IEEE P802.11
Wireless LANs

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| IEEE 802.11 Topic Interest Group on Light Communications May, 2017 Daejeon Meeting Minutes |
| Date: 2017-05-11 |
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Abstract

Topic Interest Group on Light Communications meeting minutes from the IEEE 802.11 Daejeon meeting, May 2017.

**IEEE 802.11 Topic Interest Group on Light Communications**

**Monday, May 8, 2017, PM1 Session**

Attendance: around 15 people

1. The IEEE 802.11 LC TIG meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi).
2. Chair reviewed the IEEE-SA patent policy, logistics, and reminders on TIG rules, including meeting guidelines and attendance recording procedures.
	1. Chair asked if anyone has any questions about the IEEE-SA patent policy, logistics or reminders. No questions.
	2. Chair asked if there were any questions on any of the above items. None.
	3. It is reminded all to record their attendance.
3. Chair presented the agenda which was approved.
4. Chair goes through **document 11-17-0772-00-00lc** which contains a working document provided by ITU-R SG1 WP1A and tries to identify the value of (near) visible light communication as a possible offload opportunity for the overcrowded lower RF frequencies.
5. Group discussed the document, e.g. why optical spectrum is now considered much wider between 100 nm and 10.000 nm than in previous documents which only considered the visible light.
6. Chair discusses draft liaison statement intended for ITU-R, which will be escalated via Bob Heile to the IEEE SA. Main goal is to state from IEEE point of view that light spectrum should not be regulated for communications and be license-free. One point of discussion raised by Volker was if the reason why the light spectrum shall not be regulated could be explained clearer. Chair said that the more explanation are discussed the narrower such statements become and it becomes less likely that they are supported by a large number of people. ETRI raised further discussion about the interference of LC devices into RF bands. This was also commented by Andrew Myles (Cisco) who said that such interference is not a regulatory issue. The text was accordingly modified. Text will be further discussed with TG7m and then submitted to the 802.11 and 802.15 WGs.
7. Two use case documents were presented again from contributions made at the last teleconference by the Co-op group Ltd, a UK-wide retailer, and Deutsche Telecom.
8. **Document 11-17/0584r0** by Co-op Group Ltd. is on LC in retail scenarios. Sales floor is currently cabled only but wireless alternatives are needed when refitting or modifying the space. Creating more bandwidth on the sales floor with LC enables future growth of IoT enabled devices. Other use case is location based content delivery. Data density of Li-Fi allows very high bandwidth content without interfering with other devices. Wireless and network security due to non-penetrative and highly containable spatial confinement is of interest for the retailer. Comment was to reuse some formulations from the input document 1:1 in **doc. 11-17/0024r4** as it is the language of the end user.
9. **Doc. 11-17/0625r0** by Deutsch Telekom provides a very good overview of use cases:
	1. Screen-to camera (indoor and outdoor, <1 m, barcodes),
	2. VLC using illumination indoor (Office, EMI-sensitive, indoor localization) and outdoor (streetlight to customer V2I, V2V),
	3. Free-space optics distance < 500 m, Wireless-to-the-building, Mobile backhaul in different scenarios (e.g small-cell to macro-scell)
	4. Other applications (hundreds of kms, space, inter-satellite)

The Authors will provide a written text that can be included in the report.

1. John presented his suggested changes in the report 0024r4 in a slide set **doc. 11-17/0725r0**, which is accompanied with a text document indicating where the changes are made. The proposed changes were all accepted, with the small change request to add a reference to the terms BSS, and so on which people outside 802.11 are not familiar with.
2. Nikola suggested to include a picture from a recent publication about possible modulation formats. The availability of the copyright was discussed again and Nikola has clarified this with the authors already.

**Tuesday, May 9, 2017, PM1 Session**

Attendance: around 15 people

1. The IEEE 802.11 LC TIG meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi).
2. Chair reviewed the IEEE-SA patent policy, logistics, and reminders on TIG rules, including meeting guidelines and attendance recording procedures.
	1. Chair asked if anyone has any questions about the IEEE-SA patent policy, logistics or reminders. No questions.
	2. Chair asked if there were any questions on any of the above items. None.
	3. It is reminded all to record their attendance.
3. Chair presented the agenda which was approved.
4. Chair discusses draft liaison statement intended for ITU-R
	1. Osama (Huawei) asked if the ITU-R had send any official request to IEEE 802; Nikola explained that it is a response to the request for input by the ITU-R SG1 WP1A editor (Rene Vroom).
	2. Discussion on the liaison text the agreed text can be found in <https://mentor.ieee.org/802.11/dcn/17/11-17-0790-02-00lc-lc-liaison-statement-to-itu-r.docx>
5. Volker (HHI) presented suggested modifications to the TIG report <https://mentor.ieee.org/802.11/dcn/17/11-17-0804-00-00lc-suggested-modifications-for-the-working-document.docx>
	1. The contributions were reviewed and discussed
	2. Modified contribution was agreed as <https://mentor.ieee.org/802.11/dcn/17/11-17-0804-01-00lc-suggested-modifications-for-the-working-document.docx> , technical editor will incorporate the agreed modifications in to the latest revision of TIG report.
6. Nikola presented economic considerations for LC <https://mentor.ieee.org/802.11/dcn/17/11-17-0803-00-00lc-economic-considerations-for-lc.ppt>
	1. John (Huawei) suggested to defer the discussion on the proposed text
7. Meeting recessed

**Thursday, May11, 2017, AM2 Session**

Attendance: around 25 people

1. The meeting was called to order by the Chair, Nikola Serafimovski (pureLiFi). He explained the rules of operation and patent policy.
2. The main topic of this session is the economic viability of LC.
3. The Chair presented **document 11-17/0803r1**.
4. He explained that optical transmission and receiver elements are well understood in industry due to numerous non-communication applications they already have. In addition, data transmission techniques that can be applied to light communication are well understood in the mobile communications industry. By combining these, economic solutions can be developed that fit the market needs. Devices are expected to have similar complexity and cost compared to Wi-Fi chipset.
5. There are market analysis that predict a market size from $75.5 Billion in 2023 with a CAGR of 80%. Developing an IEEE 802.11 standard would enable to hit these market opportunities just in time when this is needed.
6. The Chair asked for the report to be finalized at this meeting or at the next. Edward Ad (Huawei) argued that usually there is a common collection period to let people make further comments before the report is formally delivered to the WG. This was agreed by the chair.
7. The outcomes of the economic considerations for LC in **doc. 11-17/0803r1** shall be included in the TIG report. The summary covers balanced costs, known cost factors, consideration of installation costs, consideration of installation costs, considerations for operational cost as well as market size/opportunities. The Chair proposed the corresponding text blocks to be added. The proposed text blocks were discussed and have been approved by the group. John Li Qiang (Huawei) recommends putting the referenced to market size estimation into the report so that it is directly accessible. Volker Jungnickel (Fraunhofer HHI) asked why the market size for Li-Fi in 2023 shall be more than twice as large as the predicted market size for Wi-Fi in 2020 and if this is realistic. The Chair responded that these are published numbers from top institutions, but not the same, and one should look more into the methodology used in these reports to find an answer to this question.
8. The Chair proposed to add a section on benefits and advantages of LC vs RF communications from **doc. 11-17/0590r2** to the report. Lei (Huawei) asked why this should be added. The chair responded because this comes from Swiss regulator and their perspective may be very useful to be available in the TIG report. Lei (Huawei) suggested that adding that section may be controversial and it detracts from the original purpose of the LC TIG that is looking at working seamlessly with other RF technologies.

1. A reference from a regulator in Singapore (IMDA) shall also be added to the report. This was also confirmed. The text is about unlicensed access to the spectrum and requirement to prevent electromagnetic interference.
2. The Chair presented the final version of the input of IEEE 802 into the working document of ITU-R SG1 WP1A that has been approved in IEEE 802.15, 802.11 and 802.18 WGs with some editorial rights granted. There was no objection to include this texts also into the
**doc. 11-17/0023r6**.
3. Jeasung (SNUST) mentioned that ITU-R is using OWC instead of LC, why should only LC be used here. The Chair responded that LC is used for consistency in the whole text. Volker Jungnickel (Fraunhofer HHI) agrees to be consistent in this document but noted that the term LC also included the whole area of fiber optic communications. He recommended to rethink the different wordings used for the same technology in different IEEE working groups and find a consistent terminology that includes the word “wireless” in the future. This was noted by the Chair.
4. The Chair discussed to add a number of references to demonstrated systems in the document. Volker (Fraunhofer HHI) recommended adding that these systems are based on proprietary technology and that standardization is needed to address the predicted market opportunities.
5. Finally, there was an initial discussion and baseline wording of the recommendations. The discussion showed that this needs some more work. Lei (Huawei) said that the main driver for standardization is the need for interoperability, and this should be explicitly stated. Volker (Fraunhofer HHI) stated that the mission of IEEE 802.11 could be to develop a technology that is suitable to develop the mass market in this field and that this objective is not yet addressed by any of the existing standardization groups. Both inputs have been included in the draft recommendation.
6. Going back to the agenda, the need for a telco was discussed. Volker mentioned that the draft is complete now and there is time to review it and provide comments to the Chair for discussion and possible correction, John (Huawei) asked a question to Edward Au (Huawei) how to launch this document to the working group. Edward (Huawei) recommended making a motion in the TIG to initiate a common collection period (CCP) of 30 days eventually starting e.g. on Monday. Then the telco could be used to resolve comments and an already revised and more harmonized document could be presented at the July meeting. John (Huawei) recommended 20 days for the CCP and will send it out.
7. There was a motion

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**Should the TIG approve doc. 11-17/0023r7 (granting the technical editor editorial rights) and collect comments from the IEEE 802.11 WG with a 20 days review period?**

**Mover: Volker Jungnickel**

**Seconder: Nikola Serafimovski**

**Yes: 13**

**N0: 0**

**Abstain: 1**

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The meeting was adjourned until July plenary session in Berlin.