**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **<Responses to questions concerning IEEE 802.15.4e-2012>** |
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| Re: |  [Response to questions sent to IEEE 802.15 reflector |
| Abstract | [Responses to questions concerning 802.15.4e |
| Purpose | [Description of what the author wants P802.15 to do with the information in the document.] |
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This document is a response by the SC maintenance to an email sent to the IEEE 802.15 14 reflector on March 2016 from kakhavan@QCA.QUALCOMM.COM.

**EMAIL**

“Hi,

Regarding 15.4e amendment, We have a few MAC related questions that we need answered since the explanation is ambiguous.  Also, we have noticed many differences between the 15.4e amendment and the latest 2015 draft standard.

QUESTION 1: IEEE 802.15.4-2015 standard

WHEN WILL THE 2015 STANDARD BE RELEASED?  If soon, we would like to design toward that standard rather than the e-amendment.

QUESTION 2: PAN ID Compression

(page 60-61) Section 5.2.1.1.5 PAN ID Compression field

We have run into a section of the standard that does not make logical sense.  We are unsure if this is a typo in the standard or if this is the intend of this feature.  Specifically, PAN ID compression is something that we implemented for 2006/2011.  However, for Amendment E the PAN ID compression feature has changed significantly.  It seems that in the table below that all the settings make logical sense, except for the 2 highlighted in yellow.  Based on the other settings in the table one can argue that the 2 highlighted settings may have been swapped (i.e. typo).  The only other explanation is that the table is correct and that the Pan ID compression bit does not necessary follow a “logical” implementation.

The question is;  is the table correct?  If not, are the highlighted bits swapped?

FYI: 2015 draft version:  The Pan ID compression implementation remains unchanged, but the “Multipurpose” frame has been removed from the “frame types” column of this table.

\*\*\*\*\* BELOW ARE QUESTIONS REGARDING: Multipurpose Wake-up Frame (needed for CSL feature)

(page 75) 5.2.2.6 Multipurpose frame format

(page 78-79) 5.2.2.8 LE-multipurpose Wake-up frame

QUESTION 3: Multipurpose Wake-up Frame - without FCS

The CSL amendment-E feature requires the use of Wake-up frames.  The standard describes the Wake-up frame as a multipurpose frame containing the RZ Timer header IE and no additional MAC Payload.  The contents of the MHR is then described and shown in Figure 48m.

This figure is a representation of the entire PSDU, but the 2-byte FCS (CRC) is not shown.  It seems that the figure is incorrect and that the FCS was inadvertently left out, but should always be there for a multipurpose frame.  It does not make sense for the FCS to be absent.

The question is; should the 2-byte FCS (CRC) be included for a Wake-up frame?  If not, then how is the integrity of a Wake-up frame checked?

FYI: 2015 draft version:  Figure 48m has been removed, and therefore it is assumed that the FCS is indeed present for a Wake-up frame.  This contradicts the 2012 E amendment.

QUESTION 4: Multipurpose Wake-up Frame – Frame Control size issue – “Dest PAN ID present”

Figure 48m shows 1-byte Frame Control, yet a 2-byte Dest PAN ID present.  However, the Dest PAN ID can only be present if the "PAN ID Present" bit is set, but this requires a 2-byte Frame control.  The “PAN ID Present” bit that is required is bit 8 of Frame Control (which is in the 2nd byte).

The text and figure 48k describes the format and use of a multipurpose frame.

The question is; should the wakeup frame have a 2-byte Frame Control?  If not, how then can the Dest PAN ID be present with only a 1-byte Frame Control?

FYI: 2015 draft version:  Figure 48m and the ambiguous text from page 78-79 has been removed, and therefore it is assumed that a 2-byte Frame Control is used to signal the presence of a Dest PAN ID in a Wake-up frame.  In fact, the 2015 standard clearly describes that the 2nd Frame Control byte is needed to include the Dest Pan ID. This contradicts the 2012 E amendment.

QUESTION 5: Multipurpose Wake-up Frame – Frame Control size issue – “Security Enabled”

The text from page 79 indicates that security (encryption) can be applied to a Multipurpose Wake-up Frame.  The "RZ Timer Header IE" cannot  be encrypted since it is a header IE.   More importantly, the wake-up frame contains no MAC payload which means there is nothing “to apply security to”.  And finally, to enable security a 2-byte Frame Control is required, yet a 1 byte Frame Control is specified.

The question is; should the comment regarding security for a Wake-up frame not be in the standard?  If not, then how is security applied to a Wake-up frame?

FYI: 2015 draft version:  Figure 48m and the ambiguous text from page 78-79 has been removed, and therefore it is assumed that security will not be applied to a Wake-up frame.  This contradicts the 2012 E amendment.

QUESTION 6: Multipurpose Wake-up Frame – Frame Control size issue – “IE present”

The text from page 78 and 79 indicates that the  “RZ Timer header” IE (Information  Element) needs to be included in the Multipurpose Wake-up Frame.  In order to indicate that an Information Element is present in the frame we need to set the “IEs List Present” field in Frame Control.  This is the 15th bit of Frame Control and thus requires a 2-byte Frame Control.

The question is; should the wakeup frame have a 2-byte Frame Control?  If not, how then can there be Information Elements present with only a 1-byte Frame Control?

FYI: 2015 draft version:  Figure 48m and the ambiguous text from page 78-79 has been removed, and therefore it is assumed that a 2-byte Frame Control is used to signal the presence of IEs in a Wake-up frame.  This contradicts the 2012 E amendment.

Regards,

* Koorosh Akhavan”

**SC maintenance response**

* Question 1: When will the 802.15.4-2015 standard be released?
	+ We expect it to be published very soon, perhaps April.
* Question 2: Is the PAN-ID table in 802.15.4e correct?
	+ No, the 802.15.4 revision effort found numerous errors in 802.15.4e-2012 which were corrected in the revision. Please refer to document [15-15-0911-01](https://mentor.ieee.org/802.15/dcn/15/15-15-0911-01-0mag-proper-pan-id-field-settings-for-802-15-4-2015.docx) for the correct text
* Question 3: should the FCS be included in the Wake-up frame?
	+ Yes, all 802.15.4 frames include either the 2-octet or 4-octet FCS. Please refer to 802.15.4-2015 for the correct text
* Question 4: should the wakeup frame have a 2-octet Frame Control?
	+ Yes, The Wake-up frame does use the 2-octet Frame Control. Please refer to 802.15.4-2015 for the correct text
* Question 5: Does the wakeup frame have security?
	+ Yes, the Wake-up frame can have security, since there is no payload there can be no encryption, but the whole frame can use authentication aspect of security.
* Question 6: Given then need for an IE, should the wakeup frame have a 2-octet Frame Control?
	+ Yes, The Wake-up frame does use the 2-octet Frame Control. Please refer to 802.15.4-2015 for the correct text