IEEE P802.11
Wireless LANs

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| CR for WUR frame format |
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Abstract

This submission proposes resolutions for comments related to TGba D3.0 with the following CIDs (17 CIDs):

* 3210, 3392, 3175, 3393, 3111, 3369, 3394, 3260, 3370, 3371, 3395, 3261, 3397, 3046, 3398, 3176, 3368

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Minor editorial changes

***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 TGax 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** | **Comment** | **Proposed Change** | **Resolution** |
| 3210 | Michael Montemurro | 74.21 | Wakeup Radio frames for WUR should be added as a subclause of 9.3 | Move this to a subclause of 9.3 | REJECTEDWUR frames have a different format from the frames defined in 9.3. Considering the relevancy and the baseline spec impact, we propose not to change the subclause structure.  |
| 3392 | Yunsong Yang | 74.25 | Title and content in 9.10.1 are largely redundant, comparing to 9.10.2. Should merge these two subclauses into one. And since WUR Short Wake-up frame is an exception, should provide a reference to where the format of the WUR Short Wake-up frame is defined. | Merge 9.10.1 and 9.10.2 into one subclause. Add one sentence to provide a reference to where the format of the WUR Short Wake-up frame is defined. | REVISEDAgree in principle.The proposed resolution is to merge the cited subclauses and remove the redundancy. Also, instead of making an exception for WUR Short Wake-up frame, we propose to modify the format of WUR Short Wake-up frame to be aligned with the general WUR frame format.TGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3392. |
| 3393 | Yunsong Yang | 74.36 | Since the subclause title is General WUR frame format, it would be better that the described general frame format also applies to the WUR Short Wake-up frame. One possible way is to reduce the FC field to a 4-bit field, containing only the Type and Protected subfields. Move the other 4 bits to be part of the TD field, so that the 16-bit TD field is not present in the WUR Short Wake-up frame but presented in all other types of WUR frames. The meaning of all these fields and subfields remain the same, just the locations are changed. | Define a General WUR frame format that also applies to the WUR Short Wake-up frame with the following changes: reduce the FC field to a 4-bit field, containing only the Type and Protected subfields; move the other 4 bits to be part of the TD field, so that the 16-bit TD field is not present in the WUR Short Wake-up frame but presented in all other types of WUR frames; and maintain the meaning of all these fields and subfields while changing their locations. | REVISEDAgree in principle with the comment. However, the length information cannot be type dependent, since WUR Wake-up frame can be both FL or VL.The proposed change is to make the FC field variable length (8 bits for general WUR frames, 4 bits for Short frame), as well as the TD Control field (12 bits for general WUR frames, 0 bit for Short frame), so that the general WUR frame format can be applied to Short Wake-up frame as well.TGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3393. |
| 3175 | Liwen Chu | 75.10 | this statement can't be applied to short wake-up frame. | As in comment. | REJECTEDWUR Short Wake-up frame can be classified as a FL WUR frame, since it has a fixed length and has no Frame Body field. |
| 3111 | Jeongki Kim | 76.20 | For clarification, add the reference "subclause 9.10.3.2 WUR Wake-up frame format " at the end of the sentence. | Change the text as follow:"The Miscellaneous subfield is reserved in all FL WUR frames except for broadcast addressed WUR Wake-up frames defined in 9.10.3.2 (WUR Wake-up frame format)." | REVISEDAgree in principle.TGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3111 |
| 3369 | Xiaofei Wang | 76.60 | It seems to be irrelevant to have a reference to here for CRC calculation and bits order in the description for Type Dependent Control field. Conider to remove the reference or at least make it more readable. It is currently unreadable what these two sentence is trying to state, would Type dependent control field contain CRCs? | as in comment | REVISEDAgree in principle.TGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3369. |
| 3394 | Yunsong Yang | 76.61 | Text on L61-L65 may be a copy-and-paste error. It was a reference to 9.10.3 in D2.0. | Replace the text on L61-L65 with "9.10.3 (Format of individual WUR frame types))." | ACCEPTEDTGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3394. |
| 3260 | Po-Kai Huang | 77.5 | The description of CRC is not relevant in frame body clause. | Remove the description of CRC. | REVISEDAgree in principle.TGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3260. |
| 3370 | Xiaofei Wang | 77.5 | It seems to be irrelevant to have a reference to here for CRC calculation and bits order in the description for frame body field. Conider to remove the reference or at least make it more readable. | as in comment | REVISEDAgree in principle.TGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3370. |
| 3395 | Yunsong Yang | 77.5 | Text after the word "see" until the end of the sentence may be a copy-and-paste error. It was a reference to 9.10.3 in D2.0. | Replace the cited text with "9.10.3 (Format of individual WUR frame types))." | ACCEPTEDTGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3395. |
| 3371 | Xiaofei Wang | 77.13 | "where L is equal to the Length/Miscellaneous subfield in the Frame Control field" is wrong. L should be equal to the value contained in the Length/Miscellaneous subfield. | change "where L is equal to the Length/Miscellaneous subfield in the Frame Control field" into "where L is equal to value contained in the Length/Miscellaneous subfield in the Frame Control field" | ACCEPTEDTGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3371. |
| 3261 | Po-Kai Huang | 79.19 | Change "when" to "and" since VL WUR Wake-up frame is always group addressed to one or more WUR non-AP STAs. | Change "when" to "and" since VL WUR Wake-up frame is always group addressed to one or more WUR non-AP STAs. | ACCEPTEDTGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3261. |
| 3397 | Yunsong Yang | 79.64 | "The Miscellaneous subfield is only present in the broadcast WUR Wake-up frame", is that statement technically correct? What about an individually addressed WUR Wake-up frame? We know that an individually address WUR Wake-up frame is a FL WUR frame. Therefore, the Length Present subfield is set to 0. And P76L14 says that "The Length/Miscellaneous subfield contains the Length subfield when the Length Present subfield is set to 1; otherwise it contains the Miscellaneous subfield." | Revise this paragraph by describing the content of Miscellansous subfield for broadcast addressed WUR Wake-up frame, FL group addressed WUR Wake-up frame and individually addressed WUR Wake-up frame, in a way that doesn't contradict to each other. And state that Miscellansous subfield is not present in VL group addressed WUR Wake-up frame and the WUR Short Wake-up frame. | REVISEDAgree in principle.TGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3369. |
| 3046 | Gaurav Patwardhan | 81.81 | Not properly formatted Operating field for the Frame Body field Format of WUR Discovery frame. | The Operating Channel field is the combination of Operating Class and Channel field. This field in the Frame body field of the WUR Discovery frame is not properly formatted wrt 9.4.1.22 REVmd 2.0 | REVISEDAgree in principle with the comment.The sited field indicates the same information as the Operating Class and Channel field defined in the base line. In order to avoid confusion, we propose to change the name as ‘Operating Class and Channel field’.TGba editor to make the changes shown in 11-19/1447r0 under all headings that include CID 3046. |
| 3398 | Yunsong Yang | 80.46 | Frame Body field is always present in the WUR Discovery frames. So, the draft should states that the Length Present subfield is set to 1. | Insert a new paragraph between L45 and L47 to read: "The Length Present field is set to 1. The Length/Miscellaneous subfield contains a Length subfield, which is set to the length of the Frame Body field as defined in 9.10.2.4 (Frame Body field)." | REVISEDAgree in principleAlready resolved in D3.1 by the CID 3190. |
| 3176 | Liwen Chu | 82.21 | Table 9-540a (WUR frame types) defines multiple types. Here the specific type value should be given. | As in comment. | REJECTEDWUR Short Wake-up frame already has a type value '4' as defined in Table 9-540a. It is redundant to have duplicated information in this subclause. |
| 3368 | Xiaofei Wang | 82.21 | If the "protected" field is always set to 0, maybe it is better to make it reserved since it doesn't convey any information and would be wasted. | change "protected" to "reserved" and change the associated text. | REJECTEDWUR Short Wake-up frame follows the general WUR frame format. To keep the consistency of the spec, it is not recommended to change the encoding defined in the general frame format. The commentor is recommended to submit a proposal in details in order to have the change. |

**Discussion: None**

**TGba Editor: *delete the following subclause and update subclause numbers throughout the draft (#CID 3393)***

* General WUR frame format

**TGba Editor: *make the following changes of this clause (#CID 3392, 3393)***

Figure 9-993a (WUR frame format) depicts the general MAC frame format for WUR frames.

|  |  |  |  |
| --- | --- | --- | --- |
|  |                                      |  |  |
|  | MAC Header | Frame Body | FCS |
| Octets: | 2 or 4 | variable | 2 |
| * WUR frame format
 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0   B7 | B8  B19 | B20  B31 |
|  | Frame Control | ID | Type Dependent Control |
| Bits: | 8 | 12 | 12 |
| * MAC header of WUR frameexcept WUR Short Wake-up frame
 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0   B3 | B4  B15 |  |
|  | Frame Control | ID |
| Bits: | 4 | 12 |
| Figure 9-993b1—MAC header of WUR Short Wake-up frame |

The MAC header of the WUR frame consists of the Frame Control field, ID field, and the Type Dependent Control field, if present, 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).

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.

The FCS field is defined in 9.10.2.5 (Frame Check Sequence (FCS) field).

* MAC header
* Frame Control field

**TGba Editor: *make the following changes of this clause (#CID 3393, 3111)***

Two variants of the Frame Control field are defined. The format of the Frame Control field for a WUR frame that is not a WUR Short Wake-up frame is illustrated in Figure 9-993c (Frame Control field format of WUR frame except WUR Short Wake-up frame). The format of the Frame Control field for WUR Short Wake-up frame is illustrated in Figure 9-993c1 (Frame Control field format of WUR Short Wake-up frame).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0      B2 | B3 | B4           | B5           B7 |
|  | Type | Protected | Length Present | Length/Miscellaneous |
| Bits: | 3 | 1 | 1 | 3 |
| * Frame Control field format of WUR frame except WUR Short Wake-up frame
 |

|  |  |  |
| --- | --- | --- |
|  | B0      B2 | B3 |
|  | Type | Protected |
| Bits: | 3 | 1 |
| Figure 9-993c1—Frame Control field format of WUR Short Wake-up frame |

The Type subfield indicates the type of the WUR frame, as defined in Table 9-540a (WUR frame types).

|  |
| --- |
| * WUR frame types
 |
| Type  | Type description |
| 0 | WUR Beacon |
| 1 | WUR Wake-up |
| 2 | WUR Vendor Specific |
| 3 | WUR Discovery |
| 4 | WUR Short Wake-up |
| 5-7 | Reserved |

The Protected subfield indicates whether the information carried in the WUR frame has been processed by a message integrity check (MIC) algorithm. The Protected subfield is set to 1 if the WUR frame is protected utilizing the MIC algorithm as defined in 29.10 (Protected WUR frames); otherwise it is set to 0 to indicate that the WUR frame contains the 16-bit CRC as defined in 9.10.2.5.2 (Cyclic Redundancy Check (CRC) for WUR frames).

The Length Present subfield indicates whether the Length/Miscellaneous subfield contains the Length subfield or not. The Length Present subfield is not present in WUR Short Wake-up frames.

The Length/Miscellaneous subfield contains the Length subfield when the Length Present subfield is set to 1; otherwise it contains the Miscellaneous subfield. The Length/Miscellaneous subfield is not present in WUR Short Wake-up frames.

The Length subfield indicates the length of the Frame Body field as defined in 9.10.2.4 (Frame Body field).

The Miscellaneous subfield is reserved in all FL WUR frames except for broadcast addressed WUR Wake-up frames as defined in 9.10.3.2 (WUR Wake-up frame format). *(#3111)*

* Type Dependent Control field

**TGba Editor: *make the following changes of this clause (#CID 3369, 3394)***

The Type Dependent Control field contains control information that depends on the WUR frame type (see 9.10.3 (Format of individual WUR frame types)). *(#3369, 3394)*

* Frame Body field

**TGba Editor: *make the following changes of this clause (#CID 3260, 3370, 3395, 3371)***

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)). *(#3260, 3370, 3395)* The Frame Body field is not present when the Length Present subfield of the Frame Control field is 0 (i.e., within FL WUR frames) and is present when the Length Present subfield of the Frame Control field is 1 (i.e., within VL WUR frames).

The length of the Frame Body field is in units of octets and is equal to 2 × (*L* + 1), where *L* is equal to the value contained in the Length/Miscellaneous subfield in the Frame Control field. *(#3371)* The minimum length of the Frame Body field is 2 octets, and the maximum length of the Frame Body field is 16 octets.

* WUR Wake-up frame format

**TGba Editor: *make the following changes of this clause (#CID 3261, 3397)***

The frame format of the WUR Wake-up frame is defined in Figure 9-993a (WUR frame format).

The Frame Control field is defined in 9.10.2.1.1 (Frame Control field).

The Length Present subfield is set to 1 if the Frame Body field is present and is set to 0 otherwise.

The ID field of the FL WUR Wake-up frame contains one of the following:

* The WUR ID when the frame is individually addressed to a WUR non-AP STA (see 29.5.5 (WUR ID)).
* The WUR group ID when the frame is group addressed to all WUR non-AP STAs belonging to the group identified by the WUR group ID (see 29.5.4 (WUR Group ID)).
* The transmitter ID when the frame is a broadcast addressed frame transmitted by the WUR AP identified by the transmitter ID (see 29.5.3 (Transmitter ID)).
* The nontransmitter ID when the frame is a broadcast addressed frame transmitted by the WUR AP identified by the nontransmitted ID when dot11MultiBSSIDImplemented is true (see 29.5.6 (Nontransmitter ID)).

The ID field of the VL WUR Wake-up frame contains a WUR group ID and the frame is group addressed to one or more WUR non-AP STAs that are identified by the WUR IDs included in the Frame Body field and belong to the group identified by the WUR group ID (see 29.5.4 (WUR Group ID)). *(#3261)*

The Type Dependent Control field of a WUR Wake-up frame contains the Counter subfield and the Sequence Number subfield as defined in 9-993e (Type Dependent Control field of WUR Wake-up frame).

|  |  |  |
| --- | --- | --- |
|  | B0             B3 | B4                   B11 |
|  | Counter | Sequence Number |
| Bits: | 4 | 8 |
| * Type Dependent Control field of WUR Wake-up frame
 |

The Counter subfield:

* Contains the BSS Update Counter field if the WUR Wake-up frame is broadcast addressed. The BSS Update Counter field is defined as an unsigned integer initialized to 0 that incre-ments when a critical update to the BSS parameters has occurred (see 29.9.2 (WUR AP operation)), or
* Contains the 4 LSBs of the partial packet number (PPN) (see 31.8 (Protected WUR frames)) if the WUR Wake-up frame is not broadcast addressed, the Protected subfield in the Frame Control field is 1, and the most recently sent WUR Operation element has the Common PN subfield equal to 0, or
* Is reserved otherwise.

The Sequence Number subfield:

* Contains the TSF timer [9: 16] if the Protected subfield in the Frame Control field is 1 and the most recently sent WUR Operation element has the Common PN subfield equal to 1 (see 29.10.3.1 (Generation of the PN by a WUR AP)), or
* Contains the 8 MSBs of the PPN (see 29.10 (Protected WUR frames)) if the WUR Wake-up frame is not broadcast addressed, the Protected subfield in the Frame Control field is 1, and the most recently sent WUR Operation element has the Common PN subfield equal to 0, or
* Is reserved otherwise.

The Miscellaneous subfield is present if the Length Present subfield is set to 0. The Miscellaneous subfield contains the Group Addressed BU subfield as defined in Table 9-993f (Miscellaneous subfield of broadcast WUR Wake-up frame) if the frame is broadcast WUR Wake-up frame. Otherwise, the Miscellaneous subfield is reserved. *(#3397)*

|  |  |  |
| --- | --- | --- |
|  | B0 | B1                B2 |
|  | Group Addressed BU | Reserved |
| Bits: | 1 | 2 |

* Miscellaneous subfield of broadcast WUR Wake-up frame

The Group Addressed BU subfield is set to 1 to indicate that one or more group addressed frames are buffered at the AP corresponding to the BSSID indicated in the ID field. Otherwise, the Group Addressed BU subfield is set to 0.

The Frame Body field is only present in a VL WUR Wake-up frame and contains one or more STA Info fields. The format of the STA Info field is defined in Figure 9-993g (STA Info field format).

|  |  |  |
| --- | --- | --- |
|  | B0          B11 | B12                B15 |
|  | WUR ID | Reserved |
| Bits: | 12 | 4 |
| * STA Info field format
 |

The WUR ID field is defined in 29.5 (Setting the identifiers of WUR frames).

* WUR Discovery frame format

**TGba Editor: *make the following changes of this clause (#CID 3046)***

The frame format of the WUR Discovery frame is defined in Figure 9-993a (WUR frame format).

The Frame Control field is defined in 9.10.2.1.1 (Frame Control field).The Address field is set to the Transmit ID.

The TD Control is set to bits 8 to 19 of the compressed BSSID. The Address field is set to the Transmit ID.

The TD Control is set to bits 8 to 19 of the compressed BSSID.

The Protected subfield in the Frame Control field is set to 0.

The Length Present field is set to 1. The Length/Miscellaneous subfield contains a Length subfield, which is set as defined in 9.10.2.4 (Frame Body field).

The ID field is set to the transmitter ID.

The Type Dependent Control field is set to 12 MSBs of the compressed BSSID (see 29.5.2 (Compressed BSSID)).

The format of the Frame Body field is defined in Figure 9-993h ( Frame Body Field format of WUR Discovery frame).

|  |  |  |
| --- | --- | --- |
|  | B0                     B15 | B16                                 B31 |
|  | Compressed SSID | Operating Class and Channel |
| Bits: | 16 | 16 |
| * Frame Body Field format of WUR Discovery frame
 |

The Compressed SSID field contains 16 LSBs of the Short-SSID as defined in 9.4.2.170.3 (Calculating the Short-SSID).

The Operating Class and Channel field, defined in 9.4.1.22 (Operating Class and Channel field), indicates the location of the primary channel of the BSS being advertised by the WUR Discovery frame.The format of the Frame Body field is as defined in Figure 9-747a (Frame Body field format of WUR Discovery frame).The Compressed SSID field contains 16 LSBs of the Short-SSID as defined in 9.4.2.171.2. The PCR Operating Channel field contains operating class and channel information as defined in 9.4.1.22.

The FCS field contains the 16-bit CRC as defined in 9.10.2.5.2 (Cyclic Redundancy Check (CRC) for WUR frames).

* WUR Short Wake-up frame format

**TGba Editor: *make the following changes of this clause (#CID 3392, 3393)***

The frame format of the WUR Short Wake-up frame is defined in Figure 9-993a (WUR frame format).

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|  |  |  |  |  |
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The Frame Control field is defined in 9.10.2.1.1 (Frame Control field).

The Protected subfield is set to 0.

The ID field contains a WUR ID (see 29.5.5 (WUR ID).

The Frame Body field is not present.

The FCS field contains the 16-bit CRC as defined in 9.10.2.5 (Frame Check Sequence (FCS) field).