IEEE P802.11
Wireless LANs

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| IEEE 802.11 Study Group on Light Communications March, 2018 Rosemont Meeting Minutes |
| Date: 2018-01-19 |
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Abstract

Study Group on Light Communications meeting minutes from the IEEE 802.11 Rosemont meeting, March 2017.

**IEEE 802.11 Study Group on Light Communications**

**Tuesday, March 6, 2018, PM2 Session**

Attendance: around 40 people

1. The IEEE 802.11 LC SG meeting was called to order at by the Vice Chair, John Li Qiang (Huawei).
2. The Vice Chair John Li Qiang (Huawei) reviewed the IEEE-SA patent policy, logistics, and reminders, including meeting guidelines and attendance recording procedures.
	* It is reminded all to record their attendance.
3. The Vice Chair John Li Qiang (Huawei) introduced the schedule for the week
4. Response to comments against CSD and PAR
5. Approve the minutes from the January meeting in doc. 11-18/206r4.
	* Chair asked if there are discussions. No discussion. The minutes were approved.
6. Approved the minutes from Februard conference call doc. 11-18/447r1.

1. Approved comment resolution from February conference call in doc. 11-18/387r1.
2. The Vice Chair John Li Qiang (Huawei) introduced already received comments from 3 individuals against the PAR in doc. 11-17/1604r8r8 and CSD in doc. 11-17/1603r7.
3. Comments from James Gilb
	* Scope of the project: add “wireless” to “…light communication”
	* Scope of the project: range of distances should be added, proposal is “tens of meters”, this was discussed controversially, because using a long range instead of typical operation conditions is misleading
	* Suggestion to address the comment but eventually not changing the PAR
	* Giving more detail in the CSD demonstrated technical feasibility section, where the following sentence was added “The distance of the LC link varies from tens of meters for indoor operations and hundreds of meters for outdoor operations depending on the use cases.”
	* Correct typo to “coexistence”
	* 5.4. Purpose: change to “This amendment will not have a purpose clause.”
	* 5.5. Need for the project: Delete the first instance of “significant” and let the second instance “significant” as is.
	* 6.1.b if answer here is yes, than explanation is needed. Accept. Suggested response from February conf. call in 11-18-0559r1 is taken over
	* The official names of other projects were reviewed and it was changes to “IEEE P802.15.7 Standard for Short-Range Optical Wireless Communication” and “IEEE P802.15.13 Standard…” (rest was correct).
	* Typo in 8.1 Typo “Requirements”
	* Moving to CSD
	* 1.2.1 spell out infrared 🡪 changed to “infrared (IR)”
	* 1.2.1. changes to “IEEE Std. 802.11aj and IEEE P802.11ay”
	* 1.2.1. typo change to “underutilitised”
	* 1.2.1. missing blank lines insert so that it fits on the page
	* 1.2.3. add “IEEE” in front of 802, 802.11 and 802.15 and “P” before 802.15.7m and before 802.15.13
	* One comment left out and treated later
	* 1.2.4 delete “significant” in “significant variety”
	* One comment left out and treated later
	* 1.2.5 various editorial comments (missing lines), change “emboding” to “implementing” accepted
	* Systematically check the whole CSD if IEEE std./ if IEEE P is correct before and 802.11 appears in the text
	* Coming back to left-out comments
	* 1.2.4. Technical feasibility, links to demonstrations should not be in external document
	* But at least 6 references should then be taken over into CSD from cited document developed by TIG
	* start sentence as “The LC-TIG report provides a list of publications and examples of hardware feasibility of LC. The LC-TIG report can be found at …”
	* 1.2.4 b) the first two sentences are not answering the question posed and are deleted. It is added that “Wireless communication using infrared band is a proven commercialized technology. These principles can be directly applied to visible LEDs also used for illumination. The technology has been thoroughly studied using modeling and simulations in the literature.”
4. Comments from Paul Nikolich
	* Change “light communications” in the title of the PAR to “light wave operation” and in the 5.2.b. Scope “-… (MAC) that enable light wave operation broadly referred as light communication

Meeting was recessed until 7:30 p.m..

**Tuesday, March 6, 2018, PM3 Session**

Attendance: around 15-30 people (begin-end)

1. The Vice Chair John Li Qiang (Huawei) reviewed the IEEE-SA patent policy, logistics, and reminders, including meeting guidelines and attendance recording procedures.
	* It is reminded all to record their attendance.
2. The Vice Chair John Li Qiang (Huawei) introduced the schedule for the week
	* Response to comments against CSD and PAR
3. Continuation of the discussion of comments from Paul Nikolich
4. The Vice Chair John Li Qiang (Huawei) suggested to make a straw poll on various suggested new scope statements: There were 4 options and a 5th one added during the discussion. It was discussed also to replace LC by optical wireless communications (OWC), but it was argued also that this could create a unique identity problem in the name with existing standards and projects in 802.15. It was also suggested to explain again that the original text has been used for almost the whole time during LC TIG and SG and the PAR and CSD has been approved by working group. Changing the title now may have some impact on these previous decisions.

The Vice Chair conducted a straw poll:

Option A is keep the old title and add “operation of light communications” to the Scope,

several other options listed in the slide set

Option A: Y = 21, N = 0

Option B: Y = 2, N = 11

Option C: Y = 0, N = 13

Option D: Y = 6, N = 11

Option E: Y = 1, N = 12

The group formulated a response to the comment:

* + The LC SG evaluated your opinion to make a change to the title along with the subsequent changes that would be required to make that change, and determined to maintain the existing title, see straw poll on sloide 18 in doc. 11-18/315r2.
	+ The amendment is to the Wireless LAN standard thus wireless operation is indicated.
1. The Vice Chair moved on to the comments from 802.3. They have been send previously to the group and discussed at the teleconference. The Vice Chair went through the resolutions developed in the telco one by one. There were minor changes to the suggested resolutions. It was reminded that the changes to section 5.5 due to comments dealt with here need to be consistent with the changes made due to comments provided from other groups. This issue has been checked for 5.5. All changes are now consistent. There were changes also in the previously suggested response to the comment on the unique identity in 1.2.3, in which the group has made some refinements in the additional text to be added to address the comment. This proposed additional text is included on slide 38 in 11-18/0559r1.

The Vice Chair asked for AoB. Except an editorial change there was none.

The session was recessed until Wednesday AM1 at 9:05 p.m..

**Wednesday, March 7, 2018, AM1 Session**

Attendance: 25-40- people (begin-mid-end)

1. The Vice Chair John Li Qiang (Huawei) reviewed the IEEE-SA patent policy, logistics, and reminders, including meeting guidelines and attendance recording procedures.
	* It is reminded all to record their attendance.
2. The Vice Chair John Li Qiang (Huawei) introduced the schedule for the week
	* According to suggested resolutions, the Vice Chair prepared a new PAR and CSD draft document
	* There is a contribution 11-18/556r0 that will be presented
3. The Vice Chair John Li Qiang (Huawei) made a motion to approve the Agenda. The Agenda is approved with unanimous consent.
4. The Vice Chair John Li Qiang (Huawei) read through the document automatically created by using MyProject.
5. There was a request to change the name of the project to make it more intuitive than the current letters 802.11bb. One suggestion was 802.11ao where “ao” could be interpreted as “advanced optical”. The Working Group Chair is selecting these letters when submitting the PAR. So the opportunitiy of is to be discussed with him.
6. There was a request to include “layer” after PHY in 5.2a but was not possible as this described the standard.
7. In 7.1 there was a suggestion to mention also potential differences in the LC PHY compared to other standards in this field. The beginning of all paragraphs has been changed to “A key difference…” and a sentence was added stating that “New PHY mechanisms will be defined.”.
8. It should be more clearly stated what exactly the difference compared to 802.15.7 and 802.15.13 is. The two efforts will be explicitly named as “low data rate photodiode communication (P802.15.7m) ” and “industrial applications (P802.15.13)”.
9. In the list of other relevant standard in MyProject only one other standard can be mentioned. Suggested to move the information on the others to the additional explanatory notes in Section 8.1. The full name should be stated in 8.1.
10. The meeting was paused for letting the Vice Chair do the editorial changes agreed upon in MyProject.
11. The Vice Chair John Li Qiang (Huawei) read the PAR and CSD documents and asked for further changes. Suggested to make the same changes as in the PAR also in the CSD.
12. It was suggested to add few more examples why 802.11 LC has a wider range of use cases compared to G.vlc. The discussion showed that this list is already in the same document at another place which addressed the concern raised.
13. It was noted that [4] and [5[ were not cited in the document which has been added.
14. The Vice Chair John Li Qiang (Huawei) uploaded the new PAR and CSD document and conducted a motion to approve the changes made in the PAR in doc. and CSD in .
15. Motion:

Believing the PAR contained in doc. 11-17/1604r9 referenced below …

Y: 24

N: 0

A: 2

Motion passed.

1. Motion

Believing the CSD contained in doc 11-17/163r8….

Y: 24

N: 0

A: 1

Motion passed.

1. Motion to approve the response to comments in doc. 11-18/0559r1

Y: 28

N: 0

A: 0

Motion passed.

Meeting recessed until Thursday, March 7 AM1.

**Thursday, March 8, 2018, AM1 Session**

1. The IEEE 802.11 LC SG meeting was called to order at by the Vice Chair, John Li Qiang (Huawei).
2. The Vice Chair John Li Qiang (Huawei) reviewed the IEEE-SA patent policy, logistics, and reminders, including meeting guidelines and attendance recording procedures.
	* It is reminded all to record their attendance.
3. The Vice Chair John Li Qiang (Huawei) introduced the agenda
	* One technical presentation
4. Presentation of contribution in doc. 11-18/556r1 by Oliver Luo (Huawei)
	* Short introduction into light communication and differences to RF
	* Different modulation schemes
	* Pulse modulation (OOK, PAM, PPM)
	* OFDM variants (DCO-OFDM, ACO-OFDM)
5. Discussion
	* In ACO-OFDM, as the waveform is deformed
	* Some energy is split into subcarriers that are not used, thus there is a loss of energy
	* It was explained that this is not critical but needs further study
	* Q: ACO-OFDM trades off power efficiency against spectral efficiency
	* A: This trade-off is valuable and used in the system design
	* Q: ACO vs. DCO schemes have not very well been compared under realistic conditions yet.
	* A: Agreed, could be done in LC task group.
	* Q: What modulation scheme is preferred by lighting industry today
	* A: The main used modulation scheme in commercial systems is pulse-based, i.e OOK and PPM
	* Q: Comment on slide 5, regarding bounded interference, What about co-channel interference from other lights?
	* A: Oliver replied that it can be better controlled than in RF.
	* Q: Slide 13: Is there any information loss when using ACO-OFDM
	* A: No.
	* Q: What are the most popular schemes?
	* A: OFDM-based schemes but many variants.
	* Q: Cells will overlap. Have to look at schemes which have better OBSS coordination.
	* A: Li-Fi will cause co-channel interference. But it can be better coordinated. Appropriate schemes are required. In RF multiple antennas are used.
6. Goals in the May meeting.
	* Vice Chair introduces the next steps
	* PAR will be submitted to NESCOM
	* We cannot get official approval before May meeting
	* Official kick-off will be in July
	* Presentations are welcomed in May
	* Q: Is this allowed to have meetings after submitting the PAR
	* A: (Dorothy): Should be discussed in CAC meeting: Personal preference is that the wiork of the group is continued but needs to be discussed.

Meeting has adjourned until May.