### IEEE P802.11 Wireless LANs

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| 11ba D1.0 MAC Comment Resolution for Wake-up Operation Part I | | | | |
| Date: 2018-11-11 | | | | |
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Abstract

This submission proposes resolutions for comments of TGba Draft D1.0 with the following CIDs:

731, 462, 37, 130, 132, 310, 417, 732, 733, 734, 800, 811, 866, 890, 1073, 1080, 1135, 1146, 1185, 1186, 1246, 133, 134, 135, 136, 137, 138, 600, 139, 170, 311, 327, 328, 332, 334, 335, 433, 450, 463, 464, 735, 736, 737, 801, 802, 829, 891, 986, 1079, 1136, 140, 141, 142, 419, 451, 452, 465, 738, 739, 740, 803, 804, ~~1076~~, 1077, 1138, 1139, 1140, 1147

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revision based on the discussion during the presentation. Remove CID 1076 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 D1.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGba D1.0 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** |
| 731 | Minyoung Park | 56.42 | 31.7 | In subclause 31.7 Wake-up Operation, an AP that supports WUR frame transmission should be called "WUR AP" and a non-AP STA that can receive WUR frames should be called "WUR non-AP STA". Replace "AP" to "WUR AP" and "non-AP STA" to "WUR non-AP STA" in the subclause 31.7. | As shown in the comment. | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 731. |
| 462 | John Buffington | 56.42 | 31.7 Wake-up Operation | The term "AP" should be replaced with "WUR AP" throughout this section. | Replace "AP" with "WUR AP" when appropriate within this section. | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 731. |
| 37 | Albert Petrick | 57.13 | 31.7.1 | Critical update is reference in this clause and in other clauses. Provide a Note: describing and example of a "critical update" |  | Revised –  Agree in principle with the commenter. We provide reference for the definition of critical update.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 37. |
| 130 | Alfred Asterjadhi | 56.62 | 31.7.1 | WUR ID rather than WID. Similar consideration for the third bullet (found in the next page). | As in comment. | Accepted – |
| 132 | Alfred Asterjadhi | 57.09 | 31.7.1 | This is already clear from the WUR frame format definition. Do we need the note? Please remove it. | As in comment. | Accepted - |
| 310 | Hanseul Hong | 57.03 | 31.7.1 | The WUR Wake-up frame with GID or multiple WID may also indicate the Group addressed buffered BU. However, the text only describes the indication of group addressed buffered BU in broadcast WUR Wake-up frame | add more description | Rejected –  When the WUR Wake-up frame contains the GID, the WUR Wake-up frame is group addressed rather than broadcast addressed. As a result, there is no indication for group addressed BUs  When the WUR Wake-up frame contains a list of WIDs, there is no Misc field. As a result, there is no indication for group addressed BUs |
| 417 | James Lepp | 56.64 | 31.7.1 | This sentence refers to waking up when receiving a Group ID of which the non-AP STA is a member. This "is a member" concept hasn't been defined anywhere else in the document. How does a WUR STA become a member of a Group ID. Describe "member" or use the terminology elsewhere such as "assigned Group IDs" | change "is a member" to "has been assigned". | Revised -  Agree in principle with the commenter. We revise with “including the non WUR non-AP STA.”  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 417. |
| 732 | Minyoung Park | 57.01 | 31.7.1 | The following sentence should include the value of the Address field when the list of identifiers are included in the Frame Body field and "identifiers" should clarified by replacing with "WIDs": "The WUR Wake-up frame has a list of identifiers in the Frame Body field where one of the identifiers identifies the non-AP STA."  Replace the sentence with the following: "The Address field of the WUR Wake-up frame is set to 0 and has a list of WIDs in the Frame Body field where one of the WIDs identifies the WUR non-AP STA." | As shown in the comment. | Revised –  Agree in principle with the commenter. The setting of Address field is provided in 9.10.3.2 WUR Wake-up frame format. To avoid duplicate technical statement, we only provide reference for the setting of Address field.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 732. |
| 733 | Minyoung Park | 57.04 | 31.7.1 | "the" missing in front of "Group Addressed BU subfield". | As shown in the comment. | Accepted - |
| 734 | Minyoung Park | 57.08 | 31.7.1 | The following note could be interpreted as if the broadcast WUR Wake-up frame can be a VL WUR frame: "NOTE--The Misc field is present in a broadcast WUR Wake-up frame only if the Length Present subfield of the broadcast WUR Wake-up frame is set to 0." In the current draft, an individually addressed, group addressed, and broadcast WUR Wake-up frame is a ML WUR frame and a WUR Wake-up frame can be only a VL WUR frame if the Address field is set to 0. | Delete the note. | Accepted - |
| 800 | Patrice Nezou | 56.62 | 31.7.1 | The word "WID" is never defined. Please define. | As in comment | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 130. |
| 811 | Peter Ecclesine | 56.48 | 31.7.1 | STAs have no intentions. There are six uses of 'intends' in the text. Rewrite text to say what STAs do. | that the AP will have PCR operation as described ... | Rejected –  “Intend to” is used very frequent in the baseline spec. Hence, we think it is allowed to use “intend to”. |
| 866 | Pooya Monajemi | 57.12 | 31.7.1 | Transmit a broadcast frame to a non-AP STA seems incorrect | AP may transmit a broadcast WUR frame to its associated non-AP STAs | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 866. |
| 890 | Rojan Chitrakar | 57.08 | 31.7.1 | The NOTE seem to imply that the Length Present subfield of broadcast WUR Wake-up frame may also be set to 1, which I believe is not true since broadcast WUR Wake-up frames are ML WUR frames. | Either remove the NOTE or change it to: NOTE: The Length Present subfield of a broadcast WUR Wake-up frame is always set to 0. | Revised –  Agree in principle with the commenter. We remove the note.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 132. |
| 1073 | Woojin Ahn | 56.62 | 31.7.1 | WIDs --> WUR IDs | WIDs --> WUR IDs | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 130. |
| 1080 | Woojin Ahn | 57.01 | 31.7.1 | When a multiple number of WUR STA wake-up simulatneously by a VL WUR Wake-up frame, medium contention will increase as they attempt to transmit a response frame to the AP. It could be beneficial if AP could schedule the wake-up timing of multiple STAs receiving the VL WUR Wake-up frame. The 4 reserved bits in the STA Info field can be used for this purpose. | As in comment | Rejected –  The identified problem already exists in PCR operation (ex. PS- Poll transmission after TIM indication). There are existing schemes to deal with the contention, and TGba does not need to invent new schemes for the contention problem. |
| 1135 | Xiaofei Wang | 57.15 | 31.7.1 | "field" is missing after TD Control | add "field" after "TD Control" | –Revised –  Agree in principle with the commeter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 1135. |
| 1146 | Yongho Kim | 57.04 | 31.7.1 | It is not clear when the AP tried to wake STAs up in order to deliver group addressed buffered BU(s) via a groupcast/multicast WUR wake-up frame. | Define the procedure and add the text. | Rejected –  An AP wakes STAs up to deliver group addressed BUs via wake-up frame when the AP has group addressed Bus for the STAs. |
| 1185 | yujin noh | 57.08 | 31.7.1 | NOTE does not provide any additional information. Delete it. Regardless of whether it is broadcast WUR Wake-up frame, if the Length Present subfield is set to 0, then the Misc field is present. Take a look at the description at P40L26 | as in comment | Revised –  Agree in principle with the commenter. We remove the note.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 132. |
| 1186 | yujin noh | 57.12 | 31.7.1 | There is no clear definition of broadcast WUR Wake-up frame and how to set it even though it happens to be shown many times through the spec. add somewhere what it is or the corresponding reference. | as in comment | Revised –  Agree in principle with the commenter. The definition is provided in 31.3.2. We provide the reference.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 1186. |
| 1246 | Yunsong Yang | 57.13 | 31.7.1 | In the last sentence, it should be the availability of the critical update, not the critical update itself, being indicated in the counter field. | Change "The critical update is indicated in the Counter field of the TD Control." to "The availability of the critical update is indicated in the Counter field of the TD Control field." | Revised –  Agree in principle with the commenter. We use “has occurred”, which is used in the baseline text.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 1246. |
| 133 | Alfred Asterjadhi | 57.27 | 31.7.2 | It needs to be clear that the scheduled transmission is via the PCR in this case. Also the note that follows is not clear. Does it mean that the AP can send other frames or does it mean that the limitation does not apply only to individually addressed frames? | As in comment. | Revised –  Agree in principle with the commenter. Revise the sentence to clarify the operation.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 133. |
| 134 | Alfred Asterjadhi | 57.41 | 31.7.2 | What is the Address field of the WUR Wake Up frame set to when the AP sets the Group Addressed BU bit to 1. Please clarify. | As in comment. | Revised –  Agree in principle with the commenter. Reference for the Address field setting of a broadcast WUR wake-up frame is provided.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 1186. |
| 135 | Alfred Asterjadhi | 57.49 | 31.7.2 | Need to clarify what is the condition satisfied for "i.e., prior to delivering the group addressed BUs" | As in comment. | Rejected –  The conditions are met for the following “When the AP schedules a transmission of group addressed buffered BU(s) through PCR to the non-AP STA” |
| 136 | Alfred Asterjadhi | 57.57 | 31.7.2 | The AP can send Trigger frames only to HE STAs. | As in comment. | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 136. |
| 137 | Alfred Asterjadhi | 58.12 | 31.7.2 | The HE elements are missing in this list. Please add them. | As in comment. | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 137. |
| 138 | Alfred Asterjadhi | 58.28 | 31.7.2 | I might be missing the reason why the AP would be including the WUR Operation element in this case. Cant the AP simply send a Probe Response that contains the updated elements rather than making the STA go to check the Beacon frames again? | As in comment. | Revised -  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 138. |
| 600 | Mark Hamilton | 23.01 | 9 | Where is it stated that WUR frames are not acknowledged? (I think they are not, right?) | Somwhere, (clause 9? Clause 11?) it should say that WUR frames do not get acknowledged, or shall be sent with an appropriate (No Ack?) acknowledgement policy, or equivalent. | Rejected –  Individual WUR Wake-up frame has a timeout mechanism as described in 31.7.2. In the timeout period, if the AP that sends the wake-up frame receives a response from the STA through PCR, then the transmission is successful.  Note that WUR non-AP STA does not have the capability to transmit WUR PPDU as described in 4.3.15a Wake-up radio (WUR) STA. |
| 139 | Alfred Asterjadhi | 58.51 | 31.7.2 | These two sentences can be merged into one sentence and placed as a note, indicating also that they are out of scope of the standard. | As in comment. | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 139. |
| 170 | Bin Tian | 58.09 | 31.7.2 | "The following events shall classify as a critical update" change to shall be classified | as in the comment | Accepted - |
| 311 | Hanseul Hong | 57.58 | 31.7.2 | The details of mechanism to transmit the response frame and the buffered BU for multi-user operation(MU-MIMO, MU OFDMA) should be described | Clarify | Rejected –  11ax has already defined all the required sequence, and 11ba does not need to repeat all the allowed sequence. |
| 327 | Ihtisham Khalid | 57.22 | 31.7.2 | Only abbreviation is used for "APSD" | please mention full form when it is used for the first time in text. | Rejected –  APSD is defined in 802.11-2016. See 3.2 Definitions specific to IEEE Std 802.11. |
| 328 | Ihtisham Khalid | 57.22 | 31.7.2 | Only abbreviation is used for "TWT" | please mention full form when it is used for the first time in text. | Rejected –  TWT is defined in 802.11-REVmd D1.6. See 3.2 Definitions specific to IEEE Std 802.11. |
| 332 | Ihtisham Khalid | 57.22 | 31.7.2 | Only abbreviation is used for "PM" | please mention full form when it is used for the first time in text. | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 332. |
| 334 | Ihtisham Khalid | 57.43 | 31.7.2 | Only abbreviation is used for "DTIM" | please mention full form when it is used for the first time in text. | Rejected –  DTIM is defined in 802.11-2016. See 3.2 Definitions specific to IEEE Std 802.11. |
| 335 | Ihtisham Khalid | 57.43 | 31.7.2 | Only abbreviation is used for "FMS" | please mention full form when it is used for the first time in text. | Rejected –  FMS is defined in 802.11-2016. See 3.2 Definitions specific to IEEE Std 802.11. |
| 433 | Jarkko Kneckt | 57.22 | 31.7.2 | Please be more precise on the "baseline PM change". Please clarify what is the baseline PM change. Please explain how this agreement to use PM change is signaled. | Please clarify. | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 332. |
| 450 | Jinsoo Ahn | 57.57 | 31.7.2 | Basically, AP operation after wake-up frame transmission follows "the agreed PS operation". However, it is also indicated that "An AP that sends a WUR Wake-up frame to the STA(s) may send a Trigger Frame to solicit response frames from one or more STAs.". | Define additional procedures or signaling methods when an AP try to transmit a trigger frame to solisit response frames from non-AP STA(s). | Rejected –  Sending Trigger frame can already be part of the existing PS operation like TWT. |
| 463 | John Buffington | 58.51 | 31.7.2 AP Operation | "implementation specific value" needs to be defined. | The specification refers to an "implementation specific value" which should be defined, or at minimum given a reference that identifies a reasonable set of values. | Revised –  Agree in principle with the commenter. We add a description that defining this value is out of scope of this standard.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 139. |
| 464 | John Buffington | 58.54 | 31.7.2 AP Operation | "implementation specific value" needs to be defined. | The specification refers to an "implementation specific value" which should be defined, or at minimum given a reference that identifies a reasonable set of values. | Revised –  Agree in principle with the commenter. We add a description that defining this value is out of scope of this standard.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 139. |
| 735 | Minyoung Park | 57.51 | 31.7.2 | The following sentence is hard to understand: "The maximum PCR transition delay indicated by all the non-AP STAs in the WUR Capabilities elements, that are not in awake state and have negotiated WUR service with AP, following the most recent transmitted WUR Wake-up frame indicating buffered group addressed BU(s) of PCR has expired."  Replace the sentence as follows: "The maximum PCR transition delay following the most recently transmitted WUR Wake-up frame indicating buffered group addressed BU(s) of PCR has expired. The maximum PCR transition delay is defined as the maximum value of the PCR transition delay values in the WUR Capabilities elements indicated by all the WUR non-AP STAs that are not in awake state and have negotiated WUR service with the WUR AP." | As shown in the comment. | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 735. |
| 736 | Minyoung Park | 58.34 | 31.7.2 | Typo: "-" missing: "Wake up" should be "Wake-up" | As shown in the comment. | Accepted - |
| 737 | Minyoung Park | 58.41 | 31.7.2 | "the" missing before "Address field". | Replace "Address field" with "the Address field" | Accepted - |
| 801 | Patrice Nezou | 57.57 | 31.7.2 | "An AP that sends a WUR Wake-up frame to the STA(s) may send a Trigger Frame to solicit response frames from one or more STAs."  What is the utility of this sentence ? Please remove if useless. | As in comment | Rejected –  The sentence is used to describe that sending a Trigger frame can be done by the AP that sends the WUR wake-up frame. |
| 802 | Patrice Nezou | 58.40 | 31.7.2 | If the AP never sends WUR Wake-up frames but receives response frames from non-AP STAs that are not sollicited, it means that the transmit ID of the AP may be used by another AP or the WUR ID of the sending non-AP STA is already in use by another non-AP STA. | Add a procedure to detect that some WUR IDs or its transmit ID is already in use. Add a mechanism to define a new one and to warn all others non-AP STAs. | Rejected –  Non-AP STA can wake up by themselves for whatever reason. Classifying the non-AP STA automatic wake up as false wake up does not solve any problem. |
| 829 | Po-Kai Huang | 57.18 | 31.7.2 | Add descriptions to mandate that AP shall not transmit WUR wake-up frame to a non-AP STA with data rate that are not supported by the non-AP STA. Likely, describing the condition for all variants of WUR wake-up frame like unicast addressed, group addressed, broadcast, and a list of WIDs in the framebody. | As in comment. | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 829. |
| 891 | Rojan Chitrakar | 57.48 | 31.7.2 | "the non-AP STA" shouls be "non-AP STAs". | as in comment | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 891. |
| 986 | Sung Hyun Hwang | 58.10 | 31.7.2 | The rule of increasing BSS Parameter Counter number exists for critical update. However, since there is no mandatory rule to transmit broadcast Wake-up frame for the updated Counter number, the STA may not be indicated the updated Counter number | Define a specific procedure to indicate the updated Counter number | Rejected –  It is up to AP to decide the appropriate time to send the wake-up frame indicaintg critical update. |
| 1079 | Woojin Ahn | 58.42 | 31.7.2 | In PCR, whenever a STA enters awake state from doze state, it should perfrom NAV sychronization. Therefore, the timeout value should consider not only the PCR transition delay but also NAVSyncDelay | AP waits for a timeout interval that is larger than the sum of the PCR transition delay indicated by the non-AP STA in the WUR Capabilities elements and the NAVSyncDelay | Rejected –  NAVSyncDelay is an implementation specific value, and only non-AP STA itself knows the value. |
| 1136 | Xiaofei Wang | 57.27 | 31.7.2 | It seems that this paragraph is discussing PCR operations and should clearly state so. | add "using the PCR" after "non-AP STA" | Revised –  Agree in principle with the commenter. Revise the sentence to clarify the operation.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 133. |
| 140 | Alfred Asterjadhi | 58.60 | 31.7.3 | I notice several indpendent subclauses contain similar normative behaviors which may lead to duplicates and inconsistencies throughout. Please ensure that this is not the case. This is mainly the case on the behavior specified in this paragraph and the subsequent two ones. | As in comment. | Rejected –  The first paragraph is about retrieving individually addressed BUs. The third paragraph is about retrieving group addressed BUs. The fifth pagraph is about getting PCR parameter update. These three paragraphs describe different procedures. |
| 141 | Alfred Asterjadhi | 59.16 | 31.7.3 | I see different uses of WUR STA, STA with dot11WUROptionImplemented equal to true and so on. Please use the same terminology throughout. E.g., just define what a WUR STA and WUR AP is and use it througout. | As in comment. | Revised –  Agree in principle with the commenter.  STA with dot11WUROptionImplemented equal to true means WUR STA. Since we are in clause 31, all the descriptions are for WUR STA. As a result, we remove “dot11WUROptionImplemented equal to true.”  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 141. |
| 142 | Alfred Asterjadhi | 59.27 | 31.7.3 | The term response frame here is confusing. This can be confused with Acks and so on. The intention here is that any frame sent by the STA via the PCR will act as a response to the WUR frame reception. Maybe state the possible cases, Ps-Poll, QoS Null and APSD triggers and so on. | As in comment. | Revised –  Agree in principle with the commenter. We remove “response”.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 142. |
| 419 | James Lepp | 59.06 | 31.7.3 | non-AP STA behaviour upon receiving a group-addressed WUR Wake-up Frame is insufficient. Group addressed WUR may contain indication bit which needs to be followed with different PCR behaviour depending if individual or group frames are buffered. | A non-AP STA that receives a WUR Wake-up frame with a Group Address which it had previously been assigned may furth check the indication of buffered group addressed BU(s) in the Misc Field. If it is set to 0 it shall follow individually addressed behaviour as above. If it is set to 1 it shall follow existing PCR operation for group addressed frames, which is any PS operation that the AP and the 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. | Rejected –  Only broadcast frame, i.e., the address field equal to TXID, has indication of group addressed buffered BU. See 31.7.1. |
| 451 | Jinsoo Ahn | 59.05 | 31.7.3 | Indication of buffered group addressed BU(s) can vary if 11ba allows multiple STAs wake-up via a groupcast/multicast WUR wake-up frame. | Define and add text for the groupcast/multicast wake-up precedure with indication of buffered group addressed BU(s). | Rejected –  Only broadcast frame, i.e., the address field equal to TXID, has indication of group addressed buffered BU. See 31.7.1. |
| 452 | Jinsoo Ahn | 59.27 | 31.7.3 | Basically, non-AP operation after receiving wake-up frame follows "the agreed PS operation". However, it is also indicated that "A non-AP STA should send a response frame to the associated AP using its PCR component after receiving a WUR Wake-up frame with Address field set to the WID that identifies the non-AP STA.". | Define specific additional procedures when an non-AP STA have received a WUR wake-up frame with Address field set to the WID that identifies the non-AP STA. | Rejected –  Existing PS operation like Ps-Poll or U-APSD already requires a STA to send a frame to retrieve individually addressed BUs.  Existing PS operation like TWT may not require the STA to send a frame. The descriptions do not conflict with each other. Note that it is a “should” requirement rather than a “shall” requirement. |
| 465 | John Buffington | 58.61 | 31.7.3 non-AP STAOperation | "the" is missing | Insert "the" within the sentence. "...which is any PS operation the AP and the non-AP STA..." | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 465. |
| 738 | Minyoung Park | 58.60 | 31.7.3 | In the following sentence, "the indication of individually addressed BU" is not clear: "A non-AP STA that receives a WUR Wake-up frame addressed to itself with an indication of individually addressed buffered BU(s) shall follow existing PCR operation, ..."  Replace the sentence with the following: "A WUR non-AP STA that receives an individually addressed WUR Wake-up frame with the Address field set to the WID assigned to the WUR non-AP STA, which indicates that the WUR AP has individually addressed BU(s) for the WUR non-AP STA, shall follow existing PCR operation, ..." | As shown in the comment. | Revised –  Agree in principle with the commenter.  As described in 31.7.1, there are multiple ways to indicate individually addressed BUs. We simply add a reference.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 738. |
| 739 | Minyoung Park | 59.05 | 31.7.3 | In the following sentence, "the indication of buffered group addressed BU(s)" is not clear: "A non-AP STA that receives a WUR Wake-up frame with an indication of buffered group addressed BU(s) shall follow existing PCR operation, ..."  Replace the sentence with the following: "A WUR non-AP STA that receives a group addressed WUR Wake-up frame with the Address field set to the group ID assigned to the WUR non-AP STA, which indicates that the WUR AP has group addressed BU(s) for the WUR non-AP STA, shall follow existing PCR operation, ..." | As shown in the comment. | Revised –  Agree in principle with the commenter.  Indication of group addressed BUs is described in 31.7.1. We simply add a reference.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 739. |
| 740 | Minyoung Park | 59.19 | 31.7.3 | In the following sentence: "A non-AP STA that receives the Counter subfield of the TD Control field in a WUR Wake-up frame that contains a value that is different from the value of its BSS Parameter Update Counter shall follow the procedure defined in 11.2.3.15 (TIM Broadcast) to attempt to receive the PCR Beacon information subject to its PCR delay constraints.", "the PCR Beacon" can be replaced by "Beacon" since there is only one Beacon frame defined in the baseline standard and "subject to its PCR delay constraints" is redundent because any frame transmitted by the PCR component can be only received after the PCR delay constraint.  Replace the sentence with the following: "A non-AP STA that receives the Counter subfield of the TD Control field in a WUR Wake-up frame that contains a value that is different from the value of its BSS Parameter Update Counter shall follow the procedure defined in 11.2.3.15 (TIM Broadcast) to attempt to receive a Beacon frame." |  | Revised –  Agree in principle with the commenter.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 740. |
| 803 | Patrice Nezou | 59.27 | 31.7.3 | "A non-AP STA should send a response frame to the associated AP using its PCR component after receiving a WUR Wake-up frame with Address field set to the WID that identifies the non-AP STA."  Receiving a WUR Wake-up frame must be checked with the Address Field AND the FCS field. Checking the Address field is necessary but not sufficient. |  | Rejected –  In baseline, it is well known that receiving a frame means that the FCS field is checked. As a result, checking FCS is not mentioned in every occasion. Similarly, in WUR, we follow this convention. |
| 804 | Patrice Nezou | 59.27 | 31.7.3 | "A non-AP STA should send a response frame to the associated AP using its PCR component after receiving a WUR Wake-up frame with Address field set to the WID that identifies the non-AP STA."  If multiple WUR frames are received and cancelled after FCS check, the WUR ID can be already in use by another non-AP STA. | Please add a mechanism for the non-AP STA to warn the AP that its WUR ID is already in use. | Rejected –  FCS check fails can be due to transmission error. Classifying this sitation as WUR ID collision is not accurate. |
| ~~1076~~ | ~~Woojin Ahn~~ | ~~59.01~~ | ~~31.7.3~~ | ~~For a non-AP STA using both U-APSD and PSP, each of PS-poll and U-APSD trigger is used for retrieving BUs from different ACs. However, the non-AP STA may not know from which AC it should retrieve BUs, and in the worst case, STA may not retrieve any BUs after receiving a Wake-up frame unless it responds with an expected polling frame. A remedy to address this issue is necessary~~ | ~~Need more clarification how a WUR STA can choose one of the agreed PS operation in response to WUR Wake-up frame~~ | ~~Rejected –~~  ~~In the current TIM element, the AP also does not indicate which AC for the buffered individually addressed traffic. Existing operation already handles this case with implementation specific method.~~ |
| 1077 | Woojin Ahn | 59.28 | 31.7.3 | WIDs --> WUR IDs | WIDs --> WUR IDs | Accepted - |
| 1138 | Xiaofei Wang | 58.60 | 31.7.3 | The sentence "A non-AP STA that receives a WUR Wake-up frame addressed to itself with an indication of individually addressed buffered BU(s)" seems to imply that there is an indication in the WUR wake up frame for individually addressed buffered Bus? Such an indication is not described in Clause 9, please calrify. | please clarify. | Revised –  Agree in principle with the commenter.  As described in 31.7.1, there are multiple ways to indicate individually addressed BUs. We simply add a reference.  TGba editor, please make changes as shown in doc 11-18/1847r1 under all headings that include CID 738. |
| 1139 | Xiaofei Wang | 58.61 | 31.7.3 | A WUR non-AP STA needs to first turn on its PCR and then follow the PCR procedure to retrieve packets. The step of "turning on PCR" is an essential step (part of the wake up procedure) and should be specified in the text. | add the phrase "turn on PCR" in front of "follow existing PCR operation" | Rejected –  “turn on PCR” is not accurate, and the correct workding is “non-AP STA is in awake state”.  However, adding “non-AP STA is in awake state” is redundant for following exsiting PCR operation because the current spec does not say “a non-AP STA is in awake state to send Ps-Poll frame or U-APSD trigger frame.” |
| 1140 | Xiaofei Wang | 59.21 | 31.7.3 | A WUR non-AP STA needs to first turn on its PCR and then follow the PCR procedure to conduct parameter update. The step of "turning on PCR" is an essential step (part of the wake up procedure) and is not part of the procedure already described (in the procedure described, the PCR is already turned on) and should be specified in the text. | add the phrase "turn on PCR" in front of "follow the procedure" | Rejected –  “turn on PCR” is not accurate, and the correct workding is “non-AP STA is in awake state”.  However, adding “non-AP STA is in awake state” is redundant for following exsiting PCR operation because the current spec does not say “a non-AP STA is in awake state to send Ps-Poll frame or U-APSD trigger frame.” |
| 1147 | Yongho Kim | 59.20 | 31.7.3 | Change 'TD Control field in a WUR Wake-up frame' to 'TD Control field in a broadcast WUR Wake-up frame' | Change it | Accepted – |

**Discussion:** *None.*

**Propose:** Revised for CID 731, 37, 130, 132, 133, 417, 732, 733, 866, 1135, 1186, 1246, 136, 137, 138, 139, 170, 332, 736, 737, 829, 891, 735, 141, 142, 465, 738, 739, 740, 1077, 1147 per discussion and editing instructions in 11-18/1847r1.

***TGax editor: In clause 31, add “WUR” in front of “AP” if the “WUR” prefix does not exist. In clause 31, add “WUR” in front of “non-AP STA” if the “WUR” prefix does not exist.(#731)***

***TGax editor: Change 31.1 Introduction as follows: (Track change on)***

**31. Wake-Up Radio (WUR) MAC specification  
31.1 Introduction**

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

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

***TGax editor: Change 31.7 Wake-up Operation as follows: (Track change on)***

* Wake-up Operation
* General

An AP may send a WUR Wake-up frame to an associated(#866) non-AP STA as described in 31.6.3 (AP operation) to notify the non-AP STA that the AP intends to have PCR operation with the non-AP STA as described in 31.7.2 (AP Operation) and 31.7.3 (non-AP STA Operation).

An AP shall not send a WUR Wake-up frame to associated non-AP STA(s) with data rate that is not supported by the non-AP STA(s).(#829)

If the AP and the non-AP STA support traffic filtering service (TFS) as specified in 11.22.12 (TFS Procedures), then the AP and the non-AP STA may reuse existing traffic filter sets to control the WUR Wake-up frame transmission as described in 31.7.2 (AP Operation).

The AP may transmit a WUR Wake-up frame to an associated(#866) non-AP STA to indicate that individually addressed BU(s) are available for the non-AP(#866) STA via the PCR. The WUR Wake-up frame shall satisfy any of the conditions below:

* The Address field of the WUR Wake-up frame contains a WUR(#130) ID that identifies the non-AP STA.
* The Address field of the WUR Wake-up frame contains a group ID that identifies a group of non-AP STAs that includes the non-AP STA(#417).

The WUR Wake-up frame has a list of identifiers in the Frame Body field where one of the identifiers identifies the non-AP STA (See 9.10.3.2 (WUR Wake-up frame format))(#732).

The AP may transmit a broadcast WUR wake-up frame (see 31.3.2 (Transmit ID))(#1186) with the(#733) Group Addressed BU subfield of the Misc field set to 1 to indicate that group addressed buffered BU(s) are available for all the associated non-AP STA(s) (#866) via the PCR.

(#132)The AP may transmit a broadcast WUR Wake-up frame to associated non-AP STA(s) (#866) to indicate that a critical update to the PCR’s BSS parameters has occurred(#1246) for the associated non-AP STA(s) (#866) (#1246)(see 31.7.2 (AP Operation))(#37). The critical update is indicated in the Counter subfield of the TD Control field(#1135).

* AP Operation

An AP that transmits a WUR Wake-up frame to a non-AP STA that indicates the availability of individually addressed buffered BU(s) via the PCR shall follow the existing PCR operation, which is any PS operation that the AP and the non-AP STA has agreed to use (e.g., baseline active mode and PS mode(#332) change, U-APSD, TWT, 139etc.), to deliver individually addressed buffered BU(s) to the non-AP STA. Individually addressed buffered BU(s) are delivered at specific times, which are provided along with the agreed PS operation.

When the AP schedules a transmission to the non-AP STA using the PCR component(#133), the AP shall ensure that either of the conditions below is met:

* The PCR transition delay indicated by the non-AP STA in the WUR Capabilities elements following the most recent transmitted WUR Wake-up frame intended to the non-AP STA has expired.
* The non-AP STA has indicated that it is in awake state by transmitting a frame through the PCR to the AP.

NOTE—The frames scheduled by the AP to be delivered via the PCR are not limited to individually addressed buffered BU(s) only.

An AP that transmits a broadcast(#1186) WUR Wake-up frame to a non-AP STA that indicates the availability of group addressed buffered BU(s) via the PCR shall follow existing PCR operation, which is any PS operation that the AP and the non-AP STA has agreed to use (e.g., DTIM, FMS, etc.), to deliver group addressed buffered BU(s) to the non-AP STA. Group addressed buffered BU(s) are delivered at specific times, which are provided along with the agreed PS operation.

When the AP schedules a transmission of group addressed buffered BU(s) through PCR to the non-AP STA(s)(#891), the AP shall ensure that the following condition is met:

* The maximum PCR transition delay following the most recently transmitted WUR Wake-up frame indicating buffered group addressed BU(s) of PCR has expired. The maximum PCR transition delay is defined as the maximum value of the PCR transition delay values in the WUR Capabilities elements indicated by all the non-AP STAs that are not in awake state, have negotiated WUR power management service with the AP, and are in WUR Mode.(#735)

An AP that sends a WUR Wake-up frame to the non-AP STA(s) may send a Trigger Frame to solicit response frames from one or more non-AP STAs that support the reception of the Trigger frame.(#136)

When a traffic filtering agreement is established for a non-AP STA in WUR Mode and Bit 1 of the TFS Action Code field is set to 1, then the AP should transmit a WUR Wake-up frame to the non-AP STA when the AP receives an individually addressed buffered BU destined to the non-AP STA that matches the traffic filter set.

When a traffic filtering agreement is established for a non-AP STA in WUR Mode and Bit 1 of the TFS Action Code field is set to 0, then the AP should not transmit a WUR Wake-up frame to the non-AP STA when the AP receives an individually addressed buffered BU destined to the non-AP STA that matches the traffic filter set.

An AP (#141)shall maintain a BSS Parameter Update Counter. The AP shall increase the value of the BSS Parameter Update Counter when a critical update occurs to any of the elements inside the Beacon frame. The following events shall be classified(#170) as a critical update:

* Inclusion of a Channel Switch announce element
* Inclusion of an Extended Channel Switch announce element
* Inclusion of a Wide Bandwidth Channel Switch element
* Inclusion of an Operating Mode Notification element
* Modification of the EDCA parameters
* Modification of the HT Operation element
* Modification of the VHT Operation element
* Modification of the HE Operation element(#137)
* Modification of the DSSS Parameter Set
* Inclusion of a Channel Switch Wrapper element

The AP shall include the current value of the BSS Parameter Update Counter in the WUR Parameter field in the WUR Operation element(#138). The AP shall include a WUR Operation element in the WUR Mode Setup frames if the Counter value in the WUR Operation element has been recently updated.

The AP shall include the current value of the BSS Parameter Update Counter in the Counter subfield of the TD Control field in all transmitted broadcast WUR Wake-up(#736) frames.

An AP may classify other changes in the Beacon frame as critical updates, which may include those that are described in 11.2.3.15 (TIM Broadcast).

After an AP sends a WUR Wake-up frame with the(#737) Address field set to a WUR(#130) ID that identifies a non-AP STA, the AP waits for a timeout interval that is larger than the PCR transition delay indicated by the non-AP STA in the WUR Capabilities elements:

* If the AP receives any transmission from the non-AP STA within the timeout interval, then the WUR Wake-up frame transmission is successful.
* Otherwise, the WUR Wake-up frame transmission fails, and the AP may retransmit the WUR Wake-up frame to the non-AP STA.

The methods by which an AP determines the exact value of the timeout interval and determines the number of retries after the transmission of individually addressed WUR Wake-up frame fails are implementation specific and out of scope of this standard. (#139)(#139)

* non-AP STA Operation

A non-AP STA that receives a WUR Wake-up frame addressed to itself with an indication of individually addressed buffered BU(s) (see 31.7.1 (General))(#738) shall follow existing PCR operation, which is any PS operation the associated(#465) AP and the non-AP STA has agreed to use (e.g., baseline PM change, U-APSD, TWT, etc.), to retrieve individually addressed buffered BU(s) and follow the wake up timing information (e.g., the next service period) that is provided along with the agreed PS operation.

NOTE—For example, rule b), c), and d) in 11.2.3.7 (Receive operation for STAs in PS mode) describes one operation for a non-AP STA to retrieve individually addressed buffered BU(s) using PS-Poll or U-APSD.

A non-AP STA that receives a WUR Wake-up frame with an indication of buffered group addressed BU(s) (see 31.7.1 (General))(#739) shall follow existing PCR operation, which is any PS operation that the AP and the 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.

NOTE—For example, rule e) in 11.2.3.7 (Receive operation for STAs in PS mode) describes one operation for a non-AP STA to receive group addressed frame.

A non-AP STA (#141)shall maintain a BSS Parameter Update Counter. The non-AP(#141) STA shall update the value of its BSS Parameter Update Counter to the value of the Counter subfield contained in the latest WUR Operation element received from the AP with which it is associated. A non-AP STA that receives the Counter subfield of the TD Control field in a broadcast(#1147) WUR Wake-up frame that contains a value that is different from the value of its BSS Parameter Update Counter shall follow the procedure defined in 11.2.3.15 (TIM Broadcast) to attempt to receive the (#740)Beacon information(#740).

A non-AP STA should send a (#142)frame to the associated AP using its PCR component after receiving a WUR Wake-up frame with Address field set to the WUR(#1077) ID that identifies the non-AP STA.