**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
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| Source | [] [] [address] | Voice: [ ] Fax: [ ] E-mail: [ ] |
| Re: | [Task Group 802.15.4e Plenary Meeting in LA] | |
| Abstract | [Task Group 802.15.4e Minutes.] | |
| Purpose | [Official minutes of the Task Group Session | |
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**IEEE 802.15 Plenary Meeting – Session #64**

**Jan 2010**

**Task Group 4e Minutes**

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# Monday, 18 Jan 2010, 10:30 (AM2)

**10:34** Pat Kinney, TG4e chair, called the meeting to order.

Chair presented opening report 15-10-0032-00-004e:

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.

**Agenda for Los Angeles**

Chair presented the agenda 15-09-0838-01. Discussion ensued as to personnel availability, the following changes were agreed upon:

* Move security & reduced header to Tues AM1
* Move Factory Automation to Mon AM2
* Move Blink to Mon AM2
* Add presentation of docs 24 and 41 by Liang Li

Revision resulted in updating the agenda to rev 2. Motion to approve agenda as modified was moved by Ludwig Winkel and seconded by Myung Lee. Upon neither discussion nor objection the motion carries by unanimous consent.

**Minutes from Atlanta**

It was commented that the minutes were missing two comments that should be included. Given that the minutes needed to be updated the agenda item of approving the minutes was tabled.

Note: the minutes were amended and uploaded as document 15-09-0776-01; but due to time constraints were not approved at the Los Angeles session.

**11:39 Factory Automation** report byMichael Bahr (Siemens)

* Significant discussion on issue of 20 year battery life in areas such as the implications as to transmit, receive, protocols, and also what energy drain is required to achieve this life?

**18:05** meeting recessed

# Monday, 18 Jan 2010, 13:30 (PM1)

**13:35** Chair called the meeting to order

My (Huawei/SIMIT/Vinno) presented documents 15-10-0024-01 and 15-10-0041-00.

Questions/comments:

* note that some of the comments in doc 24-01 have been addressed, some are editorial/informational
* will different applications ever exist in the same network? Could something like a PIB declaring a mode (e.g. PA, FA, etc) be used and then interpret commands and data appropriate for PA, FA, etc?
* significant discussion ensued at to the merits of document 15-10-0041-00’s proposal
* would the three added bits as per 15-10-41-00 be justified?

**14:18** FCF discussion panel of Rene Struik and Michael Bahr

* Rene presented 15-09-0233-13-004e
  + Noted that the three bits of FCF alone aren’t sufficient due to the large number of frame types, so additional bits must be used
  + How can a device designate whether it wishes an ACK or a secure ACK?
    - Use of LL mode is specific but other modes must use other means
* Michael presented 15-09-0825-03-000
* Question: What are the major differences between the proposals?
  + M Bahr
    - Retain as many frame type combinations as possible
    - Keep network concepts closer together
  + R Struik
    - Frames that are no longer (and some shorter) than alternative proposal
    - Two reserved frame types
    - Support for sync bit
  + Comment: So it seems that M Bahr is similar to existing mechanism maintaining extensibility and R Struik is minimizing length
* Comment: Length of FCF field is important for receiver energy conservation
* Comment:
  + Blink frames should be subtypes of a broader category
  + Acks should be a broad category with normal and secure
* Comment: M Bahr proposal maintains existing concept of versions
* Comment: is frame version set to 3 necessary for R Struik’s proposal?
  + The single octet frames require use of the frame version set to 3
  + R Struik proposal moves location of frame version bit?
* Question: will existing 15.4-2006 devices reject new frame types? Yes
* Question: will new devices perform properly on existing 2006 frames Yes
* Question: will blink frames have a security bit – Yes (M Bahr proposal would use the reserve bit for this purpose)
* Question: secure ack for R Struik proposal is one octet less than M Bahr’s
* Comment: M Bahr should post 825r3
* Chair requested M Bahr and R Struik to meet this evening and try to converge their proposals.

**15:30** Meeting recessed by chair

# Tuesday, 19 Jan 2010, 8:00 (AM1)

**8:09** Meeting called to order by Pat Kinney

Objectives of meeting:

* Final discussion on FCF proposals
* Selection of FCF proposal for inclusion in draft standard
* Comment resolution effort on draft standard

R Struik and M Bahr report on merger discussions

* Discussed all frame types
  + Frame version discussion was taken “off the table”
    - Both proposals are now the same as far as which bit is used
  + Ended discussion with questions and a “list”
    - Potentially merge approaches if able to save the octet on two of the frames
    - All short frame types could be a “sub-frame” type
  + Low latency frames:
    - Size is the same for both proposals
    - Filtering position of 0,1,2 or 0,1,6
  + Blink frames
    - Sizes are the same
    - M Bahr proposal has one unallocated bit for extensibility
  + CSL wake-up frame
    - M Bahr proposal is two octets as opposed to R Struik’s proposal of one octet
  + ACK
    - CSL are same sizes
    - TSCH - M Bahr proposal is two octets as opposed to R Struik’s proposal of one octet
  + EGTS beacon frame
    - M Bahr cannot set frame pending bit
      * Some conditions exist where it is set
  + Extensibility
    - Each has two reserved bit combinations with similar functionality
    - M Bahr has two different frame types starting with bit 4
  + Differences
    - Rene has an ordinary beacon, command, data frames using only one octet in addition to the two octets as in 15.4-2006 (elide addressing)
* Comments
  + Data frame pending bit is used
  + Shorter CSL wake-up is advantageous
  + No presentation was available showing a comparison of the latest proposals
  + Difficult to conceptualize without presentation
* M Bahr proposed a new alternative proposal to his existing proposal with frame type bits set to 101 final three bits would be subframe type bits of 000-011 for Blink frames, 100 for CSL Wakeup, 101-110 for Short ACKs, and 111 is reserved
  + Advantages of this proposal are CSL wakeup and TSCH Ack are one octet without an additional frame type

Agenda change

Group requested a presentation comparing the two proposals in the format used by R Struik with the addition of an extensibility slide as per M Bahr. Chair requested this presentation by 12:00 today.

Agenda change moving EGTS and TSCH up and then final presentation and vote on FCF at 12:00. R Struik moved and G Gillooly seconded, amending the agenda to 838r3 to allow this change. Upon neither discussion nor objection the agenda is hereby modified.

Draft Text

Chair requested that the draft text (in the form of deletions and additions to 604r4) of the selected FCF proposal be made available by AM1 Thursday. R Struik and M Bahr agreed to this request.

TSCH report by J Simon (15-10-833-01)

* Issues with draft:
  + Open definition of what security in Join and Activate
  + Clarification on TSCH ACK frame
    - Secure ACK payload
    - ISA100.11a compatibility?
  + Clock accuracy – 10 ppm
  + Clarification of disconnection/disassociation
  + Clarification of time sources
  + Security: disassociate from network imposes constraint on which key is used. This should be clarified in the disassociate section
  + Changes to 604r4 will be complete by Thursday AM1

Low Energy by W Hong (15-10-048-00)

* Changes to date (Liang Li’s as well?)have been included in 604r4
* Annex M was missing, and is fixed in this document
* Frame type settings will conform to 15.4-2006 format
* Change 10s to tens

**10:02** meeting recessed until AM2

# Tuesday, 19 Jan 2010, 10:30 (AM2)

**10:35** Myung Lee (CUNY) reviewed comments on EGTS to 604r4 draft:

* Remove text referring to Three-way handshake
* Liang Li will submit all changes to EGTS to Ludwig
* PIB changes are missing from 604r4 need to be in 604r5

**11:17** Rene Struik presented security & reduced header changes

* TSCH changes as noted by J Simon
* MAC ACK wait duration
* Beacon request Payload security issues
* Changes to primitives to modify PIBs concerning CSL split payload, TSCH

**11:22** Liang Li presented comments on 604r3 (15-09-0622-04)

* 7.2.4 Every ACK/NAC frame shall be authorized with a MMIC and other issues with this clause
  + Addressed by TSCH change using secured ACK
  + P Kinney to review changes with respect to ISA100.11a requirements
* 7.2.5.1.1 - Fig 54e has no sequence number field for the shortened frame format – how can retransmission be accomplished?
  + Low Latency - Comment assigned to M Bahr
* 7.2.5.2.2.3 Configuration sequence number field
  + Low Latency –Comment assigned to M Bahr
* Group acknowledgement field should be integers of octets
  + Low Latency – comment assigned to M Bahr
* Shared group time slots should require devices to use CSMA
  + Low Latency – comment assigned to M Bahr
* Table 81 acknowledgement type in wrong
  + Low Latency – comment assigned to M Bahr
* 7.2.5.2.4.5 structure is used by EGTS and does not correspond to general frame structure in 7.2.5.2.4.1
  + Liang Li to verify
* 7.2.5
  + Low Latency – comment assigned to M Bahr
* 7.2.6 .2.2.2 EGTS frame format
  + EGTS – Myung Lee to pursue
* Liang Li capture the responsible parties in this document as 622r5 and will post it

**12:03** R Struik and M Bahr resumed FCF presentations showing latest proposals and comparisons of two proposals

* R Struik presented 233r15
* M Bahr presented 825r3

Chair conducted a vote on the matter of selecting which FCF proposal should be in the draft standard. The result was:

* 6 votes for R Struik’s proposal,
* 6 votes for M Bahr’s proposal and
* 7 abstains

The chair declared that this vote did not show significant support for one proposal over the other.

Discussion ensued as to how the group wanted to proceed.

Motion: Kuor-Hsin Chang moved, and Greg Gilloly seconded, *that R Struik and M Bahr work together to produce a consolidated FCF proposal and present this proposal to the TG4e at the AM1 meeting on Thursday*. The vote on this motion was 2 votes approve and 2 votes disapprove; the motion fails.

Discussion continued as to the question of how to proceed. A comment was expressed that there was a tremendous similarity between the two proposals and that it was surprising that a compromise was not possible. The chair conducted a straw poll asking the group if there were individuals who would volunteer to work on a merged proposal, there were five individuals. The chair conducted another straw poll asking the task group if it would support the creation of a subgroup to merge the two FCF proposals with the consensus that the task group would support this effort. The individuals who volunteered to participate in this subgroup were: Tim Godfrey, Tim Harrington, Ed Richley, Greg Gillooly, Wei Hong, Rene Struik, and Michael Bahr. The chair asked Tim Godfrey to lead this group and bring a proposal for a consolidated FCF to the AM1 meeting on Thursday.

Note: minutes for the meeting of this subgroup are captured in Annex A

Chair directed the TG4e editors that, until the task group attains a significant consensus to change the FCF proposal, the draft effort shall continue to use R Struik’s proposal.

**12:50** The meeting recessed until Thursday AM1.

# Thursday, 21 Jan 2010, 8:00 (AM1)

**8:05** Meeting called to order

Report from FCF merger subgroup by R Struik (15-10-0061-00)

* Frame type subfield ‘001’ is now reserved for future use
  + Why not ‘111’ as per subgroup request?
    - Chosen to allow a short command frame at expense of short beacon frame
  + Why not reassign reserved frame type subfield to ‘111’?
    - Fixed frame pending bit error
    - Filtering rules would have been very complex
  + Chair conducted a straw poll of those who accept the frame type subfield reserved value being ‘001’ with 16 agreeing and 0 disagreeing. Chair announced the subject of the reserved frame type subfield value was over.
  + Chair asked for a motion:
    - *to adopt the FCF encoding scheme as described in document 15-10-0061-00, worksheet “consolidation non-twisted “ for inclusion into the TG4e draft document 15-09-604* moved by R Struik and seconded by T Harrington. Upon no discussion the vote was taken with the results of 18/0/0, the motion carries.
    - Motion *that the text of the approved FCF encoding scheme shall be prepared as per the doc 15-10-61-00 worksheet consolidation non-twisted in the format of changes required to doc 15-09-604-04 by 13:30 21 Jan 2010* made by L Winkel and seconded by M Bahr. R Struik commented that the motion appeared as a statement of no trust in his participation. Upon no further comments the vote was taken with the results of 11/1/5, the motion carries.

Review of document 15-09-0604-04 by L Winkel

* Names of technologies were changed as per requests from subgroup leaders
  + Chair asked the group if there were any known issues with the term time slotted channel hopping such as copyright, use of the term as a company proprietary technology, etc. J Simon responded that he was unaware of any copyrights and stated that Dust Networks had used the terminology in white papers and such but those documents did not imply that the terminology was proprietary to Dust Networks.
  + Group approved use of TSCH
  + Group approved use of Overhead reduction and enhanced security

**9:39** Chair recessed the meeting

# Thursday, 21 Jan 2010, 10:30 (AM2)

**10:35** Chair called meeting to order

Chair recessed meeting until 12:00 to allow chief editor to include the latest submissions to document 15-09-0604-04

**12:01** Chair called meeting to order

Review of draft document by L Winkel

* Removed text describing the use of public keys due to the lack of sufficient information on this procedure

**12:31** meeting recessed until Thursday PM1

# Thursday, 21 Jan 2010, 13:30 (PM1)

**13:35** Chair called meeting to order

Resumed review of draft document by L Winkel

**15:47** Chair recessed until PM2

# Thursday, 21 Jan 2010, 16:00 (PM2)

**16:05** Chair called meeting to order

Resumed review of draft document by L Winkel

**17:03** Since time was running out Chair advised the group of the possible strategies:

1. Go for letter ballot
   1. For the letter ballot to conclude before the Orlando session the letter ballot needs to start 1 February 2010. Should the letter ballot extend through the Orlando meeting the effectiveness of that meeting would be minimal.
2. Delay letter ballot until after Orlando but go for task group review
   1. Conduct a 3 week review at the TG4e/f/g level, collect the comments and resolve them at the Orlando session. The advantage of this strategy is that the quality of the draft when going to letter ballot would be very good possibly reducing the number of recirculations.
3. Go for letter ballot with cut-off date of 1 Feb, if date not met then go for task group review
   1. This tactic would still allow us to push for completion of the draft and possible go for letter ballot but if the draft was not done in time to at least get the draft reviewed by the 802.15.4 group.

Motion: *That TG4e review the draft after editing is complete, collect comments from the reviewers and resolve those comments at Orlando session*. Moved by Myung Lee and seconded by Greg Gillooly. Upon no further discussion the vote was taken with the results of 12/0/4, motion carries.

**17:14** Meeting adjourned

# Annex A

Minutes for TG4e ad hoc on Frame Control Formats

Team members:

Present: Tim Godfrey (EPRI)

Present: Tim Harrington (Zebra)

Present: Ed Richley (Zebra)

Present: Greg Gillooly (Aclara)

Present: Rene Struik – (Certicom)

Present: Michael Bahr – (Siemens)

[Not present: Wei Hong – (Arch Rock)]

TG4e special ad-hoc is called to order at 15:15, Tuesday, Jan 19th by Tim Godfrey.

Discussion of how we can free up FCF combinations from 3 bit frame type field.

Which of R Struik’s short frame formats can be removed?

M Bahr says LL frames are needed for factory automation.

We need to define “Frame Type” as the 3 bit field in bits 0-3.

Low Latency has 001.

Now we have beacon, data, ack, and command. There are four to expand into.

T Harrington notes that R Struik has tried to provide better use of short frames, but has used more bits of frame type beyond the Frame Type field.

R Struik says M Bahr’s proposal has LL isolated in one frame type.

Ed Callaway (Sunrise) joins the group.

R Struik says the short data frame encodings give a processor an advance ability to start processing. R Struik uses bit 2 to identify a short frame as early as possible.

The purpose of Low Latency was to reduce overhead.

E Callaway notes that most implementations do not start processing until the whole frame has been received. R Struik says it is possible to start some computation as the bits are received (on speculation that the FCS is OK). Even though the difference is just a few bits, this corresponds to tens of µS. E Callaway doubts that the processing time of 5 bits makes a difference.

G Gillooly asks if this special case is significant enough to significant re-structure the standard.

G Gillooly suggests getting rid of the ordinary command frame type, to get “111” combination as reserved.

Combine ordinary command and reserved 1 octet field.

M Bahr is compromising by giving up one of the reserved frame types.

E Callaway asks what the extensibility pattern is for R Struik’s proposal. R Struik says it is a specific bit combination of multiple elements. E Callaway doesn’t think it would be a problem since fields are processed at the byte level.

G Gillooly notes that R Struik’s proposal would mean the frame decoding text would have to be substantially re-written. It would invite more scrutiny and letter ballot comments.

Ludwig Winkel joins the group.

R Struik does not think there is a technical argument in favor of the compromise, so he will not agree to it.

After further discussion, R Struik is willing to reconsider.

R Struik may consider to merge commands to free up the “111” frame type.

R Struik notes for the minutes that he feels it is unacceptable that he is forced to compromise the full elegance and integrity of his proposal. He feels this is arm-twisting and does not address the problem. R Struik feels there is no technical reason for giving up functionality.

R Struik agrees to present to the group this compromise on Thursday.

We will report to the chair that R Struik will post an update on the Server on Wednesday.

R Struik will be prepared to present the compromise to TG4e at the AM1 session Thursday,

The ad-hoc is adjourned at 18:00