IEEE P802.15

**Wireless Personal Area Networks**

|  |  |
| --- | --- |
| Project | SC Maintenance |
| Title | **Resolutions to SB comments on categories Frak, PCA and JH** |
| Date Submitted | June 1, 2015 |
| Source | [Jussi Haapola][Centre for Wireless Communications / University of Oulu] | Voice: +358 40 8363 018E-mail: jhaapola@ee.oulu.fi |
| Re: | Sponsor Ballot Comment resolution |
| Abstract |  |
| Purpose | Comment resolution |
| Notice | This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |
| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15. |

**i-2**

KINNEY, PATRICK

Page 34 Clause 6.2.5.4 Line 50

Comment:

Sentence: 'The slotted PCA backoff algorithm is illustrated in Figure 20 and the unslotted PCA backoff algorithm is illustrated in Figure 21 within the dashed line rectangles, respectively.' should not exist.

Proposed change:

Delete it.

Type T

Must be Satisfied Yes

**Resolution: Accept**

**i-3**

KINNEY, PATRICK

Page 35 Clause 6.2.5.4 Line 11

Comment:

Sentence: 'When operating a LECIM PHY in a nonbeacon-enabled PAN using unslotted CSMA-CA, the critical event message transmission may be initiated at any time, and the PCA backoff algorithm follows Figure 21.' partially obsolete

Proposed change:

Delete ', and the PCA backoff algorithm follows Figure 21'

Type T

Must be Satisfied Yes

**Resolution: Accept**

**i-5**

KINNEY, PATRICK

Page 36 Clause 6.2.5.5 Line 17

Comment:

"""Paragraphs with CCA Mode 4 (ALOHA) are obsolote:

When CCA Mode 4 (ALOHA) with the PCA backoff algorithm is used in a beacon-enabled PAN, the process illustrated in Figure 20 is modified as follows: CW is initialized to 1. The algorithm advances directly from the state ""Locate backoff period boundary"" to the state ""TB = 0?""

When CCA Mode 4 (ALOHA) with the PCA backoff algorithm is used in a nonbeacon-enabled PAN, the 21 process illustrated in Figure 21 is modified as follows: when the state ""Timeout?"" returns ""N,"" the algorithm 22 advances directly to the state ""TB = 0?"""""

Proposed Change:

Delete them

Type T

Must be Satisfied Yes

**Resolution: Accept**

**i-181**

Kivinen, Tero

Page 117 Clause 7.2.10 Line 51

Comment:

Do the LECIM devices with fragmentation need to implement 4-octet FCS? I think both 2 and 4 octect FICS are mandatory for LECIM devices supporting fragmentation. Should it be mentioned here?

Proposed change:

Type T

Must be Satisfied No

**Resolution: Revised**

**Proposed Resolution:**

**Add to Clause 7.2.10 page 117, line 52**

**“PSDU fragment packets implement either 2 or 4-octet FICS, as described in 23.3.3.”**

**Note: check PICS to make sure they are in agreement.**

**What does “NOT (RF10 || RF18): M” in MF5.1, 2 octet FCS mean?**

**i-333**

Kivinen, Tero

Page 136 Clause 7.4.2.9 Line 53

Comment

The reference to 9.4 is incorrect. The 9.4. does not describe how to do the MIC calculation for fragments.

Proposed change:

Change "9.4" with "23.3.3b"

Type T

Must be Satisfied Yes

**Resolution: Accept**

**i-341**

Kivinen, Tero

Page 137 Clause 7.4.2.9 Line 1

Comment:

The TID is not optional in the Fragment or Frak frames, how can it be omitted?

Proposed change:

Replace "A transaction identifier (TID) field value of zero indicates that the TID field will not be present in the fragments that follow. When the TID field value is nonzero, the value" with "A transaction identifier (TID) field value"""

Type T

Must be Satisfied Yes

**Resolution: Revise**

**Proposed Resolution:**

**Replace "A transaction identifier (TID) field value of zero indicates that the TID field will not be present in the fragments that follow. When the TID field value is nonzero, the value" with " A transaction identifier (TID) field value of zero indicates that the TID field is a reserved field in the fragments that follow. When the TID field value is nonzero, the value "**

**i-263**

Kivinen, Tero

Page 137 Clause 7.4.2.9 Line 9

Comment:

The FICS length field is not ignored even when the Secure Fragment field is set to one, as this field is still used when specifying the length of the Frak Validation field on the Frak frames.

Proposed change:

Change "The FICS length field is valid only if the Secure Fragment field indicates that fragments will be sent without Authentication." to "If Security Fragment fields is set to one, meaning fragments will be sent with Authentication, then the FICS length field only specifies the length of the Frak Validation field in the Frak frames sent by the responder."

Type T

Must be Satisfied No

**Resolution: Revise**

**Proposed Revision:**

**Change “The FICS length field is valid only if the Secure Fragment field indicates that fragments will be sent without authentication. The FSC Length field shall be set to zero if a 2-octet FICS will be used and shall be set to one if a 4-octet FICS will be used. ” to “If Security Fragment field is set to one, then the FICS length field only specifies the length of the Frak Validation field in the Frak frames. The FICS Length field shall be set to zero if a 2-octet FICS will be used and shall be set to one if a 4-octet FICS will be used. If Security Fragment field is set to zero, the PSDU Counter field and the Reserved field accounting for the last four octets of the FCSD Content field shall not be present. The FICS Length field shall be set to zero if a 2-octet FCS will be used and shall be set to one if a 4-octet FCS will be used."**

**i-335**

Kivinen, Tero

Page 137 Clause 7.4.2.9 Line 15

Comment:

Why do we have the addressing fields second time inside the IE. Why cannot we use the values from the MHR? Is this to allow layer 2 routing or what?

Proposed change:

Remove all of the Addressing information from the IE and say the addressing information of the frame is used instead.

Type T

Must be Satisfied Yes

**Resolution: Reject**

**Resolution comment:**

**Commenter’s proposed optimization is not necessary.**

**i-361**

Kivinen, Tero

Page 140 Clause 7.4.2.12 Line 8

Comment:

The table 13 maps Bit numbers 2-5 to enumeration of phyLecimDsssPsduSpreadingFactor. There is no speciation how this enumeration is encoded in that 4-bit value. The enumeration have values of 1,2,4,8 and 16, so direct integer conversion is not possible.

Proposed change:

Specify how enumeration is mapped to the bits.

Type T

Must be Satisfied Yes

**Resolution: Revise**

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute | Type | Range | Description |
| phyLECIMDSSSPSDUSpreadingFactor  | Integer | 16–32 768  | 2x (where x = 4–15) chips per symbol. This attribute is only valid for the LECIM DSSS PHY. |

 Comment. Oops, *phyLecimDsssPsduSpreadingFactor* is not defined in table 181, nor anywhere else in the SB draft: Taking from 802.15.4k-2013:

**Proposed Resolution:**

**Add *phyLecimDsssPsduSpreadingFactor* to Table 181 with the above description.**

**Add on page 140 to line 9: “The 4-bit field functions as an unsigned integer x, where x is the exponent of two (2x). The number represents the maximum spreading factor. Valid 4-bit field values are 0b0100 – 0b1111.”**

**i-7**

KINNEY, PATRICK

Page 159 Clause 7.4.3.15 Line 54

Comment:

The relation between 'Delay Tolerance' and MAC PIB attrtibute macCritMsgDelayTol needs to be clarified. This comment was also approved earlier, but no changes have been don in the text,

Proposed resolution:

Add in: "The MAC PIB attribute macCritMsgDelayTol relation to Delay Tolerance is macCritMsgDelayTol = (60 \* Delay Tolerance) / (2^{14} -1)."

Type T

Must be Satisfied Yes

**Resolution: Revise**

**Proposed revision:**

**Replace: “The Delay Tolerance field describes the delay tolerance of a critical event message, encoded as an integer in units of 60/(2^{14} – 1) seconds.” with “The Delay Tolerance field describes the delay tolerance of a critical event message, encoded as an unsigned integer in units of 60/(2^{14} – 1) seconds. The MAC PIB attribute macCritMsgDelayTol relation to Delay Tolerance is macCritMsgDelayTol = (60 \* Delay Tolerance) / (2^{14} -1).”**

**i-362**

Kivinen, Tero

Page 160 Clause 7.4.4.16 Line18

Comment:

The Spreading Factor field is 4 bit field containing enumeration of phyLecimDsssPsduSpreadingFactor. There is no speciation how this enumeration is encoded in that 4-bit value. The enumeration have values of 1,2,4,8 and 16, so direct integer conversion is not possible.

Proposed resolution:

Specify how enumeration is mapped to the bits.

Type T

Must be Satisfied Yes

**Resolution: Revise**

**Proposed resolution: See response to comment i-361, adding phyLecimDsssPsduSpreadingFactor to table 181.**

**i-284**

Kivinen, Tero

Page 162 Clause 7.4.4.17 Line 21

Comment:

The FSK Operating Mode IE says that Channel Number is as defined in 10.1.2, but the 10.1.2 has lots of different ways of calculating the channel number, and some of those are larger than what can be expressed in the 8-bit field. This also does not specify how this number is encoded.

Proposed change:

The Channel Number field needs to be specified what range it has, and which parts of 10.1.2.\* really apply. Also add that it is encoded as unsiged integer.

Type T

Must be Satisfied No

**Resolution: Revise**

**Proposed resolution:**

**Replace page 162, line 22: “The Channel Number field is defined in 10.1.2.” with “The Channel Number field is defined in 10.1.2.10.2 and it is encoded as an unsigned integer.”**

**Resolution comment: The 4-bit Operating Band, 9-bit Channel Number and 1-bit channel spacing is sufficient for Clause 10.1.2.10.2, I’m not sure how to identify other FSK PHYs. PICS say the “FSK Operating Mode IE” is only used in LECIM FSK. Hence the bit fields are sufficient.**

**i-8**

KINNEY, PATRICK

Page 295 Clause 8.4.2 Line 20

Comment:

macCritMsgDelayTol still incorrectly defined even though the change was approved earlier.

Proposed resolution:

Change to: Type float; Range 0 - 60; Description "The maximum transaction delay, in seconds, for a critical event message before issuing MCPS-DATA.confirm with status 'TRANSACTION\_EXPIRED' , as defined in 7.4.3.15.; Default 15.

Type T

Must be Satisfied Yes

**Resolution: Accept**

**i-425**

**Gilb, James**

Page 298 Clause 8.4.2.2 Line 18

Comment:

macJoinPriority isn't a higher layer function, as it is described in the text. It is fully determined and used by the MAC.

Proposed resolution:

Delete macJoinPriority as a PIB entry

Type T

Must be Satisfied Yes

**Resolution: Accept**

**Note: Not a PCA, but TSCH aspect. This PIB entry could be used by the higher layer to know hop distance to the clock source.**

**i-336**

Kivinen, Tero

Page 317 Clause 9.3.2.3 Line 17

Comment:

We do not use phyFragmentFrameCounter here directly we use the PSDU Counter field of the IE setting up the transaction. Also the Fragment Frame Counter field is not specifeid at all.

Proposed resolution:

Change "The Fragment Number field shall be set to phyFramentFrameCounter." with "The Fragment Frame Counter field shall be set to PSDU Counter field of the FSCD IE setting this fragmentation transaction up.

The Fragment Number field shall be set to the Fragment Number field of the Fragment Header field of the Fragment packet as specified in 20.3.3.""

Type T

Must be Satisfied Yes

**Resolution: Accept**

**i-338**

Tero Kivinen INSIDE Secure

Page 518 Clause 23.3.1 Line 53

Comment:

The text about macFrameCounter etc is wrong, and is already described in the 9.3.2.3.

Proposed change:

Remove “9.2.1, except that macFrameCounter is replaced with phyFragmentFrameCounter. The phyFragmentFrameCounter shall be comprised of the PSDU counter field, used as the most significant 26 bits, and the fragment number, used as the least significant 6 bits.

Type T

Must be satisfied Yes

**Resolution Accept**

**i-339**

Tero Kivinen INSIDE Secure

Page 519 Clause 23.3.2 Line 17

Comment:

Add new step 2b that will fetch the PSDU Counter value from the PIB if secured frame, and increment it afterwards.

Proposed change:

"Add new step:

2b) If Secure Fragment is set to one, set the PSDU Counter value to the phyFragmentFrameCounter. If the PSDU Counter has value of 0x3ff ffff then return error, otherwise increment the phyFragmentFrameCounter."

Type T

Must be satisfied Yes

**Resolution Accept**

**i-340**

Tero Kivinen INSIDE Secure

Page 519 Clause 23.3.2 Line 27

Comment:

This paragraph is confusing. I think the abort is sent from the responder as Frak not as Fragment, and also the text on page 521 line 53 says that abort is indicated by setting all bit positions of the Frak Content to zero, not by setting Fragment Number zero. Of course this could also be the case where the sender aborts the transaction and sends Fragment with Fragment Number of zero out to indicate it aborts the transaction, but how does the receiver know this is not first fragment?

Proposed change:

"Replace

Fragments shall be transmitted beginning with fragment 1 and ending with fragment n. The Frak is described in 23.3.5.2. If the Frak retransmission count is exceeded during the transaction, the transaction is terminated and a fragment with the Fragment Number field set to zero is transmitted to signal that receiving device is terminating the transaction.”

With

Fragments shall be transmitted beginning with fragment 1 and ending with fragment n. The Frak is described in 23.3.5.2. If the Frak retransmission count in the receiver is exceeded during the transaction, the transaction is terminated and a fragmentFrak with the Fragment Number field set to zero and Frak Content set to zero, is transmitted to signal that receiving device is terminating the transaction.”

"

Type T

Must be satisfied Yes

**Resolution Revised**

Proposed resolution:

Rationale: The receiver can terminate transaction and with a Frak frame with Frak Content set to zero. This can be only done with Frak Policy field value 0. The transmitter can terminate transaction by setting Fragment Number field to 0, as the first fragment number is 0b000001.

Suggestion: Replace

"Fragments shall be transmitted beginning with fragment 1 and ending with fragment n. The Frak is described in 23.3.5.2. If the Frak retransmission count is exceeded during the transaction, the transaction is terminated and a fragment with the Fragment Number field set to zero is transmitted to signal that receiving device is terminating the transaction.”

With

**“Fragments shall be transmitted beginning with fragment 1 (0b000001) and ending with fragment n. The Frak is described in 23.3.5.2. If the Fragmentation retransmission count is exceeded during the transaction, the transaction is terminated by the transmitter transmitting a fragment with the Fragment Number field set to zero (0b000000). The receiver can terminate the transaction by setting all Frak Content bit positions to zero.”**

**i-346**

Tero Kivinen INSIDE Secure

Page 520 Clause 23.3.3 Line 1

Comment:

Does the Fragment Number start from 0 or from 1. There is text saying using Fragment Number 0 abort the transaction, and there is text saying we send fragment 1 first etc.

Proposed change:

Clarify the fragment number range. This same problem is in the Frak.

Type: T

Must be satisfied: Yes

**Resolution: Revised**

Resolution comment: **See recommendation to i-340.**

**i-342**

Tero Kivinen INSIDE Secure

Page 520 Clause 23.3.3 Line 11

Comment:

"Remove “7.2.10, except that the initial remainder value used for CRC calculation shall be as described in

7.4.2.9.” as there is no longer ability to set the remainder values."

Proposed change:

"Remove “7.2.10, except that the initial remainder value used for CRC calculation shall be as described in

7.4.2.9.”"

Type: T

Must be satisfied: Yes

**Resolution:** **Accept**

Resolution comment to SC maintenance: Why did we remove initial remainder offsetting?

**i-343**

Tero Kivinen INSIDE Secure

Page 520 Clause 23.3.3 Line 12

Comment:

Change reference from 23.3.1 to new section 23.3.3b.

Proposed change:

Change reference from 23.3.1 to new section 23.3.3b.

Type: T

Must be satisfied: Yes

**Resolution: Accept**

**i-334**

Tero Kivinen INSIDE Secure

Page 520 Clause 23.3.3 Line 14

Comment:

Add section describing how to calculate the FICS when using MIC.

Proposed change:

"Add new section to the 23.3.3b:

23.3.3b Calculating FICS field using MIC

When phyPSDUFragSecure is TRUE, the length of FICS field shall be 4 octets and shall contain the MIC-32 calculated as follows:

The nonce for the CCM transformation is calculated as specified in the 9.3.2.3. The Private Payload field is set to empty, The Open Payload field is set to contain the Fragment Header and Fragment Data. The SecurityLevel is set to 1.

The key is set to be the same key that was used to protect the frame containing the FSCD IE negotiating the exchange. i.e. secure fragments can only be used if security was enabled when setting the transaction up.

The CCM transformation shall then use the Private Payload field, the Open Payload field, the macExtendedAddress, the SecurityLevel, and the key to produce the secured fragment according to the CCM\* transformation process defined in 9.3.4"

Type: T

Must be satisfied: Yes

**Resolution: Accept**

**i-344**

Tero Kivinen INSIDE Secure

Page 520 Clause 23.3.5 Line 38

Comment:

The text “Upon completing the transmission of the fragment preceding the expected Frak according to the Frak policy selected, the initiating device shall suspend transmission and wait for the expected Frak.” is confusing. It might be better to write the transmitter operations separately for each frak policy

Proposed change:

"Change “Upon completing the transmission of the fragment preceding the expected Frak according to the Frak policy selected, the initiating device shall suspend transmission and wait for the expected Frak.” with

“When using Frak policy of zero, the transmitter will wait for Frak after each fragment. When using other Frak policies of two the transmitter will wait for Frak only after transmitting the last expected fragment.”"

Type T

Must be satisfied: Yes

**Resolution: Reject**

**Resolution Comment: There is no confusion.**

**i-345**

Tero Kivinen INSIDE Secure

Page 520 Clause 23.3.5 Line 41

Comment:

"The text “The number of retransmissions shall be limited by macMaxFrameRetries.” is not clear whether we do macMaxFrameRetries for each fragment separately, or whether we fail the transaction if we get macMaxFrameRetries fragment retraries during the sending of the whole frame."

Proposed change:

Clarify which one is meant.

Type: T

Must be satisfied: Yes

**Resolution: Revised**

Resolution comment:

"As Fragments access the channel as individual frames they should be treated as such and maMaxFrameRetries is per fragment.

**Proposed resolution:**

**Change to: “The number of retransmissions shall be limited by macMaxFrameRetries per fragment.”**

**i-347**

Tero Kivinen INSIDE Secure

Page 522 Clause 23.3.5 Line 17

Comment:

I assume that if Fragments Received field is omitted, then it is assumed that all bits in there are 0, i.e. the Frak frames get longer all the time we go forward. Other option was to assume that we only indicate those frames which needs to be retransmitted sent, i.e. if we leave out frames 0-15, but include frames 16-31 then it is assumed that everything in 0-15 was already received properly. This needs to be clarified.

Proposed Change:

Type: T

Must be satisfied: Yes

**Resolution: Revised**

Proposed resolution:

**Append to line 21: "Once all fragments from a group have been acknowledged, the corresponding group can be omitted from future Frak frames of the same transaction."**

**i-195**

Tero Kivinen INSIDE Secure

Page 522 Clause 23.3.6 Line 43

Comment:

The text "The receiving device is not required to validate the FCS of the PSDU nor is it required to send an Imm-ACK or Enh-ACK" is confusing. We already say earlier that you assume FCS is correct without it being in frame, and that we proceed with according to 6.7.4.2, which is section covering acknowledgements. Why do we have this text here? Is it not required for receipient to send Ack if AR is set?

Proposed Change:

Remove "The receiving device is not required to validate the FCS of the PSDU nor is it required to send an Imm-ACKor Enh-ACK"

Type: T

Must be satisfied: No

**Resolution: Reject**

**Note: This needs to be discussed. The term “process” is confusing. There is technically no need to transmit Enh-Ack, but do we want to?**

**Resolution comment:**

**As fragmentation is not able to abide with the conventional timing for Acks in 6.7.4.2. we needed to circumvent the timing constraints. Hence, there is no Imm-Ack or Enh-Ack as the data source can not associate such Ack to any PSDU. When all of the fragments have been Fraked, all fragments’ FCS pass and hence the fragment payload PSDU FCS has to pass as well. Fraking the last outstanding fragment serves as the final Ack for the PSDU.**