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

Submission Title: [Resolutions to LB59 Comments on Radio Specs]

Date Submitted: [December 2010]

Source: [Cristina Seibert[1], Steve Jillings[2], Steve Shearer[1]]   Company [[1]Silver Spring Networks, [2]Semtech]

Re: [Resolutions to Radio Spec Comments]

Abstract: [Resolutions to Radio Spec Comments]

Purpose: [802.15.4g Comment Resolution for LB59.]

Overview

- Resolution of a number Radio Specification comments
- Comments in Part I were discussed in Radio Specification meeting held on November 30th.
- Comments in Part II were discussed in the Radio Specification teleconference held on December 7th.
- Comments in Part III are newly proposed comment resolutions
- Color coding of comments:
  - Green: agreed
  - Blue: discussed but kept open
  - Black: not yet discussed

Part I

15-10-0939-02-004g

Comments 1

- CID 41
  - "The single-sided clock frequency tolerance T, in ppm, shall be set as follows" isn't clear what externally visible characteristic is being specified.   Phrase "tolerance shall be set" isn't clear what "set" means. Discussion ……..capture and demodulate.
  - clarify that this is the transmitter frequency tolerance that is being specified.
  - **AP: Replace with "The single-sided clock frequency tolerance T at the transmitter, in ppm, shall be as follows"**
- CID 42
  - Sentence is redundant; last sentence in sub-clause says all regulatory requirements will be met.
  - Delete sentence
  - **A**
- CID 50:
  - Added text "and an OFDM receiver, which shall provide a maximum PER of 10% with a PSDU length of 250 octets with a receiver maximum input level greater than or equal to -20 dBm." seems inappropriate here …….. Sensitivity conditions are in 6.1.7. When I go through all that, it is saying the max input is -20dBm, which is already stated in the base standard.
  - Delete the added text.
  - **A**

Comments 2

- CID: 63
  - The PSDU length used for receiver sensitivity tests should be consistent for all SUN PHYs.
  - Change the PSDU length to 250 octets for all SUN PHYs
  - **AP: Remove the added text on page 30 line 26, page 82 lines 22 and 53 concerning receiver sensitivity tests for the MR-OFDM PHY. Remove the added text in Table 6 concerning the PSDU length for the receiver sensitivity test.**

- CID 72:
  - Clarify channel page for aCCATime
  - Change: "….at the lowest mandatory symbol rate for that channel page." to: "…at the lowest mandatory symbol rate for the specific 32-bit channel page definition."
  - **AP: Change to: "...at the lowest mandatory symbol rate for that channel page (see Figure 22a)"**

- CID 235:
  - Table 31: I looked in 6.1.2, and didn't see where the current channel was uniquely defined as an integer. Did I miss it?
  - Describe how each logical channel is defined by a single, unique integer value.
  - **AP: Replace "see 6.1.2" with "refer to NumChan in 6.1.2.5a"**

Comments 3

- CID 242:
  - The text says, "for the inner levels, and [...] for the outer levels as shown in Figure 65p, but the figure only shows the constraint on the positive deviation values. And since figures are always normative, they override text, which is undesirable in this case since both positive and negative deviations need to be specified.
  - Modify Figure 65p to show constraints on negative deviations, too.
  - **A**
- CID 362:
  - this tolerance applies to the transmitter. It would be good to remind this here, the same way it is stated right after for the channel switch time "The channel switch time is a transmitter parameter…"
  - rephrase as follow: "The single-sided clock frequency tolerance T, in ppm, shall be set in the transmitter as follow:"
  - **AP: same resolution as CID 41**
- CID 422:
  - The conditions for the receiver sensitivity tests are overly complicated
  - Use PSDU length of 20 octets for all PHYs as in the baseline standard
  - **AP: same resolution as CID 63**

Comments 4

- CID 572:
  - Need to clarify units in "The transmit spectral content at M1 and M2 shall be less than −25 dB and −35 dB, respectively."
  - Clarify the units (dBc or dBm)
  - **AP: The transmit spectral content is defined as a ratio of the out-of-channel power to in-channel power, for which the units of dB are appropriate. No change required.**

- CID 573:
  - Clarify the units for So
  - So is -90 dBm
  - **A**

- CID 705:
  - The reference value with regard to the offset frequencies M1 and M2 is missing. Is this the carrier frequency?
  - Specify the reference value of the offset values M1 and M2.
  - **AP: Change to "offset frequencies M1 = 1.5×R×(1+h) and M2 = 3×R×(1+h) relative to the carrier frequency..."**

Comments 5

- CID 971:
  - The PSDU length used to define the receiver sensitivity is of 250 octets for MR-FSK and MR-OFDM, and 20 octets for MR-OQPSK.
  - Make consistent the definition of the receiver sensitivity over all the SUN PHYs, w/r/t the PSDU length. Define the MR-OQPSK receiver sensitivity for a PSDU of 250 octets.
  - **AP: Same resolution as CID 63**

- CID 1036:
  - Document says "PER < 1%" This value is not stable for repeatable measurement. The transition curve between 95% and 5% PER is abrupt and then it is almost flat and oscillating for the extremities of the curve. Better points for measurement should be 10% PER, 50% PER or 90% PER.
  - Change the PER value for one of the proposed values, 10%, 50%, or 90%
  - **AP: Same resolution as CID 63**

Part II

15-10-0939-02-004g

Comments 6

- CID 468:
  - Units of dBm missing
  - Proposed Change: add (S0 = -90 dBm)
  - **A: See also CID 573**

- CID 1069:
  - Assuming NF is not clear.
  - Proposed Change: Indicate the assuming NF and the implementation loss as well if possible.
  - **AP: RX System NF is a design issue and not for a standards body to determine. Remove text on line 23 page 82 that defines the NF for the OFDM PHY.**

- CID 365:
  - The text does not say if the symbol rate tolerance applies to the transmitter or the receiver. The receiver must have a tolerance greater than a given value while the transmitter must have a tolerance less than the given value. In this case, it applies to the transmitter so it would be good to remind it.
  - Proposed Change: Rephrase as follow: "The transmitter symbol rate tolerance shall be less than or equal to +/-300ppm"
  - **A**

Comments 7

- CID 364, 363:
  - The value h,R is not completely defined. If a radio supports multiple modes (standard modes or through generic PHY), then multiple h,R can be used int he formula. Since the clock tolerance is a hardware characteristic and it cannot be changed in the fly, the formula should provide only one value
  - Proposed Change: change the definition of h to :"h,R are the minimum modulation index supported by the SUN device"
  - **AP: Re-write equation as: T <= min…, for all combinations of R, h and F supported by the device, where R is the symbol rate… However, may have different clock frequencies supported for each bands.**

- CID 996
  - this is poorly written
  - Proposed Change: change, for example: The ratio of the total transmitted in-channel and out-of-channel power shall be less that -25dB and -35dB respectively at the defined offset frequencies, in the defined frequency bandwidth measurement interval. Power shall be measured in a frequency bandwidth measurement interval equal to 1.5R, where R is the symbol rate, expressed in units of Hertz, and at the offset frequencies 1.5R(1+h) and 3R(1+h), where h is the modulation index for 2-level modulation, and 3 * the modulation index for 4-level modulation. The spectrum analyzer settings for this measurement shall be as follows: the resolution bandwidth is 1 kHz, the video bandwidth is 1 kHz or greater, rms detector. The modulated signal shall use a PN data pattern
  - **Reclassify as "Editorial"**

Comments 8

- CID 461:
  - Why is the 12%/50% level so asymmetrical?
  - Proposed Change: Check
  - **Z**

- CID 466:
  - The meaning of "frequency interval" is not clear.
  - Proposed Change: Replace with "integration bandwidth".
  - **A**

- CID 467:
  - The pseudo-random sequence should be defined.
  - Proposed Change: Use PN9 and a sequence length of 512 bits.
  - **AP: Change line 37, page 70 to: "The modulated signal shall use a PN data pattern of 511 bits or longer. "**

Comments 9

- CID 641:
  - Should give the EVM for different data rates.
  - Proposed Change:
  - **AP: The modulation quality for MR-FSK is specified via the eye diagram, with associated frequency and timing requirements. There is no need for additional testing of the I and Q samples. The MR-OFDM quality tests are given in 6.12b.3.5. The MR-OQPSK EVM tests are according to the baseline standard. No change required.**

- CID 845:
  - Regulatory-related text in lines 9, 21-23 and 42. It seems better to add a general statement to 6.1.1.
  - Proposed change: Remove text for individual parameters and add to what is already in 6.1.1.
  - **AP: Statement on line 9 removed per CID 42. For the remaining lines, editors to align with text and editorial guidelines used in 802.15.4i. (NOTE: Regulatory requirement statements were kept in individual sub-clauses of the 4i draft).**

- CID 861:
  - The text regarding the RX-to-TX turnaround time on lines 19-20 and lines 22-23 is already covered by text in the 2006 standard (it is said for all PHYs).
  - Remove the redundant text.
  - **A**

Comments 10

- CID 995:
  - specs shouldn't make reference to regulatory
  - Proposed Change: remove
  - **AP: same resolution as CID 845**

Part III

Comments 11

- CID 248:
  - "Channel switch time is a transmitter parameter..." Is there a matching receiver parameter? If not, why the tight specification?
  - Please elucidate.
  - **AP: a matching receiver spec would be difficult to test. Discussion with commenter needed.**

- CID 484:
  - Radio should have a blocking spec. How strong of a signal should the radio be able to receive
  - The radio shall be capable of receiving signal levels up to 10 dbm with out damage and a PER of less than 10^-3
  - **AP: There is a maximum receiver input level specification in the baseline standard which will apply also to TG4g. No change required.**