### IEEE P802.11Wireless LANs

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| 11ba D2.1 MAC Comment Resolution for WUR Power Management and Negotiation Part I |
| Date: 2019-04-17 |
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Abstract

This submission proposes resolutions for comments of TGba Draft D2.1 with the following CIDs:

2029, 2034, 2036, 2053, 2097, 2130, 2150, 2151, 2152, 2175, ~~2176~~, 2215, ~~2216~~, ~~2217~~, 2218, ~~2221, 2222~~, 2223, ~~2224~~, 2225, 2238, 2243, 2396, 2399, 2436, 2437, 2438, 2439, 2505, 2508, 2610, 2657, ~~2682~~, 2693, ~~2695~~, 2700, 2756, 2775, 2784, 2785, 2799, 2807

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revised based on the offline discussion.
* Rev 2: Revised based on the discussion in F2F and defer strike out CIDs for further discussion.

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 D2.1 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGba D2.1 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** |
| 2029 | Albert Petrick | 72.57 | 30.7.3 | Note-4 states a WUR non--AP STA is implementation specific if the STA is in the awake state. This Note is ambiguous and needs clarity. All STAs and APs are implementation specific wrt to WUR power state, regardless if the STA is in the awake state, or doze. | As commented | Rejected – If a WUR non-AP STA is in doze state, then the WUR power state of the WUR non-AP STA is controlled by the WUR duty cycle operation.  |
| 2034 | Alfred Asterjadhi | 39.41 | 9.4.2.1 | I think the values are ANA until the draft passes letter ballot. Please check if that is the case. If yes, then please keep <ANA> for all these values until the draft gets 75% approval. | As in comment. | Rejected –Based on 14/0629r22, there is no rule for having ANA value assigned only after 75 % approval rate. Further, D2.0 has passed 75% approval rate. As a result, all the number can be kept.  |
| 2036 | Alfred Asterjadhi | 52.57 | 9.6.34.2 | The Dialog Token field is reserved. Actually this has to be set to 0 since it is an unsolicited response. Please replace wiith "is 0". Also to make it clearer in paragraph 44 add that the Dialog Token field is set to 0 to identify a response transaction that is not solicited by a request. | As in comment. | Revised – Agree in principle with the commenter. Searching through the baseline, the dialog token is indeed set to 0 for other cases. We also note that in 9.2.2 Conventions, it specifies that a reserved field is set to 0, which means that there is no technical change.*Reserved fields and subfields are set to 0 upon transmission and are ignored upon reception.* TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2036 |
| 2053 | Alfred Asterjadhi | 72.34 | 30.7.3 | The timing description does not read well. Is the STA expected to wake at the next SP or after receiving the WUR Wake-up frame plus the transition delay? I think the intention is to say at the next service period but not earlier than the expiration of a transition delay following the reception of a WUR Wake up frame. Please fix wording. Also now TWT has individual classifier preceding it. The TWT can be either individual or broadcast. Maybe i missed something. | As in comment. | Revised – Agree in principle with the commenter. The original text alreadys clarify this, and we simply move the corresponding text up front. We note that individual TWT is just an example. TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2053 |
| 2097 | Carl Kain | 40.14 | 9.4.2.7.9 | The notes section of the first entry of table 9-222 is a little ambiguous. You should specify what type of frame is being used when matching TFS. This section of the amendment is about fields and values, but it would be much clearer if you identify the frame types in the notes section | Identify the type of "frame" being referred to in this section of the notes. | Rejected – The notes section of the first entry is the texts from the baseline. The commenter should submit the comment to revmd if the commenter has questions about the texts in the baseline. |
| 2130 | Hanseul Hong | 72.53 | 30.7.3 | This note is duplicated with Note 1 and Note 2 in P72L10 | Delete one of them | Rejected – The note is added to clarify the operation under WUR mode and WUR mode suspend. Note 1 and note 2 in P72L10 is added to remind the reader about baseline operation.  |
| 2150 | James Lepp | 72.16 | 30.7.3 | "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." Not sure what the last part of the sentence is for. Probably no need for the second sentance as well. | "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." | Rejected – If the WUR non-AP STA is in the awake state, there is no need for the WUR non-AP STA to follow WUR duty cycle schedule, since there is no need to received any wake-up frame from the associated AP. In this case, the WUR non-AP STA can scan for WUR discovery frame if the device has the capability to receive WUR discovery frame at the same time.  |
| 2151 | James Lepp | 72.26 | 30.7.3 | "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))." I read 11.2.3.1 of 11md and I don't understand what aspect of the non-AP STA operation this sentence is referring to. There is alot more there than just listening to a beacon. | clarify | Rejected – The refered sentence in the baseline that requires non-AP STA to listen for beacon is shown below.*A STA operating in PS mode (11ah)with dot11NonTIMModeActivated equal to false that is not in WNM**sleep mode shall periodically listen for Beacon frames, as determined by the ListenInterval parameter of the**MLME-ASSOCIATE.request or MLME-REASSOCIATE.request primitive and the ReceiveDTIMs**parameter of the MLME-POWERMGT.request primitive.* |
| 2152 | James Lepp | 73.14 | 30.7.4 | Change to state the WUR AP transmits a WUR Wake-up frame with an identifier of the STA or STAs it wants to wake up. Not a frame "to a" STA. Current text isn't precise and excludes many cases such as a list of unicast IDs, multicast IDs and broadcast IDs. | "The WUR AP may send a WUR Wake-up frame containing an identifier of the WUR non-AP STA in the WUR duty cycle schedule agreed between the WUR AP and that WUR non-AP STA." | Revised – Agree in principle of the commenter. We note that the proposed sentence is also not comprehensive. We simply provide a reference to 30.8, where the readers can find all the mehotd of identifying a WUR non-AP STA. TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2152 |
| 2175 | Joseph Levy | 19.17 | 3.2 | The wake-up radio (WUR) channel definition states that a WUR non-AP STA listens to the channel, this is not always true as there is no requirement for a WUR non-AP STA to listen to the WUR channel when it is allowed to be WUR-Doze. It is adequate and more correct to define the channel based on the WUR AP transmission requirement. | Delete: "and a WIR non-AP STA listens" | Revised – Agreed in principle with the commenter. We revise the definition to simply focus on the transmission part. TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2175 |
| ~~2176~~ | ~~Joseph Levy~~ | ~~19.27~~ | ~~3.2~~ | ~~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.~~ | ~~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 the WUR non-AP STA may alternates between the WUR awake state and the WUR doze state."~~ | ~~Rejected –~~ ~~It is clarified in 18/1494r4 that WUR mode is not a new “power save mode.” Also note that power save mode already has its meaning in the baseline. It is also worth noting that alternating between WUR awake state and WUR doze state only has its meaning if a WUR non-AP STA is in doze state, where the WUR non-AP STA can not receive non-WUR PPDU. As a result, the definition proposed by the commenter is not the agreement of the 11ba group.~~ |
| 2215 | Joseph Levy | 68.55 | 30.7.1 | The phrase "to utilize WUR features" is unnecessary. | Delete: "To utilize WUR features" | Accepted -  |
| ~~2216~~ | ~~Joseph Levy~~ | ~~68.60~~ | ~~30.7.1~~ | ~~It is unclear as to what WUR mode is. Is WUR mode the mode in which a non-AP STA is in WUR awake state or WUR doze state, or is it a mode in which when a non-AP STA activates PS it then will move into either WUR awake state or WUR doze state (WUR mode is a mode of a non-AP STA that is in active mode). It is more clear that WUR mode suspend is a "state" where the STA is either in active mode or a legacy PS mode.~~ | ~~Clarify what is meant by WRU mod and WUR mode suspend.~~ | ~~Rejected –~~ ~~It is clarified in 18/1494r4 that WUR mode and WUR mode suspend are negotiation statuses 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. In WUR mode suspend, the WUR non-AP STA keeps all the negotiated WUR parematers that can be used later. For detailes, please see the definition in 30.7.3 and 30.7.4.~~ |
| ~~2217~~ | ~~Joseph Levy~~ | ~~68.60~~ | ~~30.7.1~~ | ~~When a non-AP STA is using WUR power management service I would assume it is in WUR awake or WUR doze state. What does WUR mode suspend have to do with WUR power management service. A STA in WUR mode suspend is using legacy power management.~~ | ~~Clarify the meaning of this sentence.~~ | ~~Rejected –~~ ~~A WUR non-AP STA that is in WUR mode suspend still keeps all the negotiated WUR parameters. As a result, the WUR operation can be resumed later by switching into WUR mode. As a result, WUR mode suspend is still part of the WUR power management service.~~  |
| 2218 | Joseph Levy | 68.64 | 30.7.1 | The statement that "... except that some of the rules are relaxed as denied in the subclauses below." is very unclear. What is relaxed? What is followed? And what does any of this have to do with setting up the WUR Mode. Also since the WUR non-AP STA is also a STA it must follow the power management procedures in 11.2.3. | Delete the sentence: "A WUR STA shall follow the power management procedure defined in 11.2.3 (Power management in a non-DMG infrastructure network) except that some of the rules are relaxed as defined in the subclauses below." | Revised – Agree in principle with the commenter. This sentence follows the new writing style that a new amendment inherits the baseline and only describes the exception. For example, in 11ax, we have the following sentence. *An HE STA shall follow the rules defined in 10.7 (Multirate support) and 26.15.4 (Rate selection constraints for HE STAs) for selecting the rate, MCS, NSS, and the rules defined in 10.3.2.6 (VHT RTS procedure), 10.3.2.7 (CTS and DMG CTS procedure), 10.7.6.6 (Channel Width selection for Control frames) and 10.7.11 (Channel Width in non-HT and non-HT duplicate PPDUs) for selecting the channel width (BW) of transmitted PPDUs with the following exceptions:*In our context, the baseline behaviour in 11.2.3 is followed except the rule deifned in the following subclause. We clarify that it is for 30.7.3 and 30.7.4. TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2218 |
| ~~2221~~ | ~~Joseph Levy~~ | ~~72.4~~ | ~~30.7.3~~ | ~~The statement that the WUR non-AP STA can be in one of two WUR power states is confusing, as there are many other states that a WUR non-AP STA may be in.~~ | ~~Clarify that a WUR non-AP STA that has completed setting up a WUR mode, when it activates PS mode will be in one of these two states.~~ | ~~Rejected –~~ ~~A WUR non-AP STA can be in these two WUR power states for receiving WUR discovery frame and does not need to even associate with a WUR AP.~~ |
| ~~2222~~ | ~~Joseph Levy~~ | ~~72.15~~ | ~~30.7.3~~ | ~~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?~~ | ~~Clarify if this is WUR mode or in PS mode with WUR mode.~~ | ~~Rejected –~~ ~~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.~~  |
| 2223 | Joseph Levy | 72.17 | 30.7.3 | As is the case in PS mode the requirements for this mode should be on the AP not the STA. The STA in PS mode may or may not be in doze or awake state as that STA dictates, the only requirements for the doze and awake states are on the AP. e.g. the AP must buffer frames for the STA during its doze state and may only send frames to the STA during its awake state. So statements telling the non-AP STA what state it must be in are not appropriate and should be deleted. | Remove all statements which require WUR non-AP STA to be in a specific state. Rewrite these requirements so that they apply to the WUR AP. | Rejected – WUR duty cycle schedule is an agreement that a WUR non-AP STA must honor so that WUR AP know when to transmit WUR frame to the WUR non-AP STA. |
| ~~2224~~ | ~~Joseph Levy~~ | ~~73.14~~ | ~~30.7.4~~ | ~~The statement that the "The WUR AP may send a WUR Wake-up frame to the WUR non-AP STA in 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." is very confusing. If WUR awake state and WUR doze state are simply PS modes, then the above should simply state that the WUR AP may send a Wake-up frame when the non-AP STA is in the WUR awake state. This state will only occur when the PS is active and a WUR mode has been negotiated with the WUR AP. Simply stating doze state is not the equivalent of say PS is active. Doze state is a specific PS state and has nothing in common with WUR awake state.~~ | ~~Correct the sentence as suggested in the comment.~~ | ~~Rejected –~~~~Simply changing the statement to say non-AP STA is in PS mode is not correct. In PS mode, non-AP STA may still be in awake state, where the WUR operation is not even relevant. It is then technical correct to say that WUR operation only needs to be defined when it is relevant, i.e., the WUR non-AP STA is in doze state. In other cases, the WUR power state of the WUR non-AP STA is implementation specific.~~  |
| 2225 | Joseph Levy | 73.18 | 30.7.4 | What does "the WUR non-AP STA's schedule is suspended" mean? | Clarify the condition as per the comment? | Revised – Agree in principle with the commenter. We revise the sentence to clarify the definition. TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2225 |
| 2238 | kaiying Lv | 72.53 | 30.7.3 | When a WUR non-AP STA is in active mode, the WUR non-AP STA should not be in WUR mode. | As in comment. | Revised – 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. However, after discussing with the commenter, we agree to put the note that clarify this upfront so that the reader know this upfront.TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2238 |
| 2243 | Lei Huang | 19.17 | 3.2 | WUR Discovery frames are also a kind of WUR frames. However, they are not transmitted in WUR channel. | Change the definition of WUR channel to"A channel in which a WUR AP transmits WUR frames to one or more WUR non-AP STA which is associated with the WUR AP. | Revised – Agree in principle with the commenter. We simply say “WUR Wake-up frames.”TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2243 |
| 2396 | Mark RISON | 39.35 | 9.4.2.1 | Element IDs should be assigned by ANA, not by TGba | Change the Element ID extension cells in Table 9-94 to <ANA> | Rejected – The element ID value is the value assigned by the ANA. |
| 2399 | Mark RISON |  |  | Frames are either received or they are not; they cannot be "unsuccessfuly" received | At 70.61 change "If the WUR non-AP STA receives the WUR Mode element which containing WUR ModeResponse Status field set to "Accept" successful" to "If the WUR non-AP STA receives a WUR Mode element that contains a WUR ModeResponse Status field set to "Accept"". At 71.2/9/17/23/31/45/51, 72.21 delete "successful". Delete the NOTE at 71.57 | Revised – Agree in principle with the commenter. We change the text for 70.61. For 71.2/9/17/23/31/45/51, 72.21, and the note, it is about “successful frame exchange”, which is a common phrase used in the baseline. TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2399 |
| 2436 | Ming Gan | 68.49 | 30.7 | Exchange the subclause of WUR non-AP operation and the subclause of WUR AP operation. Make them aligned with the structure of subcluse "Wake up Operation" | As in comment | Revised – Agree in principle with the commenter. TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2436 |
| 2437 | Ming Gan | 72.34 | 30.7.3 | The second sub-bullet contradicts the first sub-bullet and the concept of suspend. | What is the meaning of suspend. The second sub-bullet seems to say that the existing negotiated service period is active. Morevover, we have WUR suspend mode, existing negotiated service period is active in this mode. If they are active in WUR mode, why do we need WUR suspend mode? Please clarify it. | Revised – Agree in principle with the commenter. We revise the sentence to clarify the definition. We note that the second bullet is the additional operation after receiving wake-up frame.TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2437 |
| 2438 | Ming Gan | 72.17 | 30.7.4 | What are WUR awake or doze states? | Please define them. | Rejected – WUR awake state and WUR doze state are defined in page 72 line 4. |
| 2439 | Ming Gan | 73.20 | 30.7.4 | The first sub-bullet seems to say that the existing negotiated service period is active, it contradicts the concept of suspend | As in comment | Revised – Agree in principle with the commenter. We revise the sentence to clarify the definition. We note that the second bullet is the additional operation after receiving wake-up frame.TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2439 |
| 2505 | Osama Aboulmagd | 19.42 | 3.2 | The WUR Primary channel is not communicated to the non-AP STA in any form. Primary channel number is not included in the WUR Capabilities element and is not included in WUR Operation element. How non-AP STA knows the primary channel used for sending WUR frames? | Indicate how the WUR Primary channel information is shared among AP and non-AP STA. | Rejected – The WUR Primary channel is equivalent to the channel that a WUR Beacon frame is transmitted and is indicated in the WUR Operating Class field and WUR Channel field in the WUR Operation element.  |
| 2508 | Osama Aboulmagd | 44.45 | 9.4.2.292 | WUR mode is not defined? What does it mean? what is the behavior of the WUR STA in this mode? Need to add a definition in clause 3.2. | as in comment | Rejected –WUR mode is already defined in 3.2 as shown below.***wake-up radio (WUR) mode:*** *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.* |
| 2610 | Rojan Chitrakar | 73.32 | 30.7.4 | It would help to add a NOTE here to clarify that a WUR AP should not send a WUR Wake-up frame to a WUR non-AP STA in WUR mode suspend. | add a NOTE here as below:NOTE - The WUR AP does not send a WUR Wake-up frame to the WUR non-AP STA. | Revised – Agree in principle with the commenter.TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2610 |
| 2657 | Tomoko Adachi |  | 9.4.2.5 | Now said in the definition that the WUR mode is the status when a STA is in the doze state, it is reasonable to indicate whether there is buffered traffic to a non-AP STA in TIM element. When the STA is in the awake state and finds the indication, the STA can transmit a frame to the WUR AP of its availability. | Have the WUR AP set the indication of buffered traffic for WUR non-AP STAs in TIM element. | Rejected – The indication of TIM element follows the baseline rule and does not change after WUR service is negotiated.  |
| ~~2682~~ | ~~Woojin Ahn~~ | ~~72.34~~ | ~~30.7.3~~ | ~~"the next service period" is ambiguous. What happens if the non-AP STA wakes up in the middle of a SP?~~ | ~~Please clarify~~ | ~~Revised –~~ ~~Agree in principle with the commenter. The original text alreadys clarify that it is the next service period after considering transition delay, and we simply move the corresponding text up front.~~ ~~TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2682~~ |
| 2693 | Xiaofei Wang | 19.27 | 3.2 | The removal of the definitions PCR and addition of definition of WUR mode don't adquatly address the intended operation of WUR. Active mode and PS mode alone will not be able to indicate that the STA has its main receiver on or off (defined that a STA have its receiver on"), it is not very clear which receivers are on or off or switching. In addition, 11ba PAR calls clearly for a PCR and WUR radio. Do we need to amend the PAR given now both PCR and WUR are removed? | either adquately describe the complete operations modes given the new definition and amend the PAR, or return to the original designs of two radios with modifications to address previous concerns raised. | Rejected – The writing style of treating WUR as a capability is the recommendation from architecture group after discussions last for several meetings. The operations under WUR mode is defined in clause 30.7. |
| ~~2695~~ | ~~Xiaofei Wang~~ | ~~19.27~~ | ~~3.2~~ | ~~The definition of WUR mode seems to explicitly exclude the case that the STA cannot enter the low power mode for scanning for WUR discovery frames while not associated with an AP. This may have a big impact on power consumptions for STAs that are in the unassociated state when scanning for new APs to associate with.~~ | ~~Provide a definition for WUR mode that will at least not exclude the case that an unassociated STA can enter the low power mode WUR mode and trying to scan for WUR discovery frames~~ | ~~Rejected –~~ ~~For an unassociated state, there is no negotiated WUR power management service, and it is entirely implementation specific for the WUR non-AP STA to alternate between the WUR awake state and the WUR doze state.~~  |
| 2700 | Xiaofei Wang | 19.16 | 3.2 | The definition of WUR channel is not very precise. The WUR AP and WUR non-AP STA must be associated with each other for this definition to be valid. That aspect is currently not very clear. Is the WUR channel associated with an AP or with a STA? Please clarify. | Please provide a more clear and precise definition for WUR channel. | Revised – Agreed in principle with the commenter. We revise the definition to say “transmits WUR frames to an associated WUR non-AP station (STA)”. TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2700 |
| 2756 | Yonggang Fang | 19.27 | 3.2 | It is not clear about the definition of the wake-up radio (WUR) mode. It should be an operation mode of WUR of non-AP STA and consists of state of WUR awake and doze. It is not related to WUR AP directly. | Please clarify | Rejected –We note that the existing definition shown below specficies exactly what the commenter has requested. ***wake-up radio (WUR) mode:*** *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.* |
| 2775 | Yonggang Fang | 53.1 | 9.6.34.3 | Please clarify the relationship between "WUR Mode Setup" and "Enter WUR Mode"; and beween "WUR Mode Teardown" and "WUR Mode Suspend". If they are similar or equivalent, suggest to use the same terms to avoid confusion. | Please clarify | Rejected –WUR Mode Setup is related to the two-way handshake for negotiating WUR power managmenet service. Enter WUR mode is a one-way handshake to alternate between WUR mode and WUR mode suspend after negotiating WUR power management service. WUR mode teardown is to teardown the negotiated WUR power management service. For details, please see 30.7. |
| 2784 | Yongho Seok | 43.29 | 9.4.2.291 | For WUR Vendor Specific frame operation, the WUR STA and WUR AP may need to exchange the vendor specific signaling information.Please append the vendor specific subelement to the WUR Operation element. | As in comment. | Revised – Agree in principle with the commenter. We simply allow vendor specific element in WUR setup frame.TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2784. |
| 2785 | Yongho Seok | 44.45 | 9.4.2.292 | For WUR Vendor Specific frame operation, the WUR STA and WUR AP may need to exchange the vendor specific signaling information.Please append the vendor specific subelement to the WUR Mode element. | As in comment. | Revised – Agree in principle with the commenter. We simply allow vendor specific element in WUR setup frame.TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2785. |
| 2799 | Yunsong Yang | 36.27 | 9.3.3.7 | If a STA didn't include a WUR Capabilities element in the Association Request, does the WUR AP have to include the WUR Capabilties and WUR Operation elements in the Association Response sent to the requesting STA? If not, we can follow the notes for the WUR Mode element, which is two entries below, by adding the presence of the WUR Capabilities element in the Association Request as the second condition for the WUR Capabilities and WUR Operation elements to be present in the Association Response. And make similar changes in the Reassociation Response, but not for the Probe Response (understood that it is desirable to keep the contents in the Probe Response the same as in the Beacon). | Change the notes for WUR Capabilities beginning on P36L27 to: "The WUR Capabilities element is present when dot11WUROptionImplemented is true, and the WUR Capabilities element is present in the Association Request frame that solicited this Association Response frame; otherwise it is not present." Change the notes for WUR Operation beginning on P36L33 to: "The WUR Operation element is present when dot11WUROptionImplemented is true, and the WUR Capabilities element is present in the Association Request frame that solicited this Association Response frame; otherwise it is not present." Change the notes for WUR Capabilities beginning on P37L40 to: "The WUR Capabilities element is present when dot11WUROptionImplemented is true, and the WUR Capabilities element is present in the Reassociation Request frame that solicited this Reassociation Response frame; otherwise it is not present." And Change the notes for WUR Operation beginning on P37L46 to: "The WUR Operation element is present when dot11WUROptionImplemented is true, and the WUR Capabilities element is present in the Reassociation Request frame that solicited this Reassociation Response frame; otherwise it is not present." | Rejected –We note that the text of including WUR capabilities element in association request/response and reassociation request/response follows the baseline texts for HT/VHT/HE. We note that the text of including WUR operation element in association response and reassociation response follows the baseline texts for HT/VHT/HE. |
| 2807 | Yunsong Yang | 32.57 | 9.6.34.2 | For these two types of actions, is the Dialog Token field indeed reserved or is the field not reserved but set to 0? If the Dialog Token field is indeed reserved for these two types of actions, then why can't we use value zero for the Dialog Token on L45? | Please check if restricting the Dialog Token to nonzero values on L45 is necessary? | Revised – Agree in principle with the commenter. Searching through the baseline, the dialog token is indeed set to 0 for other cases. We also note that in 9.2.2 Conventions, it specifies that a reserved field is set to 0, which means that there is no technical change.*Reserved fields and subfields are set to 0 upon transmission and are ignored upon reception.* TGba editor to make the changes shown in 11-19/0591r2 under all headings that include CID 2807 |

**Discussion:** *None.*

**Propose:** Revised for CID 2036, 2053, 2152, 2175, 2215, 2225, 2243, 2807, 2784, 2785, 2436, 2437, 2439, 2610, 2700, 2399, ~~2682~~, 2238, 2218 per discussion and editing instructions in 11-19/0591r2.

***TGba editor: Change the clause number of “30.7.3 WUR non-AP STA operation” to “30.7.4 WUR power management operation for a WUR non-AP STA” and update the reference (#2436)***

***TGba editor: Change the clause number of “30.7.4 WUR AP operation” to “30.7.3 WUR power management operation for a WUR AP” and update the reference (#2436)***

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

* Definitions specific to IEEE Std 802.11

Insert the following definitions maintaining alphabetical order:

**multicarrier on-off keying (MC-OOK) symbol:** A MC-OOK symbol can be either an On symbol where the multicarrier signal is present or an Off symbol where the multicarrier signal is not present.

**wake-up radio (WUR) access point (AP):** An access point (AP)that is a non-high-throughput (non-HT), high-throughput (HT), very high throughput (VHT), or high efficiency (HE) AP that is capable of transmitting a WUR physical layer (PHY) protocol data unit (PPDU) and supports the WUR operation.

**wake-up radio (WUR) channel:** A channel in which a WUR access point (AP) transmits WUR Wake-up frames to associated WUR non-AP stations (STAs).(#2175, #2243, #2700)

(…existing texts ….)

***TGba editor: Change 9.6.34.2 WUR Mode Setup frame format as follows:***

* WUR Mode Setup frame format

The WUR Mode Setup frame is an Action frame of category WUR. The Action field of a WUR Mode Setup frame contains the information shown in Table 9-524b (WUR Mode Setup frame Action field format).

|  |
| --- |
| * WUR Mode Setup frame Action field format
 |
| Order | Information |
| 1 | Category |
| 2 | WUR Action |
| 3 | Dialog Token |
| 4 | WUR Mode element (see 9.4.2.292 (WUR Mode element)) |
| 5 | WUR Operation element (optional) (see 9.4.2.291 (WUR Operation element)) |
| Last  | Vendor Specific element (optional) (see 9.4.2.25 (Vendor Specific element))(#2784, #2785) |

The Category field is defined in Table 9-53 (Category values).

The WUR Action field is set to 0 as defined in Table 9-524a (WUR Action field values).

The Dialog Token field is defined in 9.4.1.12 (Dialog Token field).

In a WUR Mode Setup frame with the Action Type field of the carrying WUR Mode element set to “Enter WUR Mode Suspend Request” or “Enter WUR Mode Request,” the Dialog Token field is set to a nonzero value chosen by the transmitting STA to identify the request/response transaction.

In a WUR Mode Setup frame with the Action Type field of the carrying WUR Mode element set to “Enter WUR Mode Suspend Response” or “Enter WUR Mode Response,” the Dialog Token field is set to the value copied from the corresponding received WUR Mode Setup frame with the Action Type field of the carrying WUR Mode element set to “Enter WUR Mode Suspend Request” or “Enter WUR Mode Request.”

In a WUR Mode Setup frame with the Action Type field of the carrying WUR Mode element set to “Enter WUR Mode Suspend” or “Enter WUR Mode,” the Dialog Token field is set to 0.(#2036, #2807)

The WUR Mode element field contains a WUR Mode element as defined in 9.4.2.292 (WUR Mode element).

The WUR Operation element field contains a WUR Operation element as defined in 9.4.2.291 (WUR Operation element).

The Vendor Specific element field contains one or more Vendor Specific elements as defined in 9.4.2.25 (Vendor Specific element).(#2785)

***TGba editor: Change 30.7 WUR power management procedure as follows:***

* WUR power management procedure
* General

A WUR AP may provide WUR power management service to its associated WUR non-AP STAs as defined in 30.7.2 (WUR mode setup), 30.7.3 (WUR non-AP STA operation), and 30.7.4 (WUR AP operation).(#2215)

A WUR non-AP STA is in WUR mode or WUR mode suspend while using WUR power management service provided by a WUR AP.

A WUR STA shall follow the power management procedure defined in 11.2.3 (Power management in a non-DMG infrastructure network) except that some of the rules are relaxed as defined in 30.7.3 and 30.7.4(#2218).

* WUR mode setup

To use the WUR power management service, a WUR non-AP STA exchanges WUR Mode elements in WUR Mode Setup frames or (Re)Association Request/Response frames with a WUR AP. The settings for WUR mode setup are defined in Table 30-1 (Settings for WUR mode setup frame exchange - Request and Response) and Table 30-2 (WUR Mode Setup/Teardown frame transmission).

|  |
| --- |
| * Settings for WUR mode setup frame exchange - Request and Response
 |
| **Request frame: Action Type field of the WUR Mode element within a request frame transmitted from a WUR non-AP STA to a WUR AP** | **Response frame: Action Type field of the WUR Mode element within a response frame transmitted from a WUR AP to a WUR non-AP STA** | **Response frame: WUR Mode Response Status field of the WUR Mode element within a response frame transmitted from a WUR AP to a WUR non-AP STA** | **Status after the completion of the exchange** |
| Enter WUR Mode Request | Enter WUR Mode Response | Accept | The WUR non-AP STA enters WUR mode. |
| Enter WUR Mode Suspend Request | Enter WUR Mode Suspend Response | Accept | The WUR non-AP STA enters WUR mode suspend. |
| Enter WUR Mode Request | Enter WUR Mode Response | Denied | WUR power management service is not provided by the WUR AP to the WUR non-AP STA at this time. |
| Enter WUR Mode Suspend Request | Enter WUR Mode Suspend Response | Denied | WUR power management service is not provided by the WUR AP to the WUR non-AP STA at this time. |

NOTE—The definition of WUR mode and WUR mode suspend is described in 30.7.3 (WUR non-AP STA operation) and 30.7.4 (WUR AP operation).

|  |
| --- |
| * WUR Mode Setup/Teardown frame transmission
 |
| **Frame type carrying the WUR Mode element (and Action Type field of the WUR Mode element) transmitted from a WUR non-AP STA to a WUR AP** | **Frame type carrying the WUR Mode element (and Action Type field of the WUR Mode element) transmitted from a WUR AP to a WUR non-AP STA**  | **Status after the completion of the exchange** |
| WUR Mode Setup frame (Action Type = Enter WUR Mode) |  | The WUR non-AP STA enters WUR mode from WUR mode suspend. |
| WUR Mode Setup frame (Action Type = Enter WUR Mode Suspend) |  | The WUR non-AP STA enters WUR mode suspend from WUR mode.  |
|  | WUR Mode Setup frame (Action Type = Enter WUR Mode Response) | The WUR non-AP STA that is in WUR mode updates the WUR Parameters. |
|  | WUR Mode Setup frame (Action Type = Enter WUR Mode Suspend Response) | The WUR non-AP STA that is in WUR mode suspend updates the WUR Parameters. |
| WUR Mode Teardown frame |  | The WUR non-AP STA tears down WUR power management service. |
|  | WUR Mode Teardown frame | The WUR AP tears down WUR power management service. |

NOTE 1—A request frame in Table 30-1 (Settings for WUR mode setup frame exchange - Request and Response) is successfully transmitted from a WUR non-AP STA to a WUR AP if an Ack frame is transmitted from the WUR AP to the WUR non-AP STA for the request frame.

NOTE 2—A response frame in Table 30-1 (Settings for WUR mode setup frame exchange - Request and Response) is successfully transmitted from a WUR AP to a WUR non-AP STA if an Ack frame is transmitted from the WUR non-AP STA to the WUR AP for the response frame.

If the WUR AP denies the WUR mode setup, the WUR Mode Response Status field in the corresponding WUR Mode element shall be set to one of the values with meaning “Denied” shown in Table 9-321c (WUR Mode Response Status Definition).

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.(#2399)

After a WUR non-AP STA has negotiated WUR power management service with a WUR AP, the WUR non-AP STA may switch from WUR mode to WUR mode suspend by initiating and completing a successful frame exchange, which includes a WUR Mode Setup frame with Action Type field of the carrying WUR Mode element set to “Enter WUR Mode Suspend” from the WUR non-AP STA and an Ack frame from the WUR AP as described in Table 30-2 (WUR Mode Setup/Teardown frame transmission).

After a WUR non-AP STA has negotiated WUR power management service with a WUR AP, the WUR non-AP STA may switch from WUR mode suspend to WUR mode by initiating and completing a successful frame exchange, which includes a WUR Mode Setup frame with Action Type field of the carrying WUR Mode element set to “Enter WUR Mode” from the WUR non-AP STA and an Ack frame from the WUR AP as described in Table 30-2 (WUR Mode Setup/Teardown frame transmission).

The Action Type field in the WUR Mode element of the WUR Mode Setup frame sent by the WUR non-AP STA in this frame exchange indicates the status that the WUR non-AP STA shall adopt upon successful completion of the frame exchange.

A WUR non-AP STA may indicate in the WUR Mode element its recommendation on which WUR channel to assign for itself if the WUR FDMA Channel Switching Support subfield in the WUR Capabilities element sent by the WUR non-AP STA is set to 1; otherwise, the WUR non-AP STA shall not recommend a WUR channel. The WUR non-AP STA may indicate in the WUR Mode element its recommendation on which data rate (LDR or HDR) to use for individually or group addressed WUR wake-up frames transmitted to the WUR non-AP STA if the 20MHz WUR PPDU with HDR Support subfield in the WUR Capabilities element sent by the WUR non-AP STA is set to 1; otherwise, the WUR non-AP STA shall not recommend a WUR data rate. The WUR non-AP STA should avoid repeatedly renegotiating WUR power management with the same recommended WUR parameters in the WUR Mode element for the remainder of the association if the WUR AP doesn’t use the recommended value(s) from the WUR non-AP STA.(#2696, #2697, #2752)

A WUR AP may assign the WUR channel to WUR non-AP STAs or select the data rate of the transmitted WUR PPDU based on the values contained in the Recommended WUR Parameters subfields received from these WUR non-AP STAs.(#Ed, #2696, #2697, #2752)

After a WUR non-AP STA has negotiated WUR service with a WUR AP, the WUR AP may update the WUR parameters with the WUR non-AP STA in WUR mode, or WUR Mode Suspend by using the PCR component to initiate and complete a successful frame exchange, which includes an unsolicited WUR Mode Setup frame with the Action Type in WUR Mode element set to “Enter WUR Mode Response”, or “Enter WUR Mode Suspend Response”, from the WUR AP and an Ack frame from the WUR non-AP STA. The WUR non-AP STA that sent the ACK frame in response to the unsolicited WUR Mode Setup frame shall update the WUR parameters to the parameters included in the recieved WUR Mode Setup frame. The STA may tear down WUR operation if the STA doesn’t intend to use the parameters. After a WUR non-AP STA has negotiated WUR service with a WUR AP, the WUR AP may update the WUR parameters with the WUR non-AP STA in WUR mode, or WUR Mode Suspend by using the PCR component to initiate and complete a successful frame exchange, which includes an unsolicited WUR Mode Setup frame with the Action Type in WUR Mode element set to “Enter WUR Mode Response”, or “Enter WUR Mode Suspend Response”, from the WUR AP and an Ack frame from the WUR non-AP STA. The WUR non-AP STA that sent the ACK frame in response to the unsolicited WUR Mode Setup frame shall update the WUR parameters to the parameters included in the recieved WUR Mode Setup frame. The STA may tear down WUR operation if the STA doesn’t intend to use the parameters. After a WUR non-AP STA has negotiated WUR power management service with a WUR AP, the WUR AP may update the WUR parameters with the WUR non-AP STA in WUR mode by initiating and completing a successful frame exchange, which includes an unsolicited WUR Mode Setup frame with the Action Type in WUR Mode element set to “Enter WUR Mode Response” from the WUR AP and an Ack frame from the WUR non-AP STA as described in Table 30-2 (WUR Mode Setup/Teardown frame transmission).

After a WUR non-AP STA has negotiated WUR power management service with a WUR AP, the WUR AP may update the WUR parameters with the WUR non-AP STA in WUR mode suspend by initiating and completing a successful frame exchange, which includes an unsolicited WUR Mode Setup frame with the Action Type in WUR Mode element set to “Enter WUR Mode Suspend Response” from the WUR AP and an Ack frame from the WUR non-AP STA as described in Table 30-2 (WUR Mode Setup/Teardown frame transmission).

The WUR non-AP STA that sent the Ack frame in response to the unsolicited WUR Mode Setup frame shall update the WUR parameters to the parameters included in the received WUR Mode Setup frame. The WUR non-AP STA may teardown WUR operation as described below if the WUR non-AP STA doesn’t intend to use the parameters.

After a WUR non-AP STA negotiates WUR power management service with a WUR AP, the WUR non-AP STA may tear down WUR power management service by using initiating and completing a successful frame exchange, which includes a WUR Mode Teardown frame from the WUR non-AP STA and an Ack frame from the WUR AP as described in Table 30-2 (WUR Mode Setup/Teardown frame transmission).

After a WUR non-AP STA negotiates WUR power management service with a WUR AP, the WUR AP may tear down WUR power management service by using initiating and completing a successful frame exchange, which includes a WUR Mode Teardown frame from the WUR AP and an Ack frame from the WUR non-AP STA as described in Table 30-2 (WUR Mode Setup/Teardown frame transmission).

NOTE—A frame exchange is considered successful if the STA transmitting the frame receives the Ack frame sent in response.

A WUR STA that successfully finishes WUR mode setup shall operate as defined in 30.7.3 (WUR non-AP STA operation) and 30.7.4 (WUR AP operation).

* WUR non-AP STA operation

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.
* WUR Doze: the WUR non-AP STA is not able to receive WUR frames.

NOTE 1—A WUR non-AP STA can be in the awake or doze state as defined in 11.2.1 (General) 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.(#2238)

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

* 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. 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.
* 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.
* 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)).
* 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 during the negotiated service periods until the schedule is resumed as described below: (#2225, #2437, #2439)
* After the time that 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) plus the transition delay indicated by the WUR non-AP STA in the WUR Capabilities element, the WUR non-AP STA shall be in the awake state at the next service period following the existing PS operation (e.g., individual TWT) agreed between the WUR AP and the WUR non-AP STA.(#2053)
* 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 non-AP STA.
* The WUR non-AP STA shall follow the wake-up operation defined in 30.8 (Wake-up Operation).

NOTE 1—The WUR duty cycle schedule agreed between WUR AP and WUR non-AP STA can be that the WUR non-AP STA is always in the WUR awake state.

NOTE 2—Examples of the negotiated service period between WUR AP and WUR non-AP STA for the WUR non-AP STA’s schedule include individual TWT and schedule for WNM sleep mode.

(#2238)NOTE 3 – The WUR power state of a WUR non-AP STA is implementation specific if the WUR non-AP STA is in the awake state.

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.

NOTE—If a WUR non-AP STA is in WUR mode suspend, the existing negotiated service period between WUR AP and WUR non-AP STA for the WUR non-AP STA’s schedule is active.

* WUR AP operation

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 WUR AP may send a WUR Wake-up frame to the WUR non-AP STA (see 31.8 (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 in the doze state.(#2152)
* 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: (#2225, #2437, #2439)
* After the time that 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) plus the transition delay indicated by the WUR non-AP STA in the WUR Capabilities elements, the WUR AP expects that the WUR non-AP STA is in the awake state at the next service period following the existing PS operation (e.g., individual TWT) agreed between the WUR AP and the WUR non-AP STA. (#2053)
* 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.
* The WUR AP shall follow the wake-up operation defined in 30.8 (Wake-up Operation).

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.

NOTE – A WUR non-AP STA in WUR mode suspend does not need to follow thhe WUR duty cycle schedule agreed between the WUR AP and the WUR non-AP STA. (#2610)