IEEE P802.11
Wireless LANs

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| Comment resolutions for 9.10.1 and 9.10.2 |
| Date: 2018-11-01 |
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Abstract

This submission proposes resolutions for multiple comments related to TGba D1.0 with the following CIDs (47 CIDs):

* 84, 85, 86, 288, 289, 290, 291, 316, 377, 378,
* 379, 380, 381, 383, 384, 385, 386, 412, 523, 524,
* 597, 598, 599, 610, 785, 786, 847, 848, 849, 1110,
* 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1144, 1165,
* 1166, 1167, 1168, 1234, 1235, 1236, 1237

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Incorporated comments received from Rojan. Changes in green.

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. This introduction is 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.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 84 | Alfred Asterjadhi | 40.33 | Duplicated sentence. Delete one. | Delete this sentence. | Revised –Agree with the comment. Incorporated.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 84. |
| 85 | Alfred Asterjadhi | 42.07 | Please use font 9 for all notes. Apply throughout the draft. | As in comment. | Accepted |
| 86 | Alfred Asterjadhi | 42.16 | If it contains the 16 LSBs of the C-BSSID then it is obvious it is 16 bits. Remove "is 16 bits in length and" | As in comment. | Revised –Agree with the comment. Incorporated.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 86. |
| 288 | Ganesh Venkatesan | 38.37 | Inconsistency -- use of {ML|VL} WUR in and nonzero length frame body field in Table 9-318f. Avoids confusion if the usage is consistent. | Recommend using ML and UL WUR throughout the document. | Revised –Agree in principle with the comment. Incorporated.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 288. |
| 289 | Ganesh Venkatesan | 39.33 | "The Misc field is reserved unless explicitly stated otherwise." is repeated | Delete the repetition | Revised –Agree with the comment. Incorporated. Page number seems 1 page behind (referencing to CID 84 as GMT).TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 289. |
| 290 | Ganesh Venkatesan | 41.00 | Typo | Replace OUII with OUI | Rejected –Could not find any occurrence to OUII in the draft. Did also a broad search.  |
| 291 | Ganesh Venkatesan | 41.48 | There is no Length subfield. There is a Length/Misc subfield. | Replace 'Length subfield' with 'Length/Misc subfield' | Accepted |
| 316 | Hiroyuki Motozuka | 40.01 | "Type", "Length Present", "Length/Misc", and "Protected" are subfields, not fields. | Replace each "field" in line 1,23,26,27,29,30,33,35 and 37 with "subfield" | Revised –Agree with the comment. TGba editor: Replace “Type field” with “Type subfield” throughout the draft.TGba editor: Replace “Length Present field” with “Length Present subfield” throughout the draft.TGba editor: Replace “Length/Misc field” with “Length/Misc subfield” throughout the draft.TGba editor: Replace “Protected field” with “Protected subfield” throughout the draft. |
| 377 | James Lepp | 38.52 | The FCS contains either a 16-bit CRC or a 16-bit MIC based on what? | "An FCS, which contains either a 16-bit CRC or a 16-bit MIC depending on the value of the Protected subfield in the Frame Control field of the WUR header." | Revised –Agree with the comment. Incorporated as suggested.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 377. |
| 378 | James Lepp | 39.41 | Editorial: change "that has declared support of its reception" to "that has indicated support for the format in a WUR Capabilities element". Also are you writing this as a requirement on the AP that the AP needs to keep a list of WUR STAs and their capabilities and tx as appropriate, or a requirement on WUR STAs that they must support ML WUR frames. | Editorial: change "that has declared support of its reception" to "that has indicated support for the format in a WUR Capabilities element" | Revised –Agree in principle with the comment. This sentence is intended to be a declarative statement. Normative behaviors for different types of WUR frames are defined in their respective subclauses in 31. Proposed resolution is to specify in general that the STA supports its reception.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 378. |
| 379 | James Lepp | 39.41 | Editorial. Don't put this statement as a "NOTE", just add it as another sentence in the paragraph above. | Editorial. Don't put this statement as a note, just add it as another sentence in the paragraph above. | Revised –Agree with the comment. Incorporated as suggested.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 339. |
| 380 | James Lepp | 39.37 | The opposite of variable-length is fixed-length. |  | Revised –Agree with the comment. Incorporated as suggested. Used fixed length rather than ML.TGba editor: Replace “ML” with “FL” throughout the draft.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 380. |
| 381 | James Lepp | 39.37 | Add ML WUR and VL WUR to the acronym table in 3.4. They currently aren't defined as acronyms. | Add ML WUR and VL WUR to the acronym table in 3.4. They currently aren't defined as acronyms. I'd be equally satisfied if you just wrote out minimal-length and variable-length in full and not used the acronyms. | Revised –Agree with the comment. Incorporated as suggested (added acronyms). Used fixed length rather than ML as suggested by CID 380.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 381. |
| 383 | James Lepp | 40.31 | The sentence "The Misc field is reserved unless explicitly stated otherwise." is repeated twice. | Remove duplicate sentance | Accepted |
| 384 | James Lepp | 40.38 | The value of 1 indicates the frame is protected by a MIC. The value of 0 indicates the frame is protected by a CRC. Better explain the value of 0 in this paragraph. | Explain when its set to 0 | Revised –Agree with the comment. Incorporated as suggested.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 384. |
| 385 | James Lepp | 41.48 | Clarity | Change: "The minimum length and the maximum length of the Frame Body field are 2 octets and 16 octets, respectively." to "The minimum length of the Frame Body field is 2 octets and the maximum length of the Frame Body field is 16 octets." | Revised –Agree with the comment. Incorporated as suggested.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 385. |
| 386 | James Lepp | 42.01 | Suggest to change the title of 9.10.2.5.2 so that once integrated in the base standard there isn't confusion with this CRC calculation specific to WUR and the (802.11-2016 9.2.4.8) FCS CRC definition that applies to the rest of 802.11. | Change Cyclic Redundency Check (CRC) to WUR Cyclic Redundency Check (CRC). (and/or move this to chapter 31) | Revised –Agree with the comment. Incorporated as suggested (added for WUR frames).TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 386. |
| 412 | James Lepp | 42.42 | There are two spoce in figure 9-963c where it says "Frame Body (optional)". It would be more accurate to say "Frame Body (if present)". Yes this is an optional field, but its not optional for the CRC calculation - if it is present it is part of the calculation, if not present then its not used. | Change text in figure to "Frame Body (if present)". | Revised –Agree with the comment. Incorporated as suggested. TGba editor: Replace “Frame Body (optional)” with “Frame Body (if present)” twice in Figure 9-963c (CRC-16 implementationf or WUR MPDUs). |
| 523 | Lei Huang | 40.33 | "The Misc field is reserved unless explicitly stated otherwise." is duplicated. | remove the paragraph "The Misc field is reserved unless explicitly stated otherwise." | Accepted |
| 524 | Lei Huang | 42.59 | In figure 9-963c, "x4x3x2x1x0" is mssing in the input to the 1s Complement block. | "x4x3x2x1x0" should be included as a part of input to the 1s Complement block. | Revised –Agree with the comment. There is a visio problem with the figure. The line should not point to the middle polynomial but rather to the right-most polynomial. TGba editor: Move the right line that starts from the “1S COMPLEMENT” block so that it ends in the middle of the block with x4x3x2x1x0 polynomial (keep height). |
| 597 | Mark Hamilton | 38.49 | The "Address" field in a WUR frame isn't really an addresss (in the usual sense), but is just a locally assigned ID within the BSS. Why not call it a Destination ID, or something similar, to avoid confusion? | Rename "Address" field of WUR frame to "Dest ID" throughout the amendmnet. | Revised –Agree in principle. Proposed resolution accounts for the suggestion (in principle)TGba editor: Replace “Address” with “ID” throughout the draft when it refers to the name of a field of the WUR frame. |
| 598 | Mark Hamilton | 39.33 | This paragraph is redundant with the above information that says the Frame Body is optionally present. | Delete the cited paragraph. | Accepted |
| 599 | Mark Hamilton | 39.37 | This information is closely related to the Frame Body optionality, described above. | Append this paragraph to the paragraph above (line 25) about the Frame Body being optional. | Revised –Agree with the comment. Incorporated as suggested (simpler to move the sentence of the FCS field).TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 599. |
| 610 | Mark Hamilton | 42.05 | 802.11 style does not put defined terms in italics | Change "calculation fields" to normal font, throughout the amendment. | Rejected –Same italicization can be found in REVmd D1.5 in P807L52. Quoting:The FCS field is a 32-bit field containing a 32-bit CRC. The FCS is calculated over all of the fields of the MAC header and the Frame Body field. These are referred to as the *calculation fields*.As such suggestion is to keep it as currently is. |
| 785 | Osama Aboulmagd | 39.60 | What "Misc." is? What does it stand for? | as in comment | Rejected –The comment fails to identify a technical issue and is asking a question. Misc is the name of the field.  |
| 786 | Osama Aboulmagd | 40.31 | The sentences on line 31 and line 33 are repetitive. Delete one of them | as in comment | Accepted |
| 847 | Po-Kai Huang | 39.38 | When a WUR frame that has a Frame Body field is transmitted, the length of the Frame Body field is fixed rather than variable. For WUR Discovery frame, the Frame Body field also has a fixed length. It maybe better to use a different name rather than using VL WUR frame. | Use Non minimal length (NML) WUR frame. | Rejected –This seems to be a filosophycal question. Did “ML” come before the “VL or the other way around? From a technical perspective please note that all WUR frames that contain the Frame Body are variable length, independently of the type because the Length field indicates the length of the WUR frame, and that can change. For example, while the WUR Discvovery frame as of now has a predetermined FB size it is possible that in new amendments more fields may be added which will make it variable length. |
| 848 | Po-Kai Huang | 42.33 | Define WUR MPDU in Clause 3. | As in comment. | Revised –Agree with the comment. Defined.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 848. |
| 849 | Po-Kai Huang | 41.26 | In convention, we have the following description for bit order. It looks like we should have OU1 be the 12 LSB of the OUI. "In figures, all bits within fields are numbered, from 0 to k, where the length of the field is k + 1 bits. Bits within numeric fields that are longer than a single bit are depicted in increasing order of significance, i.e., with the lowest numbered bit having the least significance." | As in comment. | Revised –Agree with the comment. Specified as LSBs.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 849. |
| 1110 | Xiaofei Wang | 39.33 | The sentence seems to just reiterate the frame format defined abvoe "The MAC header and the FCS field (#Ed) constitute the minimal WUR frame format and are present in all WUR frames, including reserved types." and is repetitive. | remove the sentence "The MAC header and the FCS field (#Ed) constitute the minimal WUR frame format and are present in all WUR frames, including reserved types." | Accepted |
| 1111 | Xiaofei Wang | 39.41 | This note covers normative behavior and should be taken out of the note and mvoe to Clause 31. | Change the note into normative text and move to Clause 31 | Rejected –The spec has already normative behavior related to this capability bit. No further changes are needed for this CID. Quoting from 31.3: “The AP shall not include the WUR ID of a WUR STA that does not support reception of VL WUR frames (see 9.4.2.274 (WUR Capabilities element)).” |
| 1112 | Xiaofei Wang | 40.26 | The sentence "The Length/Misc field contains the Length field when the Length Present field is set to 1 and the Misc field when the Length Present field is set to 0." is confusing and should be rewritten/ | change the sentence "The Length/Misc field contains the Length field when the Length Present field is set to 1 and the Misc field when the Length Present field is set to 0." into "The Length/Misc field contains the Length field when the Length Present field is set to 1. Otherwise, it contains the Misc field." | Revised –Agree in principle. Incorporated. TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 1112. |
| 1113 | Xiaofei Wang | 40.30 | The sentence "The Misc field is reserved unless explicitly stated otherwise." is repeated twice. | remove the sentence "The Misc field is reserved unless explicitly stated otherwise." | Accepted |
| 1114 | Xiaofei Wang | 41.04 | The address field contains an address, not "an identifier for the WUR frame", at least, "for the WUR frame" should be removed. | remove "for the WUR frame" | Revised –Disagree in principle with the comment. The Address field does contain an identifier as defined in the respective subclauses of this clause. However, agree with the removal of the WUR frame and merging the two sentences. TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 1114. |
| 1115 | Xiaofei Wang | 41.10 | The title of Table 9-533-b is for the Address field of WUR frame and should named accordingly, instead of Identifiers of WUR frames | as in comment | Revised –Agree in principle with the comment. The proposed solution is to replace Address field with Identifier.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 1115. |
| 1116 | Xiaofei Wang | 42.07 | By not including Partial BSSID in the transmitted WUR frame, a receiving STA may not have the capabilities to tell whether a WUR frame is incorrectly received due to channel conditions or rate settings, or due to it is transmitted by a different BSS. A more clear indication of a BSS in the transmitted WUR frame is more desirable. | suggest to include a form of BSSID in the transmitted WUR frame to ensure that a receiving STA will be able to identify the cause of reception failure | Rejected –It does not matter if the WUR frame is not received due to channel conditions, or rate settings or because of transmission from a different BSS since the STA is not expected to take any action upon reception of a failed frame. The addition of some form of BSSID in the transmitted WUR frame will further increase the WUR frame size increasing WM occupancy. |
| 1117 | Xiaofei Wang | 42.31 | the sentence at P42L15 "The Embedded BSSID field, if present, is the last field of the calculation fields." should be moved to P42L31. | as in comment | Rejected –The comment fails to identify a technical issue. The current location of the sentence is appropriate.  |
| 1118 | Xiaofei Wang | 42.41 | Please clarify why the two optional fields in the calculation fields are treated differently in figure 9-963c. There is no reason why the two optional fields should be split up into two boxed based on the condition of whether one of them is present in the calculation field | combine the two boxes on the left of Figure 9-963c, and indicates Embedded BSSID as optional | Revised –Agree in principle with the comment. TGba editor: Remove the box that starts with “Calculation fields (without Embedded BSSID)” from Figure 9-963c.TGba editor: Remove “(with Embedded BSSID)” from the box that starts with “Calculation fields (with Embedded BSSID)” in Figure 9-963c and add “(if present)” after the fifth bullet “Embedded BSSID”. |
| 1144 | Yongho Kim | 40.33 | Duplicated sentence:"The Misc field is reserved unless explicitly stated otherwise." | Delete one of them | Accepted |
| 1165 | yujin noh | 40.33 | "The Misc field is reserved unless explicitly stated otherwise." is duplicated at L30 and L33. Delete one of those. | as in comment | Revised –TGba editor: Delete sentence in P40L33. |
| 1166 | yujin noh | 41.48 | in "2 x (L+1\_", "x" should be math symbol (not text x) | as in comment | Accepted |
| 1167 | yujin noh | 39.17 | Considering Embedded BSSID described enough in CRC subclause, add Embedded BSSID field in Figure 9-963a. For example, add the field with the description like (if present) | as in comment | Rejected –Embedded BSSID is not carried in the frame that is transmitted over the air. Descirptions in subclause 9.10.2.5.2 are sufficiently details to make this aspect clear for those WUR frame types that do contain this component. |
| 1168 | yujin noh | 41.41 | add reference with "9.10.3 Format of individual WUR frame types" after the end of sentence (e.g. ... individual WUR frame types (see (9.10.3 Format of individual WUR frame types)) | as in comment | Accepted |
| 1234 | Yunsong Yang | 38.45 | Information in clause 9.10.1 are repeated in clause 9.10.2, therefore is redundant. And it isn't the conventional 802.11 text style to have a leading subclause called "Basic Component". | Delete the entire clause 9.10.1. And in P39L29, change the sentence "The FCS field is defined in 9.10.2.5 (Frame Check Sequence (FCS) field)." to "The FCS field contains either a 16-bit CRC or a 16-bit MIC and is defined in 9.10.2.5 (Frame Check Sequence (FCS) field)." | Rejected –The structure follows the conventional 802.11 text. Please see 9.2.1 (Basic components) in IEEE802.11REVmd D1.5 in page 769. |
| 1235 | Yunsong Yang | 39.41 | Strictly speaking, the second half of the statement in the Note isn't true, bacause a WUR Discovery frame is a VL WUR frame, but it isn't sent to a WUR STA that has declared support of ... | Change the cited Note to read: "An ML WUR frame can be sent to any WUR STA while a VL WUR frame can only be sent to a WUR STA that has declared support of its reception (see 9.4.2.274 (WUR Capabilities element)), except that a WUR Discovery frame is broadcasted." | Revised –Agree with the comment. Proposed resolution generalizes the indication by simply referring to a STA that supports its reception.TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 1235. |
| 1236 | Yunsong Yang | 39.57 | It may be desirable for a receiving STA to know whether a received WUR frame is protected with a CRC or a MIC as early as possible. Therefore, it may be better to have the Protected bit in B0 of the Frame control field, instead of B7. | Move the Protected field to the left of the Type field in Figure 9-963b, and renumber the bit numbers of all the fields accordingly. And in P40L35, move the paragraph describing the Protected field to be before the paragraph describing the Type field in P40L1. |  |
| 1237 | Yunsong Yang | 40.29 | The langauge of "The Length field contains the length ..." isn't right. Either the field indicates the length, or the field contains a value equal to the length divided by 2 and subtracted by 1. | Change "The Length field contains the length of the Frame Body field as defined in 9.10.2.4 (Frame Body field)." to "The Length field indicates the length of the Frame Body field as defined in 9.10.2.4 (Frame Body field)." or "The Length field contains a value equal to the length of the Frame Body field divided by 2 and subtracted by 1, as defined in 9.10.2.4 (Frame Body field)." | Revised –Agree with the comment. Incorporated as suggested (first option).TGba editor to make the changes shown in 11-18/1833r1 under all headings that include CID 1237. |

**Discussion: *None.***

* MAC frame format for Wake-up Radio (WUR) frames
* General WUR frame format

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 377):***

Each Wake-up Radio (WUR) frame consists of the following basic components:

* A *MAC header*, which comprises Frame Control, Address, and Type Dependent (TD) Control fields;
* A variable-length *frame body*, which, if present, contains information specific to the frame *type*;
* An *FCS*,which, depending on the value of the Protected subfield in the Frame Control field, contains either a 16-bit CRC or a 16-bit MIC. *(#377)*
* General WUR frame format

Figure 9-963a (WUR frame format) depicts the general MAC frame format for WUR frames.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0   B7 | B8  B19 | B20  B31 |  |  |
|  | Frame Control | Address | TD Control | Frame Body | FCS |
| Bits: | 8 | 12 | 12 | variable | 16 |
| * WUR frame format
 |

The MAC header of the WUR frame consists of the Frame Control, Address, and TD Control fields, and is defined in 9.10.2.1 (MAC header).

The Frame Body field is optionally present in certain WUR frame types and is defined in 9.10.2.4 (Frame Body field).

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 598, 599, 1110):***

*(#599)*

*(#598, 1110)***TGba Editor: *Change the paragraph below of this subclause as follows (#CID 379, 380, 1235, 378):***

A WUR frame that does not have a Frame Body field is referred to as a fixed-length (FL) WUR frame. A WUR frame that has a Frame Body field is referred to as a variable-length (VL) WUR frame A WUR frame that is a FL WUR frame can be sent to any WUR STA while a VL WUR frame can only be sent to a WUR STA that supports its reception.*(#379, 380, 1235, 378)*

* *(#599)*MAC header
* Frame Control field

The format of the Frame Control field is illustrated in Figure 9-963b (Frame Control field format of WUR frame).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0      B2 | B3 | B4           B6 | B7 |
|  | Type | Length Present | Length/Misc | Protected |
| Bits: | 3 | 1 | 3 | 1 |
| * Frame Control field format of WUR frame
 |

The Type field indicates the type of the WUR frame, as defined in Table 9-533a (WUR frame types).

|  |
| --- |
| * WUR frame types
 |
| Type  | Type description |
| 0 | WUR Beacon |
| 1 | WUR Wake-up |
| 2 | WUR Vendor Specific |
| 3 | WUR Discovery |
| 4-7 | Reserved |

The Length Present field indicates whether the Length/Misc field contains the Length field or not.

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 1112):***

The Length/Misc field contains the Length field when the Length Present field is set to 1; otherwise it contains the Misc. *(#1112)*

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 1237):***

The Length field indicates the length of the Frame Body field as defined in 9.10.2.4 (Frame Body field). The Misc field is reserved unless explicitly stated otherwise.*(#1237)*

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 84, 289, 383, 523, 785, 1144, 1165, 1113):***

*(#84, 289, 383, 523, 785, 1144, 1165, 1113)*

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 384):***

The Protected field indicates whether the information carried in the WUR frame has been processed by a message integrity check (MIC) algorithm. The Protected field is set to 1 if the WUR frame is protected utilizing the MIC algorithm as defined in 31.8 (Protected WUR frames); otherwise it is set to 0 to indicate that the WUR frame is contains the CRC as defined in 9.10.2.5.3 (Cyclic Redundancy Check (CRC)).*(#384)*

* Address field

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 1114):***

The Address field contains an identifier for the which is selected from Table 9-533b (Identifiers of WUR frames) and depends on the type of WUR frame (see 9.10.3 (Format of individual WUR frame types)).*(#1114)*

**TGba Editor: *Change the table below of this subclause as follows (#CID 1114, 849):***

|  |
| --- |
| * Identifiers of WUR frames
 |
| ID*(#1114)* | Identifier description |
| Transmit ID | Identifier of the transmitting AP (see 31.3.2 (Transmit ID)) |
| Group ID | Identifier of a group of receiving WUR STAs (see 31.3.3 (Group ID)) |
| WUR ID | Identifier of an individual receiving WUR STA (see 31.3.4 (WUR ID)) |
| OUI1 | The 12 LSBs of the OUI (see 9.4.1.31 (Organization Identifier field)) *(#849)* |

* TD Control field

The Type Dependent (TD) Control field contains control information that depends on the WUR frame type (see 9.10.3 (Format of individual WUR frame types)).

* Frame Body field

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 1168):***

The Frame Body field is a variable-length field that contains information specific to individual WUR frame types (see 9.10.3 (Format of individual WUR frame types). The Frame Body field is not present when the Length Present subfield of the Frame Control field is 0 (i.e., within ML WUR frames) and is present when the Length Present subfield of the Frame Control field is 1 (i.e., within VL WUR frames).*(#1168)*

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 291, 385, 1166):***

The length of the Frame Body field is in units of octets and is equal to 2 × (*L* + 1), where *L* is the value of the Length/Misc subfield in the Frame Control field. The minimum length of the Frame Body field is 2 octets and the maximum length of the Frame Body field is16 octets.*(#291, 385, 1166)*

* Frame Check Sequence (FCS) field
* General

The FCS field contains a *TBD*-bit CRC. The FCS is calculated over all the fields of the Frame Control, Address, TD Control, Frame Body field (if present), and Embedded BSSID field (if present). These fields are referred to as the *calculation fields*.

NOTE—The Embedded BSSID field, if present, is part of the *calculation fields* but is not part of the fields of the WUR frame transmitted over the *WM*.

The Frame Body field is present in the *calculation fields* only when the WUR frame is a variable-length WUR frame (9.10.2.4 (Frame Body field)); otherwise, the Frame Body field is not present.

The Embedded BSSID field is present in the *calculation fields* only for WUR frames that are post-association WUR frames; otherwise the Embedded BSSID field is not present. The Embedded BSSID field, if present, is the last field of the *calculation fields*. The size and contents of the Embedded BSSID field is *TBD*.

The FCS is the 1s complement of the remainder generated by the modulo 2 division of the *calculation fields* by the polynomial *TBD*, where the shift-register state is preset to all 1s.

NOTE—The order of transmission of bits within the FCS field is defined in 9.2.2 (Conventions).

The *calculation fields* are processed in the order they would have been transmitted.

NOTE—The Embedded BSSID field, if present, is part of the *calculation fields* but is not part of the fields of the WUR frame transmitted over the *WM*.

A schematic of the processing is shown in Figure X (CRC-*TBD* implementation), where the SERIAL DATA INPUT consists of the *calculation fields (BL, BL-1…, B1, B0),* with *BL* being the most significant bit of the *calculation fields*.

NOTE – THE CRC in the FCS is one of the CRC-8, CRC-16, or CRC-32. Which of these ones is still *TBD*.The FCS field contains a 16-bit CRC when the Protected subfield in the Frame Control field is 0 and contains a 16-bit MIC when the Protected subfield in the Frame Control field is 1.

The CRC is calculated as defined in 9.10.2.5.2 (Cyclic Redundancy Check (CRC)), and the MIC is calculated as defined in 31.8 (Protected WUR frames).

**TGba Editor: *Change the title below of this subclause as follows (#CID 386):***

* Cyclic Redundancy Check (CRC) for WUR frames*(#386)*

The CRC is calculated over all the fields of the Frame Control, Address, TD Control, Frame Body field (if present), and Embedded BSSID field (if present). These fields are referred to as the *calculation fields*.

NOTE 1—The Embedded BSSID field, if present, is part of the *calculation fields* but is not part of the fields of the WUR frame transmitted over the *WM*.

NOTE 2—The Frame Body field is present in the *calculation fields* only when the WUR frame is a VL WUR frame (see 9.10.2.4 (Frame Body field)); otherwise, the Frame Body field is not present.

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 86):***

The Embedded BSSID field, if present, is the last field of the *calculation fields*. The Embedded BSSID field contains the 16 LSBs of the compressed BSSID, which is defined in 31.3.1 (General). *(#86)*

The Embedded BSSID field is present in the *calculation fields* of a WUR Beacon and of a WUR Wake-up frame. The Embedded BSSID field is not present in the *calculation fields* of a WUR Discovery frame. Whether the Embedded BSSID field is present or not in the *calculation fields* of a WUR Vendor Specific frame is vendor specific.

The CRC is the 1s complement of the remainder generated by the modulo 2 division of the *calculation fields* by the polynomial x16+x12+x5+1, where the shift-register state is preset to all 1s.

NOTE—The order of transmission of bits within the FCS field is defined in 9.2.2 (Conventions).

The *calculation fields* are processed in the order they would have been transmitted.

A schematic of the CRC processing is shown in Figure 9-963c (CRC-16 implementation for WUR MPDUs), where the SERIAL DATA INPUT consists of the *calculation fields (BL, BL-1…, B1, B0),* with *BL* being the most significant bit of the *calculation fields*. The CRC computation and transmission is the same as the one depicted in Figure 16-3 (CRC-16 implementation).

|  |
| --- |
|  |
| * CRC-16 implementation for WUR MPDUs
 |

3.4 Abbreviations and acronyms

**TGba Editor: *Insert the following acronym definitions (maintaining alphabetical order) (#CID 381):***

VL variable length

FL fixed length *(#381)*

**3.1 Definitions**

**TGba Editor: *Insert the following definitions (maintaining alphabetical order) (#CID 848):***

**Wake up radio (WUR) medium access control (MAC) protocol data unit (MPDU):** The unit of data exchanged between two peer WUR MAC entities using the services of the WUR physical layer (PHY). *Syn:* **WUR frame**.*(#848)*

4.3.15a Wake-up radio (WUR) STA

**TGba Editor: *Change the paragraph below of this subclause as follows (#CID 288):***

A WUR AP has the following mandatory main features:

—Transmit 20 MHz WUR PPDU with Low Data Rate.

—Transmit 20 MHz WUR PPDU with High Data Rate.

—WUR power management procedure.

—WUR Wake-up operation.

—WUR Duty cycle operation.

—Transmit an unprotected fixed length (FL) WUR Wake-up frame with WUR ID.*(#288)*

—Transmit an unprotected (FL) WUR Wake-up frame with transmit ID.*(#288)*

—Transmit a WUR Beacon frame.

A WUR AP has the following optional main features:

—Transmit 40 MHz or 80 MHz WUR PPDU.

—Transmit 80 MHz preamble punctured WUR PPDU

—Transmit a variable length (VL) WUR frame.*(#288)*

—Transmit a protected WUR frame.

—Transmit a WUR Wake-up frame with group ID.

—Transmit a WUR Discovery frame.

—Transmit a WUR Vendor Specific frame.

A WUR non-AP STA has the following mandatory main features:

—Receive 20 MHz WUR PPDU with Low Data Rate.

—WUR power management procedure.

—WUR Wake-up operation.

—Receive an unprotected FL WUR Wake-up frame with WUR ID.*(#288)*

—Receive an unprotected FL WUR Wake-up frame with transmit ID.*(#288)*

—Receive a WUR Beacon frame.

A WUR non-AP STA has the following optional main features:

—Receive 20 MHz WUR PPDU with High Data Rate.

—Allow allocated channel for receiving WUR Wake-up frame different from the channel for receiving WUR Beacon frame.

—WUR Duty cycle operation with on duration smaller than duty cycle period.

—Receive a VL WUR frame.*(#288)*

—Receive a protected WUR frame.

—Receive a WUR Wake-up frame with group ID.

—Receive a WUR Discovery frame.

—Receive a WUR Vendor Specific frame.

**TGba Editor: *Replace “Nonzero Length Frame Body” with “VL WUR Frame” throughout 9.4.2.247 (#CID 288).***

**TGba Editor: *Replace “nonzero length Frame Body field in” with “VL” throughout 9.4.2.247 (#CID 288):***

**TGba Editor: *Replace “WUR Wake-up frame that contains a Frame Body field” with “VL WUR Wake-up frame” throughout 31.3 (#CID 288).***