Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [Comment resolutions for FEC]

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Re: []

Abstract: [This document provides resolutions to comments for FEC]

Purpose: [This document provides resolutions to comments of LB51]

FEC CID 757, 760, 762, 764, 765(1/2)

- Comment:

  PHR coding and Payload coding should not be independently chosen(757)

  Add a note in bottom of the Table 8 saying something like "For MR-FSK, when coding is enabled, the FEC shall be applied over the entire PPDU (PHR+PSDU) as a single block of data, as described in Clause 6.12a.1.3." (760)

  Remove "or not supported" in Table 8.(762)

  Don't need PHR coding parameter, based on description of FEC in 6.12a,b,c.(764)

  Consider merging PHR and Payload coding.(765)

- Response: Accept in principle
- Resolution: change PSR coding to PPDU Coding

PPDUCoding	Boolean	TRUE or FALSE	A value of FALSE indicates that PPDU (PHR+PSDU) is uncoded, and a value of TRUE indicates that PPDU (PHR+PSDU) is coded.

- Text to be changed: Page 26, line 51 to Page 27 line 2.

FEC CID 757, 762, 764, 765(2/2)

- Change to

  If the PPDUCoding parameter of the PD-DATA.request primitive specifies that FEC coding is to be applied to the PHR+PSDU but the feature is either disabled or not supported, the PHY entity will issue the PDDATA.confirm primitive with a status of NSUPPORTED_PPDU_FEC.

FEC CID 1234

- Comment:

  Either terminated the PHR filed by a tail bit sequence, or consider using a dedicated block code for the PHR field.(1234)

  Response: Reject

  Proposed resolution:

  In case of a non mode switching PPDU, trace back with sufficient reliability is feasible since the minimum number of PSDU bits is 16. (since K is only 4 trace back depth of 16 will suffice). In case of a mode switching PPDU, decoding the 1st bit can also be reliable done and the bit-length of "PHR“ (i.e., Mode Switching Frame) is a priori known.

FEC CID 1236

- Comment: There should be a better option for the mandatory mode to perform, in which case the FEC should be mandatory and not the opposite.
- Response: Reject
- Resolution: The FEC mode is only used when the transmission is in a long distance. In otherwise case, we don't need to use FEC.

FEC CID 1239

- Comment:

  Add a MAC command to exchange the PHY capabilities between devices so that the devices will know the details of any optional modes that can be used between the devices. Relying on setting the PIB will not work.
- Response: shall be classified as MAC. Will be resolved by James Gilb.

FEC CID 1240

- Comment: Remove references to convolutional coding and associated PIB attributes. Replace with LDPC for FEC.
- Response: Reject
- Reason for rejection: LDPC requires large block size to achieve good coding gain. For low data rate system, it results in large processing delay. Compare to LDPC, convolutional coding is more suitable for low data rate SUN system.

FEC CID 1243

- Comment: Align with industry practice; restate interleaving as required when coding is used. Remove references to phyFSKFECInterleaving PIB attribute
- Response: Reject
- Resolution: The effect of interleaver depends on the situation of application. It is not necessary to take interleaver as mandatory.

FEC CID 1245

- Comment: K = 7. Update necessary parameters.
- Response: Reject
- Reason:

  Longer constraint length means higher complexity. It is not necessary to increase the constraint length if the required performance can be achieved with short constraint length codes.

FEC CID 1252

- Comment:The purpose of Table 75b is not clear. What is meant by SFD pattern?
- Response: Accept in principle
- Resolution: *Page 48 line 53 change to:*

Depending on the value of the selected SFD

Table 75b – SFD value and MR-FSK coding option

SFD Value	PHR +PSDU	Comment
See Table 28a	uncoded	Mandatory mode
See Table 28a	coded	optional mode; PHR and PSDU coded as a single block of data

- *Page 49 line 20 change to:*

When the SFD value indicates a coded packet, FEC shall be employed on the PHR and PSDU bits,…

FEC CID 1253, 1254

- Comment:

  Consider using a single type of FEC.(1253)

  The RSC has the advantage of being systematic, which tips the scales in favor of its adoption. Propose to adopt RSC only.(1254)

- Resolution:
  - 1253 – Withdrawn by the commenter
  - 1254 - Withdrawn by the commenter.

FEC CID 1259, 1274

- Comment:

  Re-design the interleaver as a bit-interleaver.(1259)

  Explain. Consider having interleaving always enabled in case FEC is enabled. Consider using a bit-interleaver instead of a symbol interleaver.(1274)

- Resolution:
  - 1259 Withdrawn by the commenter;
  - 1274 Reject (same resolution as 1243)
    - Reason: The effect of interleaver depends on the situation of application. It is not necessary to take interleaver as mandatory.

FEC CID 1247, 1248, 1249, 1250, 1251, 1258

- Comment:

  Explain the equation, Pi and pi are not defined, what do they mean?(1247)

  Bit nomenclature should be alligned with standard convolutional encoder terminology eg. OFDM.(1248)

  Use resolution proposed in document 15-10-0266-00-004g. (1249)

  The end of the equation is difficult to read.(1250)

  Equation number "(10)" should be in the next line. (1251)

  There is a mismatch between the name of the variable used to represent the output of the convolutional coding scheme in Figure 65c and the name of the variable used in Equation (10). (1258)

- Response: Accept in principle
- Resolution: resolved by revised document 15-10-0266-02

FEC CID 1255

- Comment: Add ", and termination sequence (tail bits)" at end of sentence.
- Response: Accept in principle
- Resolution: Same resolution as 1247 (resolved by revised document 15-10-0266-02)

FEC CID 1261, 1262, 1272

- Comment: 1261: Why is there a specific bit sequence for the stuffing bits?
- Requested resolution: Provide explanation for the specific sequence.
- Response: Accept in principle
- Resolution: resolution provided in document xx-0266-02-xx

- Comment 1262: Why is there a specific bit sequence for the stuffing bits?
- Requested resolution: Provide explanation for the specific sequence
- Response: Accept in principle
- Resolution: same as 1261

- Comment 1272: What is the reason to specify this particular kind of stuffing bits (i.e. non-zero bits)? They are usually zero.
- Requested resolution: Explain why stuffing bits are given as specified in figure 65f and 65g.
- Response: Accept in principle.
- Resolution: provided in document xx-0266-02-xx.

FEC CID 1267, 1268, 1269, 1270

- Comment ID 1267
  - There seems to be an error in the interleaver figure since Document 182 r1 has the agreed figure, and then Document 182 r2 was uploaded on afternoon on the last day of the Orlando meeting with a re-drawn figure and was not presented.
- Requested resolution: Use the figure that was agreed in the FEC subgroup and during the Orlando meeting in document 182 r1 for the interleaver.
- Response: Accept in principle.
- Resolution: provided in document xx-0266-02-xx

- Comment ID 1268
  - There seems to be an error in the interleaver figure since Document 182 r1 has the agreed figure, and then Document 182 r2 was uploaded on afternoon on the last day of the Orlando meeting with a re-drawn figure and was not presented.
- Requested resolution:
  - Use the figure that was agreed in the FEC subgroup and during the Orlando meeting in document 182 r1 for the interleaver.
- Response: Accept
- Resolution: provided in document xx-0266-02-xx

- Comment ID 1269 & 1270
  - similar to 1268 and 1267
- Requested resolution:
  - similar to 1268 & 1267
- Response: Accept in principle.
- Resolution: provided in document xx-0266-02-xx

FEC CID 1271

- Comment:
  - The text does not provide sufficient information on the interleaving procedure to so as to achieve proper implementation.(1271)
- Response: Accept.
- Resolution: provided in document xx-0266-02-xx.

FEC CID 1250, 1258

- Comment ID: 1267
- Response: Accept.
- Resolution: resolved by 1274

- Comment ID: 1258
- Response: Accept.
- Resolution: resolved by 1274

FEC CID 1238

- Comment:

  Inserting 3 tail bits after the PHR will enable the PHR to be reliably decoded, but the overhead of the tails bits is significant in relation to the 16 data bits. This results in 38 bits being transmitted for every 16 data bits, which presumably motivated the encoding as single block of data in the first place. Nevertheless, the disadvantages to the decoder are such that I recommend to either separately terminate the PHR with its own tail bits or consider using a systematic BCH(40,16) instead.(1238)

- Response: TBD

FEC CID 1241

- Comment:

  Remove references to NRNSC coding option. Remove references to pkyFSKFECScheme PIB attribute. Limit convolutional coding to RSC.

  Consider using a single type of FEC.(1241)

- Response: TBD