. | I have no idea but do something cos I have no idea what you are trying to say. I would simply delete it. | Revised –  We note that awake/doze and WUR awake/doze are different power states and control different functionality.  Awake/doze controls the functionality of receiving non-WUR PPDU. WUR awake/doze controls the functionality of receiving WUR PPDU.  However, we think that the sentence can be simplified by saying the following.  “Otherwise, the WUR non-AP STA may be in the WUR doze state.”  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3083. |
| 3084 | Graham Smith | 117.15 | 29.8.4 | "The WUR non-AP STA may be in the WUR doze state after the WUR non-AP STA completes a successful frame exchange with the WUR AP, which informs the WUR AP that the WUR non-AP STA is in the awake state." So having told the AP it is awake, you allow it to be dozing. What is this accomplishing? All this does is muddy the field. Why not just keep it simple? KISS | Either delete it or say why this is useful. | Revised –  We note that awake/doze and WUR awake/doze are different power states and control different functionality.  Awake/doze controls the functionality of receiving non-WUR PPDU. WUR awake/doze controls the functionality of receiving WUR PPDU.  We revise the sentence with the following.  *The WUR non-AP STA may be in the WUR doze state after it completes a successful frame exchange with the WUR AP, and the frame exchange informs the WUR AP that the WUR non-AP STA is in the awake state.*  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3084. |
| 3085 | Graham Smith | 117.19 | 29.8.4 | "The WUR non-AP STA may not listen for Beacon frame if the WUR non-AP STA is in PS mode (see 11.2.3.1 (General))" Is this the WUR beacon or the standard beacon. If the latter then 'Duh'. Why is this important? On top of that this is a clause covering the two WUR states of doze and awake, so why is this here at all? This whole section is confusing, it probaby should be re-written and made much clearer and simpler. | I have no idea why this is here so I would delete it. | Revised –  We clarify that the intention of the sentence is to enable WUR non-AP STA to stay in doze state as long as possible by not waking up to receive Beacon frame and the sentence is not about WUR Beacon frame, which has a WUR prefix. Note that the baseline requires the WUR non-AP STA to receive Beacon frame based on listening interval and DTIM Beacon frame based on DTIM Beacon interval.  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3085. |
| 3150 | Joseph Levy |  |  | The draft does not clearly state the difference between being in WUR mode (the mode in which the non-AP STA is assumed to be in WUR doze or WUR awake state), and an a non-AP STA having a WUR mode configured, but not in WUR mode (e.g. the STA is in active, awake, or doze state). The state of the STA prior to going into WUR mode or if the STA is in WUR Mode Suspend. Hence, the overall draft is very confusing. It is suggested that the term WUR mode configured be used in the specification to indicate that a non-AP STA has negotiated a set of WUR mode parameters that have been agreed to by the WUR AP. A WUR non-AP STA with a configured WUR mode can then move into WUR mode (WRU doze or WUR awake states), by having a frame exchange with the WUR AP with the Power Management subfield set to 1 (if this is the way the mode switch is triggered). If this not the way the mode switch is triggered, then how it is triggered needs to be clearly stated. | The draft must be clear as to what the WUR mode set frame exchange is, it should specify the sequence of PPDUs that must be sent and received in order for a non-AP STA to have a configured WUR mode. Hence it should provide a clear statement as to what the expected frame exchange is. e.g. A WUR non-AP STA my configure it WUR mode by the following frame exchange: the WUR non-AP STA will send an "Enter WUR Mode Request" frame, the WUR AP will respond with an "Enter WUR Mode Response" frame. If the "Enter WUR Mode Response" frame has WUR Mode Response Status field set to Accept the WUR no-AP STA has successfully configured WUR mode. Please see 11-19/0829r1 for additional discussion | Rejected –  The suggested revision to clarify sequence to setup WUR mode is described in 29.8.2 WUR mode setup. See Table 29-1—Settings for WUR mode setup frame exchange - Request and Response, and the following.  *If the WUR AP accepts the request for WUR mode setup with the WUR Parameters field in the WUR Mode Setup frame, the WUR Mode Response Status field in the corresponding WUR Mode element is set to “Accept”. If the WUR non-AP STA receives the WUR Mode element, which contains WUR Mode Response Status field set to “Accept”, WUR power management service is negotiated between the WUR non-AP STA and the WUR AP with WUR parameters, which are indicated in the WUR Mode elements.* |
| 3152 | Joseph Levy | 116.18 | 29.8.3 | Th WUR AP must maintain more than just the status of whether that WUR non-AP STA is in the WUR mode or WUR mode suspend as stated in the draft. The WUR AP must also maintain the agreed WUR configuration for the WUR non-AP STA. This should be stated. Also the WRU AP most only maintain the configuration for WUR non-AP STAs that have successfully configured a WUR mode, hence the use of a "STA that requests" is incorrect. | Change: "For each WUR non-AP STA that requests WUR power management service from an associated WUR AP, the WUR AP shall maintain a WUR status that indicates whether the WUR non-AP STA is in WUR mode or WUR mode suspend." To: "For each WUR non-AP STA that has successfully configured WUR power management service with an associated WUR AP, the WUR AP shall maintain the agreed WUR configuration and maintain the status of the WUR mode, indicating if the WUR mode is active or suspended." | Revised –  Agree in princicple with the commenter. We already have the following sentences saying that the WUR parameters are maintained while in WUR mode suspend. We simply add corresponding descriptions in WUR mode.  *If a WUR non-AP STA is in WUR mode suspend, then:*  *—The negotiated WUR parameters between the WUR AP and the WUR non-AP STA are maintained by the WUR AP.*  *If a WUR non-AP STA is in WUR mode suspend, then:*  *—The WUR non-AP STA may be in the WUR doze state.*  *—The negotiated WUR parameters between the WUR AP and the WUR non-AP STA are maintained by the WUR non-AP STA*  TGba editor to make the changes shown in 11-19/1166r1 under all headings that include CID 3152. |
| 3153 | Joseph Levy | 116.62 | 29.8.4 | The statement that "A WUR non-AP STA can be in one of two WUR power states:" is basically incorrect as it should state that an WUR AP assumes that the WUR non-AP STA is in one of two WUR power states. The note that follows this statement seems to just confuse things as the actual state of the non-AP STA does not really mean anything. What matters is the assumed state the governs the AP behavior, e.g. buffering frames, and sending WUR wake up PPDUs. Hence, a non-AP STA that has a configured and active WUR mode can assume it need not listen to anything other than WUR beacons to maintain timing and WUR wake up PPDUs during the scheduled WUR wake period. This should be clearly stated in the specification. | WUR non-AP STA, as all STAs many be in any state it chooses. The requirement is that when the WUR non-AP STA has activated it's configured WUR mode the WUR AP must buffer frames addressed to the WUR non-AP STA and can only "wake" the non-AP STA by sending a wake up WUR PPDU to the non-AP STA during the scheduled WUR Awake time. Suggested replacement text: "The WUR AP assumes that the WUR non-AP STA is in one of two states:" | Rejected –  We agree that eventually the state is from the perspective of the AP. However, we note that the defition follows the definition in 11.2.1 General.  However, the statement that “WUR non-AP STA is considered to be in WUR awake state” does not make sense because in this case, there is no ambituity. The statement that “the WUR non-AP STA is considered to be in WUR doze state” makese sense. However, the spec writes it in a way like “The WUR non-AP STA may be in the WUR doze state”, and thre is no further action on AP in this case, so there is no need to rewrite existing sentences. |

**Discussion:** *None.*

**Propose:** Revised for CID 3034, 3171, 3135, 3160, 3123, 3310, 3299, 3300, 3302, 3200, 3149, 3082, 3298, 3083, 3084, 3085, 3152, ,per discussion and editing instructions in 11-19/1166r1.

***TGba editor: Change 3.2 Definitions specific to IEEE Std 802.11 as follows:***

3.2 Definitions specific to IEEE Std 802.11

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

(..existing texts…)

**wake-up radio (WUR) mode:** A negotiation status between a WUR AP and a WUR non-AP STA in which the WUR power state of the WUR non-AP STA alternates between the WUR awake state and the WUR doze state based on the negotiated WUR parameters.(#3034, #3171, #3135, #3160)

***TGba editor: Change “the WUR non-AP STA is in the WUR awake state” to “the WUR power state of the WUR non-AP STA is in the WUR awake state” through the spec (#3123)***

***TGba editor: Change “the WUR non-AP STA shall be in the WUR awake state” to “the WUR power state of the WUR non-AP STA shall be in the WUR awake state” through the spec (#3123)***

***TGba editor: Change “the WUR non-AP STA is always in the WUR awake state” to “the WUR power state of the WUR non-AP STA is always in the WUR awake state” through the spec (#3123)***

***TGba editor: Change “the WUR non-AP STA is in the WUR doze state” to “the WUR power state of the WUR non-AP STA is in the WUR doze state” through the spec(#3123)***

***TGba editor: Change “The WUR non-AP STA may be in the WUR doze state” to “the WUR power state of The WUR non-AP STA may be in the WUR doze state” (#3123)***

**29.6 Maintaining synchronization**

**29.6.1 General**

(…existing texts….)

If a WUR non-AP STA, which is in WUR mode and doze state (see 11.2.1 (General))(#3123), does not receive WUR Beacon frames for a time period, the WUR non-AP STA should perform WUR scanning (see 29.12 (WUR Discovery)) or transi­tion to awake state (see 11.2.1 (General))(#3123). The methods by which the WUR non-AP STA determines the exact value of the time period are implementation specific and out of scope of this standard.(#3029)

**29.7 WUR duty cycle operation**

WUR duty cycle operation reduces the required amount of time that the WUR power state of(#3123) a WUR non-AP STA utilizing WUR mode needs to be in the WUR awake state after the WUR non-AP STA enters the doze state (see 11.2.1 (General) and(#3123) 29.8 (WUR power management procedure)) and allows a WUR AP to manage WUR activity in the BSS by scheduling a WUR non-AP STA to receive WUR frames at different times.

(…existing texts….)

If a WUR non-AP STA is in WUR mode, and the WUR non-AP STA is in the doze state (see 11.2.1 (General))(#3123), the WUR non-AP STA shall be in the WUR awake state within the on duration of a WUR duty cycle period.

**29.8.3 WUR power management operation for a WUR AP**

For each WUR non-AP STA that requests WUR power management service from an associated WUR AP, the WUR AP shall maintain a WUR status that indicates whether the WUR non-AP STA is in WUR mode or WUR mode suspend.

If a WUR non-AP STA is in WUR mode, then:

— The negotiated WUR parameters between the WUR AP and the WUR non-AP STA are maintained by the WUR AP.(#3152)

— A WUR AP shall schedule a WUR Wake-up frame for transmission to 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)).(#3123)

—The WUR AP may send a WUR Wake-up frame to the WUR non-AP STA (see 29.9 (Wake-up oper­ation)) in the WUR duty cycle schedule agreed between the WUR AP and the WUR non-AP STA if the WUR non-AP STA is considered by the WUR AP to be(#3200, #3149) in the doze state (see 11.2.1 (General)).(#3123)

—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 during the existing negotiated service period:

—The WUR AP shall follow the wake-up operation defined in 29.9 (Wake-up operation).

• After the WUR AP transmits a WUR Wake-up frame addressed to the WUR non-AP STA with an indication of individually addressed buffered BU(s), the WUR AP expects that the WUR non- AP STA is in the awake state at the earliest service period, which has end time larger than the received time of the frame plus the transition delay indicated by the WUR non-AP STA in the WUR Capabilities elements, following the existing PS operation (e.g., individual TWT) agreed between the WUR AP and the WUR non-AP STA.

• The parameters of the negotiated service period for the WUR non-AP STA’s schedule between the WUR AP and the WUR non-AP STA are maintained by the WUR AP.

(…existing texts….)

29.8.4 WUR power management operation for a WUR non-AP STA

In additional to the two power states defined in 11.2.1 (general) that differentiate the functionality of being able to receive or not being able to receive non-WUR frames, two WUR power states are defined to differentiate the functionality of being able to receive or not being able to receive WUR frames.(#3123)

A WUR non-AP STA can be in one of two WUR power states:

—WUR awake: the WUR non-AP STA is able to receive WUR frames.(#Ed)

—WUR doze: the WUR non-AP STA is not able to receive WUR frames.(#Ed)

NOTE 1—A WUR non-AP STA can be in the awake or doze state as defined in 11.2.1 (General) while in the power save mode(#3302) if the WUR non-AP STA is in WUR mode or WUR mode suspend. A WUR non-AP STA can be in active mode or power save (PS) mode as defined in 11.2.3.2 (Non-AP STA power management modes) if the WUR non-AP STA is in WUR mode or WUR mode suspend.

If a WUR non-AP STA is in WUR mode, then:

—The negotiated WUR parameters between the WUR AP and the WUR non-AP STA are maintained by the WUR non-AP STA.(#3152)

— If the WUR non-AP STA is considered by the WUR AP to be in the doze state,(#3200, #3082, #3149) the WUR non-AP STA shall be in the WUR awake state during the WUR duty cycle schedule agreed between WUR AP and WUR non-AP STA. Otherwise, the WUR non-AP STA may be in the WUR doze state. (#3298, #3083)

—The WUR non-AP STA may be in the WUR doze state after the WUR non-AP STA completes a suc­cessful frame exchange with the WUR AP, and the frame exchange informs the WUR AP that the WUR non-AP STA is in the awake state.(#3299, #3300, #3084)

—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)).(#3085)

(..existing texts…)

29.9.2 WUR AP operation

(..existing texts…)

If a traffic filtering agreement is established for a WUR non-AP STA in WUR mode, the WUR non-AP STA is in doze state (see 11.2.1 (General)),(#3123) and Bit 1 of the TFS Action Code field is set to 1, then the WUR AP should transmit a WUR Wake-up frame to the WUR non-AP STA if the WUR AP receives an individually addressed BU destined to the WUR non-AP STA that matches the traffic filter set.

If a traffic filtering agreement is established for a WUR non-AP STA in WUR mode, the WUR non-AP STA is in doze state (see 11.2.1 (General)),(#3123) and Bit 1 of the TFS Action Code field is set to 0, then the WUR AP should not transmit a WUR Wake-up frame to the WUR non-AP STA if the WUR AP receives an individually addressed BU des­tined to the WUR non-AP STA that matches the traffic filter set.

(..existing texts…)

**29.9.3 WUR non-AP STA operation**

A WUR non-AP STA that receives a WUR Wake-up frame addressed to it with an indication of individually addressed BU(s) (see 29.9.1 (General)) shall follow existing operation, which is any PS operation the associ­ated WUR AP and the WUR non-AP STA has agreed to use (e.g., baseline PM change, U-APSD, TWT, etc.), to retrieve individually addressed BU(s) and follow the wake up timing information (e.g., the next ser­vice period) that is provided along with the agreed PS operation. In this case, the WUR non-AP STA may be in the doze state (see 11.2.1 (General))(#3123) until the time indicated by the wake up timing information (e.g., the next service period) that is provided along with the agreed PS operation.

(..existing texts…)

A WUR non-AP STA that receives a WUR Wake-up frame with an indication of buffered group addressed BU(s) (see 29.9.1 (General)) shall follow existing operation, which is any PS operation that the WUR AP and the WUR non-AP STA has agreed to use (e.g., DTIM, FMS, etc.) to receive group addressed BU(s) and follow the wake up timing information (e.g., the next DTIM TBTT) that is provided along with the agreed PS operation. In this case, the WUR non-AP STA may be in the doze state (see 11.2.1 (General))(#3123) until the time indicated by the wake up timing information (e.g., the next DTIM TBTT) that is provided along with the agreed PS opera­tion.

(..existing texts…)

A WUR non-AP STA shall maintain a BSS Parameter Update Counter. The WUR non-AP STA shall update (#Ed)its BSS Parameter Update Counter to the Counter subfield contained in the latest WUR Operation ele­ment received from the WUR AP with which it is associated. A WUR non-AP STA that receives the Counter subfield of the Type Dependent Control field in a broadcast WUR Wake-up frame that contains a value that is different from (#Ed)its BSS Parameter Update Counter shall follow the procedure defined in 11.2.3.15 (TIM Broadcast) to attempt to receive the Beacon information. In this case, the WUR non-AP STA may be in the doze state (see 11.2.1 (General))(#3123) until the time indicated by the next TBTT.