**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | **<Task Group 15.4k Minutes>** | |
| Date Submitted | [16 May 2012] | |
| Source | [Pat Kinney] [<Kinney Consulting LLC>] [address] | Voice: [ ] Fax: [ ] E-mail: [ ] |
| Re: | [Task Group 802.15.4k Plenary Meeting in Atlanta] | |
| Abstract | [Task Group 802.15.4k Minutes.] | |
| Purpose | [Official minutes of the Task Group Session | |
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**IEEE 802.15 Plenary Meeting – Session #78**

**Hyatt Regency, Atlanta, Georgia, USA**

**May 14-17, 2012**

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# Monday, 14 May 2012, 10:30 (AM2)

**10:44** Chair called meeting to order.

Chair presented opening report 15-12-0242-00-004k:

Chair displayed the IEEE-SA slides #1 through #4 of the IEEE patent policy.

Chair asked if anyone in the meeting was personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance? There were no responses.

**Key Discussion Points**

* Draft text from document 15-12-0089-05-004k will be reviewed, discussion, and text changes will be proposed

**Agenda for Atlanta**

Chair presented the agenda 15-12-0205-00. Discussion ensued as to moving meeting slots to avoid conflicts with other groups. Motion to *approve the agenda (15-12-0205-01)* was made by Ben Rolfe and seconded by Shu Kato. Upon neither discussion nor objection the motion carries by unanimous consent.

**Approval of Previous Minutes**

Motion to *approve the minutes from Waikoloa 15-12-0129-00* was made by Seong-Soon Joo and seconded by Ben Rolfe. Upon neither discussion nor objection the motion carries by unanimous consent.

**11:40** Status updates of TG4k subgroups:

* DSSS by B Rolfe:
  + 2 presentations this week
  + channelization issues
  + clause 8 open issues
* FSK by C Seibert
  + No TBDs are left
  + Aus/NZ bands have been added
  + Channel page 13 has been allocated for LECIM
* MAC status by B Rolfe
  + Working on PHY/MAC interface
  + Attribute definitions
  + TBDs include Number assignments

**12:10**  Meeting recessed until Monday PM1

# Monday, 14 May 2012, 13:30 (PM1)

**13:40** Chair called meeting to order, this meeting is focused on DSSS.

M Al Ameen presented Preamble SFD design and Korean bands for DSSS PHY (15-12-0245-00).

David Howard led the review of draft text from document 15-12-0089-05.

D Howard asked the group for objections to removing the option of a variable length PHY for the DSSS PPDU:

* this change would require that fragmentation would be mandatory for the DSSS LECIM PHY, i.e. device is capable of fragmentation and that fragmentation is enabled
* There were no objections to this proposal from within the room
* Changes to Fig 154:
  + PHR is elided
  + PSDU size is defined by PIB *LECIMDSSSPSDUSIZE*
* Changes to Fig 155:
  + Figure is deleted
* Changes to Table 189:
  + Table is deleted
* Need to re-evaluate what are specific PIB fixed sizes based upon overhead

# Monday, 14 May 2012, 16:00 (PM2)

**16:06 FSK text review** by Cristina Seibert (15-12-0089-05)

* Table 66:
  + change column 1 title from “PHY (MHz)” to “Band ID”
  + change column 2 title from “Frequency Band (MHz)” to “Frequency Range (MHz)”
* Table 195 and Table 196:
  + change column 1 title from “Frequency Band (MHz)” to “Band ID”
  + Delete all country references
* Table 68l and Table 68m:
  + change column 1 title from “Frequency Band (MHz)” to “Band ID”
  + change column 1 entries to refer to Band IDs
* Fig 156
  + Delete colors
  + Delete PHR
* 8.1.2.11, page 73, line 11:
  + modify equation order to reflect the order within Table 68l

**17:45** meeting recessed until Tuesday AM1

# Tuesday, 15 May 2012, 8:00 (AM1)

**8:14** **MAC draft review**

Ben Rolfe led the review of the MAC portions of preliminary draft 15-12-0089-05.

* Add a PIB denoting fragmentation capable
* Add a PIB denoting fragmentation enabled

**8:44** Ben Rolfe presented MAC-CP and PHY Capabilities Representation (15-12-0243-00)

**9:17** Jussi Haapola presented Update on Priority Access – Distribution of Priority Channel Access Slots over the Superframe (15-12-0213-01)

**9:40** Chair recessed until AM2

# Tuesday, 15 May 2012, 10:30 (AM2)

**10:35** **Review clause 4 and annexes text**

Meeting called to order. P Kinney led the discussion on the draft text for clause 4 and annex D and annex P (15-12-0089-05).

* Request made that the fragmentation engine allows up to 128 fragments versus the 32/64 proposed
* Action Items
  + Seong-Soon Joo is responsible for the resolution of RSLN TBDs
  + Clause 4 changes
  + Annex P changes
    - P.1 – replace Wikipedia quote with US Library of Congress
    - P.1.1, line 17 – add relay to MAC enhancements
    - P1.3.1: D Howard to add some guidelines to commissioning
    - P.1.3.2: Seong-Soon Joo to enhance text to P.1.3.2 Low Energy
    - Change “P.2 Functionality added: DSSS, FSK, fragmentation, frame priority, PIBs, attributes” to “P.2 Functionality added: DSSS, FSK, fragmentation, frame priority, RSLN, PIBs, and IEs”
    - P.2.1 – D Howard to add text
    - P.2.2 – C Seibert to add text
    - P.2.4 – Jussi Haapola to add text
    - P.2.5 – P Kinney to list all LECIM PIBs
    - P.2.6 – B Rolfe to list all LECIM IEs
  + Annex E (PICS) change owners
    - DSSSS PICS: S Kato, D Howard
    - FSK PICS: C Seibert
    - MAC PICS: B Rolfe, P Kinney

**12:30** Chair recessed until PM1

# Tuesday, 15 May 2012, 13:30 (PM1)

**13:40** DSSS resolution of issues & TBDs

Chair called the meeting to order. Given that the DSSS action items needed additional time and that the FSK didn’t need the whole 2 hours for its slot assignment, the decision was made to combine DSSS and FSK resolution of issues and TBDs into the PM2 meeting.

**13:45** Chair recessed until PM2

# Tuesday, 15 May 2012, 16:00 (PM2)

**16:05** FSK resolution of issues & TBDs

Chair called meeting to order. Cristina Seibert led discussion on the resolution of FSK issues and TBDs.

* In Table 66, change first column heading to “Band Identifier (we said Band Label in the meeting, but I think identifier is better)” and second column heading to “Frequency Range (MHz). Add instructions to have these changes applied to the baseline.
* In Table 68l, change first column heading to “Band Identifier” and change the contents in that column to align with the band identifiers in Table 66.
* Swap the terms in equation (1) so that the order in which they appear aligns better with the order of columns in Table 68l.
* On line 14 of page 73, add reference from NumChan to *phyCurrentChannel* in sub-clause 9.3.
* Change the headings of Table 68l to “Total number of channels and first channel center frequencies for LECIM FSK PHYs with 200 kHz channel spacing (with footnote that channel spacing does not apply to 169 MHz band since there is only 1 channel)”, and remove Channel Spacing column. Remove Modulation column from the table.
* Change the headings of Table 68m to “Total number of channels and first channel center frequencies for LECIM FSK PHYs with 100 kHz channel spacing”, and remove Channel Spacing column. Remove Modulation column from the table.
* In sub-clause 19.2.1.3, change the equation on parity such that the P variable is eliminated (since it is only used once), instead state that “Parity = …” even if it takes 2 lines. James Gilb wants to work with you on how to better structure this section.
* Remove lines 28-32 on page 94.
* Change first column of Table 195 and 196 to the Band identifier and change the contents of those columns to match the band identifiers in Table 66. Remove the “Modulation Type” sub-rows, since it is already called out on lines 22-23 of that page.
* Remove “channel spacing” sub-rows from Tables 195 and 196, and simply state either 100 kHz or 200 kHz channel spacing may be used as permitted by regulations, with the caveat that the channel spacing parameter does not apply to band 169. Consolidate Tables 195 and 196 into one, with the headings of Tables 195 and 196 to “LECIM FSK modulation parameters”.
* Remove Table 197 and replace it with this text: FSK symbol timing used for MAC and PHY timing parameters is 40 μs for band 169 and 26.7 μs for all other bands.
* Replace lines 23-27 on page 99 with a reference to the frequency deviation tolerance specified in 18.1.2.3.1. for 2-level modulation.
* I just realized the clause numbering has changed with the publication of TG4, it has become 18 instead of 16, so please renumber all references in our draft accordingly.
* Change sub-clause 19.2.4.6 to state “Under the conditions specified in 8.1.7, a compliant device shall be capable of achieving a sensitivity of -95 dBm or better”.
* 19.2.2.5, page 101, line 1 change to “Interleaving of ~~PSDU~~ code-bits shall be employed in conjunction with ~~PSDU~~ FEC. No ~~PSDU~~ code-bit interleaving shall be employed if ~~PSDU~~ FEC is not used.”
* Line 14/15, page 101, remove ()’s
* change the "and" to "or" on line 22 on page 94

**16:32** discussion on inclusion of 2450 band in the LECIM amendment.

* What is the purpose of including this band?
* Action Item: Jerritt Kent to present a proposal as to how to make 2450 band work better

**17:00** Meeting recessed

# Wednesday, 16 May 2012, 13:30 (PM1)

**13:40** **MAC resolution of issues & TBDs**

Chair called the meeting to order

Shusaku Shimada presented “ Summary of Latest Japanese 920 MHz Rules and Conditions” (15-12-0262-02)

* New rules allow for both unlicensed and licensed users within the band where licensed users are required to pay a fee for a five year use period but are allowed to transmit at a higher transmit power

Ben Rolfe led the group on a review of the MAC issues and TBDs and

fragmentation presented (15-12-0276-00)

* DSME TBDs have been resolved
* RSLN TBDs have been resolved
* Clarifications for text in progress

**14:40** Meeting recessed by chair

# Wednesday, 16 May 2012, 16:00 (PM2)

**16:08** **Review Coexistence document**

Chair called the meeting to order, and put the meeting into a 30-minute recess to allow additional preparation for frequency channel presentation and for the coexistence document presentation.

**16:32** Upon being informed from the authors that the above mentioned documents needed additional effort, chair recessed meeting until 8:00 am Thursday

# Thursday, 17 May 2012, 8:00 (AM1)

**8:15** **Coexistence resolution of issues and TBDs**

Meeting called to order.

Shu Kato presented DSSS Channelization for TG4k (15-12-0286-00).

Comments:

* Why not one mask versus two masks? Raised cosine is very typical so it’s included, and Japan’s regulations are special and not served by the raised cosine mask.
* Intent is to show channel rasterization distillable to a simple formula for a global solution

Steve Jillings presented DSSS Channelization for TG4k (15-12-0275-00).

Comments:

* What is a “raster”? For example, change “LECIM PHY channelization is based upon a 100 kHz channel raster” to “LECIM PHY channel plan is based upon 100 kHz channel spacing”
* How does this proposal meld with the previous proposal (15-12-286)? Agreed that D Howard, S Kato, S Jilling, and C Seibert will collaborate on changes to TG4k channelization and present a final proposal to TG4k at AM2.

**9:15** meeting recessed until Thursday AM2

# Thursday, 17 May 2012, 10:30 (AM2)

**11:00** **Clause 4 and Annex resolution of issues & TBDs**

Meeting called to order by chair.

David Howard requested that the following changes

8.1.1 Operating Frequency range

* Table 66
  + Update to include DSSS PHY;  bit rate is a range i.e. symbol rate/spreading factor.  Need to handle case when symbols aren’t binary such as OQPSK.

8.1.2.11 Channel numbering for LECIM PHYs

* Update with new harmonized raster channel scheme (jillings, kato, shimada, siebert, howard)

9.3 PHY PIB attributes

* Table 71—
  + phyLECIMDSSSPPDUTxAt  2^24 enough?  Should we expand to 2^32?
  + phyLECIMDSSSPSDUSize remove 0 option;  variable size option removed.
  + Add OVSF PN code PIB’s (ameen)

19.1.1 PPDU format for DSSS

* Consider rewording to eliminate ‘least’ and ‘most’ significant terminology as it is ambiguous.
* Figure 154
  + Remove PHR column, and change PSDU column to specify ‘Fixed’ only
  + Remove table 189, figure 155, and related text

19.1.1.1 SHR, 19.1.1.1.1 Preamble field, 19.1.1.1.2 SFD field

* Add text from M Al Ameen presented Preamble SFD design and Korean bands for DSSS PHY (15-12-0245-00)

19.1.1.2 PHR.

* Remove, as there is no longer a variable length option

19.1.2.1 Data rate

* Doesn’t actually state the data rates!
* Remove channelization information from this section, as it doesn’t belong here
* Table 190 and Figure 156—LECIM DSSS reference modulator diagram
  + Remove color as it isn’t clear what it means
  + Remove PHR
  + Clarify the difference between modulated chips and modulation symbols, particularly with respect to BPSK vs. OQPSK and PHY timing PIB.

19.1.2.4 Interleaver

* Since the PIB specifies PSDU size in terms of octets, the interleaver should explain in terms of octets and bits NOT symbols

19.1.2.6.1 Gold code generator

* Equation ‘n = 2m – 1’; ‘m’ should be superscript

19.1.2.7 BPSK/O-QPSK modulation

* Figure 159—BPSK
  + If the text states all of the information which is in the figure, then the figure is not necessary;
  + What does ‘Symbol[2k…’ mean?

Changes:

* 5.4, pg 45: Change 2nd paragraph to: “When MPDU fragmentation is enabled, a compliant MPDU is transmitted as a sequence of fragments. The context of the fragment sequence is established between the initiating device and the recipient device prior to transmission. Each fragment is packaged into a PPDU that contains a fragment descriptor, fragment content, and a CVS. Certain MHR fields may be transformed or elided in order to reduce the size of the fragment.

B Rolfe led a discussion of MAC fragmentation, specifically setting up a context understanding between devices**.** Using a hashing function based upon the unique IDs of both devices along with the Transaction ID was discussed.

**12:27** meeting recessed until Thursday PM1

# Thursday, 17 May 2012, 13:30 (PM1)

**13:56** **Wrap up all remaining issues/actions/concerns**

Chair called meeting to order.

S Jillings presented Proposals for Channelization Harmonization for LECIM draft PHY (15-12-0275-01)

* discussion ensued as to replacing the 1st column of Table 68l with Band ID such as 902a, 902b, 470a, et al.

Chair asked the group for a show of support for 15-12-275-01, there were 3 votes in favor and 1 vote against.

**15:25** chair recessed meeting until PM2

# Thursday, 17 May 2012, 16:00 (PM2)

**16:06** **Wrap up all remaining issues/actions/concerns**

Chair advised the group as to remaining concerns/TBDs/issues:

1. confusion between Table 66 and Table 68l
2. fragmentation context
3. vice-chair/secretary appointment
4. approval for preliminary draft circulation
5. agree for a conference call after session with C Seibert, S Kato, S Jillings, B Rolfe, D Howard, P Kinney to resolve this issue.
6. Fragmentation ID:
   1. Hashing has been implemented in other PAN devices and could be used to increase fragment ID uniqueness
   2. Should the standard define the method as to how the Frag ID is derived?
   3. Agreement was to insert FVS offset and FVS IV in context to yield uniqueness to fragment IDs
7. Ben Rolfe was unopposed as vice-chair/secretary
8. Group approved the draft for circulation for comments pending edits as per TG4k and editor consensus

**17:35** Session adjourned