IEEE P802.11
Wireless LANs

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| Comment Resolution for MAC Misc CIDs |
| Date: 2019-01-08 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Rojan Chitrakar | Panasonic |  |  | Rojan.chitrakar@sg.panasonic.com |
| Lei Huang |  |  |  |
| Yoshio Urabe |  |  |  |
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Abstract

This submission proposes resolutions of comments received from TGba comment collection (TGba Draft 1.0).

* CIDs: 591, 616, 754, 796, 862, 940, 947, 1161, 26, 60, 63, 95, 237, 283, 420, 422, 427, 495, 590, 639, 1078 (21 CIDs)

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revised for CIDs 591, 616, 237, 796, 862 based on feedbacks from Po-kai and Yunsong. Text changes are in green.
* Rev 2: Revised for CIDs 63, 283 based on feedback from Minyoung. Text changes are in blue.
1. **Introduction**

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 Draft. The introduction and the explanation of the proposed changes are not part of the adopted material.

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

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

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| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Page.Line  | Clause | Comment | Proposed Change | Resolution |
| 591 | Mark Hamilton | 49.25 | 31.2 | What is successful reception of a WUR frame? WUR frames have no ACK. | Remove the third bullet in 31.2 | **Revised.**Agree in principle with the commenter. Due to the absence of explicit acknowledgment, it is difficult for a WUR AP to know whether a WUR frame is successfully received by a WUR STA. The concerned text has been rephrased for clarity.TGax editor to make the changes shown in 11-19/0031r2 under all headings that include CID 591. |
| 616 | Mark RISON | 49.26 | 31.2 | Frames are either received or they are not; they cannot be "unsuccessfuly" received | Delete "successfully" in 31.2 | **Revised.**The concerned text has been deleted as part of resolution of CID 591.TGax editor to make the changes shown in 11-19/0031r2 under all headings that include CID 616. |
| 754 | Nehru Bhandaru | 30.6 | 9.4.2.273 | Table 9-318c needs to specify the bit positions for the various fields | Specify which bits e.g. WUR ID is b0..b11 | **Revised.**Agree in principle with the commenter. However Figure 9-751i has already been added in TGbaD1.1 specifying bit positions of the various fields.No action required from TGba editor. |
| 796 | Patrice Nezou | 49.25 | 31.2 | A WUR AP shall not update the CW and the retries counters regardless of whether the WUR frame was successfully received or not. Why only AP and not the non-AP STA ? A WUR frame is sent by using the classical HCF contention based channel access. If many collisions occur, the CW and retries counters MUST be updated. | Please remove the sentence from line 25 to 27 to be compliant with the EDCA mechanism. | **Rejected.**Non-AP STAs do not transmit WUR frames.Since WUR frames are not acknowledged, the indication of transmission failure may only be received after 10ms or more, by which time the channel condition may already have changed. In addition there are many potential factors, other than collison, that can cause a WUR frame to be lost, e.g., the STA lose time symchronzation with the AP. Also, the FEC on the WUR frame is weak, so even at high SNRs, error may occur on the WUR frame (but would otherwise not occur if it is a data frame). Therefore, the CW setting for the entire AC shouldn’t be affected by errors that may occur on the WUR frames. As such the CW and retry counters are not updated. Please refer to 17-0652r2 for related discussion and motions. |
| 862 | Pooya Monajemi | 49.25 | 31.2 | This language is removing a critical channel contention mechanism in 802.11 for frames that can be 3msec long. Subclause 31.7.2 further exacerbates the problem by allowing any number of retries.This can potentially block the medium in high density scenarios.The WUR should maintain CW values and obey updating rules. | Require the WUR to update its CW values after unsuccessful transmissions | **Rejected.**Since WUR frames are not acknowledged, the indication of transmission failure may only be received after 10ms or more, by which time the channel condition may already have changed. In addition there are many potential factors, other than collison, that can cause a WUR frame to be lost, e.g., the STA lose time symchronzation with the AP. Also, the FEC on the WUR frame is weak, so even at high SNRs, error may occur on the WUR frame (but would otherwise not occur if it is a data frame). Therefore, the CW setting for the entire AC shouldn’t be affected by errors that may occur on the WUR frames. As such the CW and retry counters are not updated. Please refer to 17-0652r2 for related discussion and motions. |
| 940 | Stephen McCann | 49.17 | 31.2 | Do these rules also apply to transmission of a WUR Discovery frame on the WUR discovery channel? | Add the following text at P49L32: "Channel access on the WUR discovery channel is described in 31.10" | **Rejected.**The channel access rules for WUR frames also apply to WUR Discovery frames and additional rules for WUR Discovery frames are not required.  |
| 947 | Stephen McCann | 19.17 | 3.2 | Is there a difference between a "WURx awake" state and an "awake" (P33L15) state? | Change all occurances of "awake" to "WURx awake" if applicable to the WUR feature. | **Rejected.**Yes, the two states are different: the first one is referring to the state of WURx while the latter refers to the state of the PCR component. |
| 1161 | Yoshio Urabe |  | 31.2 | It is not described that the WUR frame is carried only in the WUR PPDU. | Define a WUR frame as a frame which is carried in WUR PPDU. Additionally or alternatively, add the following sentence before the first paragraph in 31.2 Channel access (P49):"A WUR AP shall use a WUR PPDU to transmit a WUR frame." | **Revised.**Agree in principle with the commenter. A generic PCR frame may be carried in a variety of PPDU formats. However, a WUR frame may only be carried in a WUR PPDU and not in any other PPDU format. Although implicitely understood, this fact is not specified in the current draft. A sentence is added to clarify this.TGax editor to make the changes shown in 11-19/0031r2 under all headings that include CID 1161. |
| 26 | Albert Petrick | 34.20 | 9.4.2.275 | In Figure 9-751g WUR parameters octet is ambiguous in this figure. Delete or add/reference it to Figure 9-751h |  | **Revised.**It is confirmed that the WUR Parameters field is a part of the WUR Operation element, and therefore, should be kept. Figure 9-751g has been revised in D1.1 to make that clear. The suggested reference to Figure 9-751h (now Figure 9-751f) is already in the text in D1.1.No action required from TGba editor.” |
| 60 | Alfred Asterjadhi | 23.10 | 9.1 | I don't think we need to add this sentence here. WUR frames fall in the same category as other frames. Remove: "WUR frame format is defined in Subclause 9.10 (MAC frame format for Wake-up Radio (WUR) frames), and other MAC frame formats are defined in Subclauses 9.2 to 9.9" since it does not bring any new information. | As in comment. | **Revised.**The concerned text has already been removed in 11ba D1.1.No action required from TGba editor. |
| 63 | Alfred Asterjadhi | 27.26 | 9.4.2.1 | Something tells me that this table is in the wrong subclause. Also, please make the change backward compatible. Non-WUR STA and WUR STA as usual. | As in comment. | **Revised.**Agree in principle with the commenter. The table has already been moved to the correct subclause in 11ba D1.1. The Notes column of the table has been revised for better clarity. TGax editor to make the changes shown in 11-19/0031r2 under all headings that include CID 63. |
| 95 | Alfred Asterjadhi | 49.22 | 31.2 | Since the WUR frame does not receive an acknowledgment in response the AP should at least be recommented to send a CTS2self prior to the WUR frame to reduce the likelyhood of the WUR frame colliding at the recipient(s). | As in comment. | **Rejected.**AP can always protect a WUR frame following baseline procedures. In addition the legacy preamble also offers protection for the WUR frame. Additional explicit recommendations are not required in the 11ba specification. |
| 237 | Emily Qi | 23.46 | 9.3.3.3 | "Last -3", "Last - 2", "Last -1". The order of these new items don't need to be "last-1", etc... If it states the order is "Last -1", it means that it has to be added before the Vendor Specific element. | Remove "Last -3", "Last -2", "last-1". Similar changes in other management frame bodys. | **Revised.**Agree in principle with the commenter. The order of the WUR elements need not be added right before the Vendor specific element. <Last – n> has been relaced with <Last assigned + m> and a note added below the table to clarify the meaning of “Last assigned” TGax editor to make the changes shown in 11-19/0031r2 under all headings that include CID 237. |
| 283 | Ganesh Venkatesan | 27.43 | 9.4.2.1 | The insertion of "WUR Wake-up frame as described in 31.5.3 (AP Operation)" to the baseline text has rendered the Notes confusing; and possibly incorrect. | Recommend turning the Notes cell for this case (Notify) to a bullet listSetting this field to 1 indicates the STA is to be sent(a) retain the original baseline text; or(b) text specific to WUR | **Revised.**The Notes column of the table has been revised for better clarity. The Resolution is the same as that of CID 63. TGax editor to make the changes shown in 11-19/0031r2 under all headings that include CID 283. |
| 420 | James Lepp | 49.23 | 31.2 | The WUR AP may use any AC for sending a WUR frame, sure as there are a number of differentt ypes of WUR Frames, but for fairness should try to use a the same AC as the buffered frame. |  | **Rejected.**Since the time duration between the transmission of a WUR Wake-up frame and the subsequent buffered PCR frame may be 10ms or more, by which time the channel condition may already have changed. As such it is not necessary to tie the AC of the WUR Wake-up frame with that of the buffered frame. Please refer to 17-0652r2 for related discussion and motions. |
| 422 | James Lepp | 51.11 | 31.4.2 | What AC is used to transmit WUR Beacons? | specify an AC for WUR Beacon transmission | **Rejected.**The channel access rules for WUR frames also apply to WUR Beacon frames and additional rules for WUR Beacon frames are not required. An AP may use any AC for sending WUR Beacon frame.  |
| 427 | Jarkko Kneckt |  | 31.2 | Clarify that WUR AP shall follow the virtual carrier sensing rules, i.e. clarify that the AP shall obtain NAV in the primary WUR channel or alternatively, if the WUR transmissionoverlaps with the primary channel of the BSS, then the AP shall use the NAV information from its primary channel. | Please clarify the virtual carrier sensing (NAV) rules for WUR transmissions. Please ensure that virtual carrier sensing is used in the WUR transmissions. | **Revised.**Reference has been added to clarify that the baseline NAV rules also apply to transmission of WUR frames. TGax editor to make the changes shown in 11-19/0031r2 under all headings that include CID 427. |
| 495 | Joseph Levy | 49.17 | 31.2 | WUR channel access should simply follow normal 802.11 AP channel access rules. A statement saying so is all that is necessary. The only two additional behaviors is: 1) the entity that is requesting that a WUR PPDU be sent should set the AC of the PPDU and there should be no restriction on what the AC setting is and 2) the AP assumes that any sent WUR PPDU has been ACKed. | Improve the clarity of the text to state that a WUR AP contends for the medium as in 10.24.2. (There are no exceptions.) In addition this standard contention, the WUR AP will always assume any sent WUR PPDU has been ACKed. Also, if it is thought necessary it could be noted that the AC of the WUR PPDU can have any AC. But, it should be clear what entity is setting the AC. Hence, it should be stated as a requirement that the entity requesting the WUR PPDU be sent must set the AC for the PPDU. | **Rejected.**Exceptions to the channel access rules for WUR frames have been discussed extensively in 11ba in the past. Please refer to 17-0652r2 for related discussion and motions. Entity that sets the ACs is implimentation detail that need not be specified in the 11ba standard. Setting AC of WUR PPDU is similar to setting of AC for PPDU that contains only Trigger frames (802.11ax). |
| 590 | Mark Hamilton | 49.17 | 31.2 | An AP is likely to have several frames queues and (internally) contending for transmission at the same time. There is no practical way for the CCA mechanism to behave differently based on the type of frame that is queued/intended to be transmitted. | The WUR channel access (for an AP) needs to be merged into the overall channel access across all queues/frames the AP may need to transmit. The WUR frame should not be unique, but should be "just another frame" (perhaps with priority) in the AP's outgoing queues. | **Rejected.**WUR frames are unique for 802.11 in the sense that they have very different utility compared to other 802.11 frames. Due to this, channel access rules for WUR frames have been discussed extensively in 11ba in the past. As a result channel access rules for WUR PPDU are discussed separately in clause 31.2 (Channel Access). Please refer to 17-0652r2 for related discussion and motions. How the WUR frames are queued for transmission are implimentation details that need not be specified in the 11ba standard. Transmission of WUR PPDU is similar to transmission of PPDU that contains only Trigger frames (802.11ax). |
| 639 | Michael Fischer | 49.17 | 31.2 | Requirements pertaining to backoff procedure and IFS length following transmission of a WUR frame are not specified. While reasonable assumptions can be made, this should be stated because not all readers are going to make the same, reasonable assumptions. | Add statements regarding IFS usage and backoff procedure usage following WUR frame transmission. This may be a simple as stating that these are handled the same as following transmission of a broadcast MMPDU, but I am not certain that this is correct. | **Revised.**Reference has been added to clarify that the baseline backoff procedure and IFS rules also apply for transmission of WUR frames. TGax editor to make the changes shown in 11-19/0031r2 under all headings that include CID 639. |
| 1078 | Woojin Ahn | 49.20 | 31.2 | If the WUR primary channel is different from the PCR primary channel, after moving into a new operation channel, the WUR AP shall perform CCA until a frame is detected by which it can set its NAV, or until a period of time indicated by the NAVSyncDelay parameter from the most recent MLME-START.request primitive has transpired | As in comment | **Revised.**Agree in principle with the commenter. Text has been added to clarify the NAV setting rules if the WUR primary channel is different from the PCR primary channel. TGax editor to make the changes shown in 11-19/0031r2 under all headings that include CID 1078. |

**Discussion:** None

**Propose:**

Revised for CIDs 63, 237, 283, 427, 591, 616, 639, 1078, 1161 as per discussion and editing instructions in 11-19/0031r2.

* Frame formats
* Format of individual frame types
* Management frames
* Beacon frame format (CID 237)

***Insert the following rows into Table 9-34 (Beacon frame body) maintaining row order:***

***TGba editor: Modify Table 9-34 (802.11ba Draft 1.1) as the following (Track Changes ON):***

|  |
| --- |
| * Beacon frame body
 |
| Order | Information | Notes |
| <Last assigned + 1> | WUR Capabilities | The WUR Capabilities element is present when dot11WUROptionImplemented is true; otherwise it is not present. |
| <Last assigned + 2 > | WUR Operation | The WUR Operation element is present when dot11WUROptionImplemented is true; otherwise it is not present. |
| <Last assigned + 3> | WUR Discovery | The WUR Discovery element is optionally presentif dot11WUROptionImplemented is true and either dot11WURDiscoveryImplemented or dot11WURNeighborDiscoveryImplemented is true; otherwise it is not present.(#61) |

 Note: “Last assigned” is the last order used by 11md, 11ax, 11ay or 11az.

* Association Request frame format (CID 237)

***Insert the following rows into Table 9-36 (Association Request frame body) maintaining row order:***

***TGba editor: Modify Table 9-36 (802.11ba Draft 1.1) as the following (Track Changes ON):***

|  |
| --- |
| * Association Request frame body
 |
| Order | Information | Notes |
| <Last assigned + 1> | WUR Capabilities | The WUR Capabilities element is present when dot11WUROptionImplemented is true; otherwise it is not present. |

 Note: “Last assigned” is the last order used by 11md, 11ax, 11ay or 11az.

* Association Response frame format (CID 237)

***Insert the following rows into Table 9-37 (Association Response frame body) maintaining row order:***

***TGba editor: Modify Table 9-37 (802.11ba Draft 1.1) as the following (Track Changes ON):***

|  |
| --- |
| * Association Response frame body
 |
| Order | Information | Notes |
| <Last assigned + 1> | WUR Capabilities | The WUR Capabilities element is present when dot11WUROptionImplemented is true; otherwise it is not present. |
| <Last assigned + 2> | WUR Operation | The WUR Operation element is present when dot11WUROptionImplemented is true; otherwise it is not present. |

 Note: “Last assigned” is the last order used by 11md, 11ax, 11ay or 11az.

* Reassociation Request frame format (CID 237)

***Insert the following rows into Table 9-38 (Reassociation Request frame body) maintaining row order:***

***TGba editor: Modify Table 9-38 (802.11ba Draft 1.1) as the following (Track Changes ON):***

|  |
| --- |
| * Reassociation Request frame body
 |
| Order | Information | Notes |
| <Last assigned + 1> | WUR Capabilities | The WUR Capabilities element is present when dot11WUROptionImplemented is true; otherwise it is not present. |

 Note: “Last assigned” is the last order used by 11md, 11ax, 11ay or 11az.

* Reassociation Response frame format (CID 237)

***Insert the following rows into Table 9-39 (Reassociation Response frame body) maintaining row order:***

***TGba editor: Modify Table 9-39 (802.11ba Draft 1.1) as the following (Track Changes ON):***

|  |
| --- |
| * Reassociation Response frame body
 |
| Order | Information | Notes |
| <Last assigned + 1> | WUR Capabilities | The WUR Capabilities element is present when dot11WUROptionImplemented is true; otherwise it is not present. |
| <Last assigned + 2> | WUR Operation | The WUR Operation element is present when dot11WUROptionImplemented is true; otherwise it is not present. |

 Note: “Last assigned” is the last order used by 11md, 11ax, 11ay or 11az.

* Probe Request frame format (CID 237)

***Insert the following rows into Table 9-40 (Probe Request frame body) maintaining row order:***

***TGba editor: Modify Table 9-40 (802.11ba Draft 1.1) as the following (Track Changes ON):***

|  |
| --- |
| * Probe Request frame body
 |
| Order | Information | Notes |
| <Last assigned + 1> | WUR Capabilities | The WUR Capabilities element is present when dot11WUROptionImplemented is true; otherwise it is not present. |

 Note: “Last assigned” is the last order used by 11md, 11ax, 11ay or 11az.

* Probe Response frame format (CID 237)

***Insert the following rows into Table 9-41 (Probe Response frame body) maintaining row order:***

***TGba editor: Modify Table 9-41 (802.11ba Draft 1.1) as the following (Track Changes ON):***

|  |
| --- |
| * Probe Response frame body
 |
| Order | Information | Notes |
| <Last assigned + 1> | WUR Capabilities | The WUR Capabilities element is present when dot11WUROptionImplemented is true; otherwise it is not present. |
| <Last assigned + 2> | WUR Operation | The WUR Operation element is present when dot11WUROptionImplemented is true; otherwise it is not present. |
| <Last assigned + 3> | WUR Discovery | The WUR Discovery element is optionally presentif dot11WUROptionImplemented is true and either dot11WURDiscoveryImplemented or dot11WURNeighborDiscoveryImplemented is true; otherwise it is not present.(#61) |

 Note: “Last assigned” is the last order used by 11md, 11ax, 11ay or 11az.

* TFS Request element (CIDs 63, 283)

***Change Table 9-223 (TFS Action Code field values) as shown below:***

***TGba editor: Modify Table 9-223 (802.11ba Draft 1.1) as the following (Track Changes ON):***

|  |
| --- |
| * TFS Action Code field values
 |
| Bit(s) | Name | Notes |
| 0 | Delete After Match  | Setting this field to 1 for any traffic filter set indicates all traffic filter sets established at the AP for the non-AP STA are deleted when a frame matches any of the traffic filter sets established for the non-AP STA. A value of 0 for this field indicates no deletion of the traffic filter set upon a match.  |
| 1 | Notify  | * If a STA is a WUR STA:

Setting this field to 1 indicates the STA is to be sent a WUR Wake-up frame as described in 31.6.4 (WUR AP operation) upon the first frame matching to the traffic filter set or the first frame match after the AP receives a Notify Response frame containing the corresponding TFS ID. Setting this field to 0 indicates the AP does not send a WUR Wake-up frame to the requesting STA. * Otherwise:

Setting this field to 1 indicates the STA is to be sent a TFS Notify frame upon the first frame matching to the traffic filter set or the first frame match after the AP receives a Notify Response frame containing the corresponding TFS ID. Setting this field to 0 indicates the AP does not send TFS Notify frame to the requesting STA.(#63, #283)  |
| 2-7 | Reserved  | All other bits are reserved.  |

* Wake-Up Radio (WUR) MAC specification
* Introduction (CID 1161)

***TGba editor: Modify the section (802.11ba Draft 1.1) as the following (Track Changes ON):***

A WUR STA has dot11WUROptionImplemented equal to true. (#141)

Clause 31 defines the MAC functions of a WUR STA. (#141)

A WUR AP shall transmit a WUR frame in the WUR Data field of a WUR PPDU as defined in 32.3.2 (WUR PPDU format). (#1161)

* Channel access (CIDs 427, 591, 616, 639, 1078)

***TGba editor: Modify the section (802.11ba Draft 1.1) as the following (Track Changes ON):***

A WUR AP that intends to transmit a WUR frame shall contend for the medium as defined in 10.24.2 (HCF contention based channel access (EDCA)) and 10.3.2 (Procedures common to the DCF and EDCAF) (#427, #639) except that:

* In a PHY-CCA.indication primitive and Table 10-16 (Channels indicated idle by the channel-list parameter), the primary channel is replaced by the WUR primary channel.
* The WUR AP may use any AC for sending a WUR frame.
* The WUR AP that sent a WUR frame using the EDCAF of a particular AC shall not update the CW and the retry counters for that AC as a result of the WUR frame transmission.(#591, #616)
* If the WUR primary channel is not the same as the primary 20 MHz channel, after switching to the WUR primary channel, the WUR AP shall perform CCA until a frame is detected by which it can set its NAV, or until a period of time indicated by the NAVSyncDelay parameter in the most recent MLME-START.request primitive has transpired. (#427, #1078)

Channel access on WUR primary 40 MHz channel and WUR primary 80 MHz channel is described in 31.9.1 (WUR FDMA channel access).