**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 | July 22, 2011 |
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| Re: | Task Group 802.15.4k Plenary Meeting in San Francisco |
| 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 #73**

**July 2011**

**Task Group 4k Minutes**

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# Monday, 18 July 2011, 16:00 (PM2)

**16:00** meeting started

Chair introduces opening report doc. 460-00.

If anyone in this meeting is 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? Hear none.

Update meeting agenda to doc.448-02, and it’s approved by TG.

Palm Springs minutes 386-00 is approved by TG.

Doc. 484-00 is presented by Pat Kinney and Ben Rolfe.

Q: Is association necessary? What about security in it?

A: In some of the use cases it’s necessary, and it’s upon upper layer protocol. Security requirements depend on the needs of network.

**17:15** Recessed

# Tuesday, 19 July 2011, 10:30 (AM1)

**8:10** Meeting called to order by chair**.**

Chair reviewed the agenda for the session and stated that the objective for this meeting was to develop the outline for a coexistence assurance document. David Howard led the discussion on this matter as per document 15-11-0509-00.

Discussion ensued as the 802.19 requirements on this effort. It was suggested that we review and leverage TG4g’s effort. Analysis and methodology has not been defined.

Going forward: request proposals to state the coexistence mechanisms, aspects of PHYs that uniquely affect coexistence (i.e. good tolerance or bad spurious emissions), and any issues/concerns and requirements.

Discussion ensued as to the emergency situations where different rules apply, e.g. emergency messages will take priority over non-emergency messages, etc.

**9:10** meeting recessed

# Tuesday, 19 Jul 2011, 10:30 (AM2)

**10:31** Meeting call to order by chair

Chair announced that this meeting slot consists of two preliminary proposal presentations.

1. Shusaku Shimada presented “Initial proposal of Resilient Relay with Rate adaptation for reliable LECIM PHY” (document 15-11-0489-00).
	* Discussion:
		+ recommend 900 MHz…why? Good bandwidth and similar bands throughout world.
		+ Why not 400 MHz? world wide commonality concerns; comment made that document 15-11-438 describes global aspects of the 400 MHz band
		+ FEC vs. two transmissions? FEC increases range, however diversity gain is also desirable
		+ New 915 - 928 MHz band in Japan? This information was released and has been presented to TG4g (doc 15-11-510-03). Should be available next year (24 July 2012).
2. Ben Rolfe presented “Preliminary Fragmentation Proposal for TG4k” (document 15-11-0478-02)
	* Discussion:
		+ Advantage of fragmentation – adding some MAC overhead – how much for info? 3 – 4 octets without using octet boundaries
		+ Optimistic to overheads, how much preamble? Could swamp size of payload
		+ 20 octet fragment example, ack is how long? Could be a bit map for each fragment but will differ from aggregated to progressive to hybrid
		+ hybrid ack: what if the ack is misinterpreted? Ack should have error check.
		+ Opens up new vulnerability to possible intention corruption…how to mitigate with better FEC or such? Possibilities – outer block code is possible – on list of things to investigate further
		+ Slide 13 – using a valid 4e frame could enhance the network function but would add additional octets

# Tuesday, 19 July 2011, 13:30 (PM1)

**1:39** meeting started

Doc. 511-01 is presented by David Howard and Sourav Dey.

* Q: SNR is low, how to handle carrier frequency offset? A: Long preamble, synchronization network, coordinator allows endpoint to track frequency.
* Q: Any RAKE receiver (Slide 10)? A: no specific assumption, SNR 3dB is for single or summed value.
* Q: Selection criteria for energy consumption? 10 years battery life? A: Network is not always working on edgy situation, but may consume some energy.
* Q: Packet size? A: A couple hundred symbols packet, not coherent receiver.
* Q: Coherence time > Symbol duration (Slide 22)? A: Yes.
* There are some power control measures.
* Q: Synchronization through cable? A: Over-the-Air synchronization, through uplink/downlink, TDD scheme.
* PN sequence is fixed.
* Q: Reason for using 1MHz chip rate? A: 600 khz for BPSK doesn’t meet FCC.

Doc. 499-01 is presented by Matt Johnson.

* Transmitting data multiple times especially in alarming condition.
* Slow hopping, one session after another.
* Q: Application? Special application? A: Metering system, gas and water meter, pressure meter.
* Q: How narrow the band is? TDD or FDD? A: Channel bandwidth 100-200 khz for individual channel, TDD.
* Multipath environment, not always line of sight.

**3:00** Recessed

# Tuesday, 19 July 2011, 16:00 (PM2)

**4:00** meeting started

Doc. 507-00 is presented by Shuzo Kato.

* Discussion on power delay profile.
* Q: Is slide 23 a strategic model or not?

Doc. 517-00 is presented by Sourav Dey.

* C: In slide 15 it seems to need high dynamic range receiver, but in the morning presentation there is a sensitive receiver to extract data from noise, so what kind of requirements and tradeoff for the system?
* C: To handle the difference between devices, transmission side needs to understand path loss and have power control.
* Q: Difference of channel model between 4k and 4g, smart grid, etc? A: Not really, will be looking into it.
* Discussion on coherence time.
* Discussion on next step of channel model: proceed with existing channel model till September session.
* Suggest to look into previous mobile radio channel models which are good for long range.

**5:00** Recessed

# Wednesday, 20 July 2011, 13:30 (PM1)

**13:30** meeting started

Doc. 479-01 is presented by Jean Schwoerer.

* C: Coherence time 20ms or less (kind of consensus)
* Q: Advantage and disadvantage of PHY fragmentation? A: Single PHR, single PHY frame.
* Q: PHY frame overhead for every fragmentation? A: No, PHY header is transmitted only on single channel.
* Q: It seems that transmitting PHY frame across multiple channels is not better than in one channel, because it depends on the success of every channel. What’s the advantage? A: It can recover the mistake easily if a single channel is failed.
* Q: What does the adaptation layer look like? A: For group ACK transmission as TSCH in 4e.
* Both transmitter and receiver know which channel transmitting which fragmentation.
* Q: Interleaving depth? A: Length of several data blocks.

Doc. 482-00 is presented by Seong-Soon Joo.

* Q: How do the requirements of network operator transfer to spec, such as latency and capacity? A: Need to look into concrete numbers.
* Q: Does it have been applied in real world? A: Not by ourselves.
* Q: Why 2km range is needed? A: Longer is better, 2km is enough.
* Q: Is every 4 minutes of beacon transmission enough? Why leaf nodes need to wake up per beacon interval? A: For synchronization.
* Discussion on energy consumption between TDMA and simple synchronization.

Doc. 486-02 is presented by Kwak.

* Q: what’s EAP? A: High priority packets go there.
* Discussion on slide 16 MAC frame length
* Slide 18, with transmitting a packet on multiple channels, will the overhead tradeoff the advantage? A: Need appropriate packet size.

**15:19** Recessed

# Thursday, 21 July 2011, 13:30 (PM1)

**13:35** Meeting called to order by chair**.**

Pingping Xu presented “An Adaptive MAC Proposals for Low Energy Critical Infrastructure Networks applications” (document 15-11-0348-02)

Jussi Haapola presented “a star-topology MAC protocol that operates extremely energy-efficiently under very low packet generation frequencies and with thousands of devices” (document 15-11-0545-00)

Ed Callaway presented “Propagation loss is independent of frequency.” (document 15-11-0540-00).

Pat Kinney leads a discussion on “Question ITU-R 250/5” activity in ITU-R related to wide area M2M activities which may have relevance to the LECIM scope. Ref: “Question ITU-R 250/5”, “Objectives, characteristics and functional requirements of wide-area sensor and/or actuator network (WASN) systems (Question ITU-R 250.5)”, “System design guidelines for wide area sensor and/or actuator network (WASN) systems (Question ITU-R 250/5)”.

It was noted that there has been mention of this in 802.18.

**15:30** meeting recessed until 16:00.

# Thursday, 21 July 2011, 16:00 (PM2)

**16:03** Meeting call to order by chair.

Pat Kinney leads a discussion on general concepts for low energy techniques such as energy harvesting. Discussion on what kind of 4k features may have an implication on energy usage. Suggestion that some protocol features, such as expected response time to stimulus, maximum duration of “on time” supported, might need to be configurable in the protocol on a per device basis.

Kato reports on question asked during channel conversation on difference between 802.11ah and 15.4g channel models. Kato reports that this has been explored and there is similarity, with the key difference being the link length of up to 15km, thus PDP and propagation loss differs. Suggests further analysis in the CM subgroup is helpful.

Pat leads a discussion on “next steps”. Final proposal presentations: each will get 1 hour slot, plan ~40min presentation + 20 min discussion.

Between now and Sept meeting: Pat suggests we continue the conference calls weekly, and to continue having the channel model call and general call at separate times (2 calls per week). Same times: Wednesday at 0600 PDT (1300 UTC) and 1830 PDT (0130 UTC), alternate with channel model and general, starting with the channel model at 0600 PDT on Wed 03-Aug-2011.

**16:51** Chair adjourned meeting at 16:51 PDT.