**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | November 2016 IEEE802.15.7r1 Minutes | |
| Date Submitted | November 2016 | |
| Source | Nikola Serafimovski (pureLiFi)  Nam Tuan Le(Kookmin University)  Yeong Min Jang (Kookmin University) | Voice: [ ] Fax: [ ] E-mail: [ ] |
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| Abstract | [Minutes of November 2016 Interim Session] | |
| Purpose | [Description of what the author wants P802.15 to do with the information in the document.] | |
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**Task group 802.15.7r1 met for 10 sessions during the November 2016 meeting.**

**AM 2 (10h: 30 - 12h:30) Session 1 (8 November 2016)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* **Yeong Min Jang – Kookmin University**
* **Rick Roberts – Intel**
* **Nikola Serafimovski – pureLiFi**
* **Dobroslav Tsonev – pureLiFi**
* **Prof. Soo Young Chang – California State University Sacramento**
* **Li Qiang – Huawei Technologies**
* **Hideki Aoyama – Panasonic**
* **Volker Jungnickel – Fraunhofer HHI**
* **Trang Nguyen – Kookmin University**
* **Nam Tuan Le – Kookmin University**
* **Eunjun Rhee – Electronics and Telecommunications Research Institute ( ETRI)**
* **Sunghee Lee - Electronics and Telecommunications Research Institute ( ETRI)**
* **Junhwan Park – Telecomcommunication and Technology Association**
* **Vinayagam Mariappan – Seoul National University of Science & Technology**
* Meeting called to order.
* **Rick Roberts reviewed the current status of D1**
* Meeting recessed until PM2.

**PM 1 (13:30 – 15:30) Session 2 (8 November 2016)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* **Yeong Min Jang – Kookmin University**
* **Rick Roberts – Intel**
* **Nikola Serafimovski – pureLiFi**
* **Dobroslav Tsonev – pureLiFi**
* **Prof. Soo Young Chang – California State University Sacramento**
* **Li Qiang – Huawei Technologies**
* **Hideki Aoyama – Panasonic**
* **Volker Jungnickel – Fraunhofer HHI**
* **Trang Nguyen – Kookmin University**
* **Nam Tuan Le – Kookmin University**
* **Eunjun Rhee – Electronics and Telecommunications Research Institute ( ETRI)**
* **Sunghee Lee - Electronics and Telecommunications Research Institute ( ETRI)**
* **Junhwan Park – Telecomcommunication and Technology Association**
* **Vinayagam Mariappan – Seoul National University of Science & Technology**
* Meeting called to order.
* **13h: 30 – 14h: 00 Trang Nguyen** discussed and presented document **doc.16- 0792r0** aboutNTU contribution. The comparison between NTU and Kookmin University on Rolling shutter Frequency shift keying modulation.
* **14h: 00 -15h: 25** **Hideki Aoyama** discussed and presented document **doc.16- 0791r0** about resolution comments.
* Meeting recessed until PM2.

**PM 2 (16: 00 – 17:30) Session 3 (8 November 2016)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* **Yeong Min Jang – Kookmin University**
* **Rick Roberts – Intel**
* **Nikola Serafimovski – pureLiFi**
* **Dobroslav Tsonev – pureLiFi**
* **Prof. Soo Young Chang – California State University Sacramento**
* **Li Qiang – Huawei Technologies**
* **Hideki Aoyama – Panasonic**
* **Volker Jungnickel – Fraunhofer HHI**
* **Trang Nguyen – Kookmin University**
* **Nam Tuan Le – Kookmin University**
* **Eunjun Rhee – Electronics and Telecommunications Research Institute ( ETRI)**
* **Sunghee Lee - Electronics and Telecommunications Research Institute ( ETRI)**
* **Junhwan Park – Telecommunication and Technology Association**
* **Vinayagam Mariappan – Seoul National University of Science & Technology**
* Meeting called to order.
* Chairman discussed about the sessions request for Jan 2017.
* **Hideki Aoyama** discussed about modulation name of contributions**.** NTU and Kookmin have same technique concept of rolling shutter and frequency shift keying. The name should be defined again for more clear.
* Meeting recessed until AM1 Session 4 (10 November 2016).

**AM 1 (16: 00 – 17:30) Session 4 (9 November 2016)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* **Yeong Min Jang – Kookmin University**
* **Rick Roberts – Intel**
* **Dobroslav Tsonev – pureLiFi**
* **Prof. Soo Young Chang – California State University Sacramento**
* **Li Qiang – Huawei Technologies**
* **Hideki Aoyama – Panasonic**
* **Volker Jungnickel – Fraunhofer HHI**
* **Trang Nguyen – Kookmin University**
* **Nam Tuan Le – Kookmin University**
* **Eunjun Rhee – Electronics and Telecommunications Research Institute ( ETRI)**
* **Sunghee Lee - Electronics and Telecommunications Research Institute ( ETRI)**
* **Vinayagam Mariappan – Seoul National University of Science & Technology**
* **Prof. Jaesang Cha – Seoul National University of Science & Technology**
* Meeting called to order.
* **Trang Nguyen** discussed presented **doc. 16-0799-r0, doc. 16-0800-r0 and doc. 16-0801-r0** about the MAC issues
* Meeting recessed until PM1 Session 5 (9 November 2016).

**PM 1 (13:30 – 15:30) Session 5 (9 November 2016)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* **Yeong Min Jang – Kookmin University**
* **Rick Roberts – Intel**
* **Dobroslav Tsonev – pureLiFi**
* **Prof. Soo Young Chang – California State University Sacramento**
* **Li Qiang – Huawei Technologies**
* **Hideki Aoyama – Panasonic**
* **Volker Jungnickel – Fraunhofer HHI**
* **Trang Nguyen – Kookmin University**
* **Nam Tuan Le – Kookmin University**
* **Eunjun Rhee – Electronics and Telecommunications Research Institute ( ETRI)**
* **Sunghee Lee - Electronics and Telecommunications Research Institute ( ETRI)**
* **Vinayagam Mariappan – Seoul National University of Science & Technology**
* **Prof. Jaesang Cha – Seoul National University of Science & Technology**
* **Junhwan Park – Telecommunication and Technology Association**
* Meeting called to order.
* **Prof. Jaesang Cha** discussed presented **doc. 16-0808-r0** about the scope of working group.
* Meeting recessed until PM2 Session 6 (9 November 2016).

**Session 6 (09 November 2016)**

**PM 2 (13:30 – 13:30)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* Yeong Min Jang – Kookmin University
* Rick Roberts – Intel
* Nikola Serafimovski – pureLiFi
* Dobroslav Tsonev – pureLiFi
* Prof. Soo Young Chang – California State University Sacramento
* Hideki Aoyama – Panasonic
* Tomoyuki Hirota – Panasonic
* Trang Nguyen – Kookmin University
* Prof. Jaesang Cha – Seoul National University of Science & Technology
* Li Qiang – Huawei Technologies
* Bob Heile – Wi-Sun Alliance
* Dorothy Stanley – HPE

Meeting called to order.

Jaesang presented (**doc. 15-16-0808r0**) to look at the IEEE 802.15.7m Technical Consideration History.

The Technical Considerations Document indicated that Photodiode communications and Image Sensor are considered mandatory elements for the 802.15.7m.

Bob Heile spoke about the consideration to continue the integration of LiFi in 802.15.7m.

There is a requirement for a project to be unique in IEEE 802. This could be a potential problem with the newly created 802.11 TIG on light communications.

Dorothy Stanley said that the TIG that was approved in 802.11 does not produce a PAR and a CSD document. If successful, it would be followed by the formation of a Study Group that would then have the

* Bob is correct that projects should be unique. However, there has been a history where different applications/markets have been targeted with a different MAC or PHY and integrated in the higher layers.
* There is no commitment by 802.11 that a new project will start in the future.

Bob mentions that the LiFi project would be looking at covering the exact same scope in two locations.

Dorothy said that there is currently no SG or TG approved in 802.11.

Bob made an argument that there is a “spouse looking for a different partner while married”.

Volker mentioned that there are different use-cases that are supported by the current structure of the 802.15.7m versus what would be supported in 802.11 light communications. Therefore, the aspects considered in 802.11 would need to be changed. The 802.11 TIG would be targeted at different market segments that would be more mass market, where the current system is targeting niche use-cases.

Rick will provide a contribution in the PM 2 session. Rick would like LiFi to exist the existing 802.15.7m. Rick highlighted that there are two very different problems being solved in the existing specifications. Therefore, he recommends that the Task Group is split. The split could exit 15.7m and work on Draft D1. The Optical Camera Communications element would benefit significantly from a significantly simplified MAC structure.

Bob mentioned that if a split allows two standards to come out, it might be better

Dedicate the WNG group time in 802.15 to discuss the merit of maintaining projects that are in the same area would be substantially similar. Would the work of 802.15.7 be better served if the group is split.

Volker asked what would happen if a split was decided?

Bob suggested that he could write a PAR and CSD very quickly, during the Atlanta meeting. There could be an approved PAR by April. The functioning as an “approved task group” could begin as soon as the PAR is submitted to the Standards Committee.

Volker asked what is the probability that a LiFi Task Group is formed in .15?

Bob has highlighted that this has a good probability of this being approved quickly assuming that the 802.11 and the 802.15.xx activities are considered substantially different. It would be best if there could be a clear separations between the two projects. The 802.15 Working Group would support the creation of another task group on LiFi as long as it was substantially different. The split was been considered for some time and the recent developments have brought the issue to the forefront. The working group in 802.15 is unlikely to consider maintaining LiFi in the existing 802.15.7m.

John asked that assuming there is a split of 802.15.7m, and assuming there is approval of a new PAR to create a Task Group, then would the PAR be approved in the 802.15 Working Group?

Bob: yes, this could be approved in Atlanta. The new PAR would need to be approved by the members of the 802.15 Working Group.

John asked what is the probability of this approval?

Bob: there should a high probability of approval if there is sufficient distinction that should be based largely on application of the technology.

Rick: The committee should continue functioning as usual for the January 2017 meeting. The decision to split would be defined in January 2017.

Bob: The Working Group in 802.15 would decide if there would be a split in the group.

Volker: The TIG in 802.11 would not have defined what is the market segment?

Bob: The current participants know what market they would like to address in 802.11 and could make a suitable comparison with the effort that would be directed in 802.15.

John: Huawei has been working on 802.15 and is committed to the current standardization activities and would like to finish the work here. However, if there is a split and the new PAR is not approved by the Working Group, then the entire effort would be lost.

Bob: No PAR that I have written has ever been rejected. Considering the case for LiFi, it is highly unlikely that this would change.

Rick: No changes will made to the committee operations. If the PAR is rejected then the committee would find a suitable way for the activity to continue in 802.15.

Nikola: why does application need to be the key differentiator or could it be technical?

Bob: The uniqueness argument could be based on technical aspects such as suitable differences in the functional aspects such as the MAC functionality, the operating data rates, etc. The use of applications to justify the technology and functional differences.

Jaesung has asked for a clarification on what is the merit (benefit) of splitting the 802.15.7m group aside from the complexity of the editing process.

Rick suggested that the complexity of the MAC is much greater than what is required for OCC.

John said that much of the presumed complexity is going to be removed because of the duplicates will be removed.

Volker, we have spent a lot of time discussing the split and the time could have been used more efficiently. The two topics that are relatively orthogonal to each other but the process that is slightly slower but clear is better than no roadmap. If there is a split, then the roadmap would be reorganized again.

Rick, we literally have OCC and LiFi working sessions where there is very little cross talk. These are two different efforts that co-exist in the same room.

John: The intention is to finish the work in 802.15. However, Huawei is relatively open to introducing a split within the working group.

Hideki: Panasonic would prefer not to split the group.

Rick presented (**doc. 15-16-0784r0**) Intel’s observations on Draft D1.

Meeting in recess until AM1.

**AM1 (8:00 – 10:00) Session 7 (10 November 2016)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* **Yeong Min Jang – Kookmin University**
* **Rick Roberts – Intel**
* **Dobroslav Tsonev – pureLiFi**
* **Prof. Soo Young Chang – California State University Sacramento**
* **Hideki Aoyama – Panasonic**
* **Volker Jungnickel – Fraunhofer HHI**
* **Trang Nguyen – Kookmin University**
* **Nam Tuan Le – Kookmin University**
* **Eunjun Rhee – Electronics and Telecommunications Research Institute ( ETRI)**
* **Sunghee Lee - Electronics and Telecommunications Research Institute ( ETRI)**
* **Vinayagam Mariappan – Seoul National University of Science & Technology**
* Prof. Jaesang Cha – Seoul National University of Science & Technology
* **Junhwan Park – Telecommunication and Technology Association**
* **Nikola Serafimovski – pureLiFi**
* Meeting called to order.
* Plan for Agenda.
* **Vinayagam Mariappan presented the comments resolution document doc. 16-0833-r0.**
* **Trang Nguyen presented the comments resolution document doc. 16-0835-r0.**
* Meeting recessed until AM2 Session 8 (10 November 2016).

**AM2 (10:30 – 12:30) Session 8 (10 November 2016)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* **Yeong Min Jang – Kookmin University**
* **Rick Roberts – Intel**
* **Dobroslav Tsonev – pureLiFi**
* **Prof. Soo Young Chang – California State University Sacramento**
* **Hideki Aoyama – Panasonic**
* **Volker Jungnickel – Fraunhofer HHI**
* **Trang Nguyen – Kookmin University**
* **Nam Tuan Le – Kookmin University**
* **Eunjun Rhee – Electronics and Telecommunications Research Institute ( ETRI)**
* **Sunghee Lee - Electronics and Telecommunications Research Institute ( ETRI)**
* **Vinayagam Mariappan – Seoul National University of Science & Technology**
* **Prof. Jaesang Cha – Seoul National University of Science & Technology**
* **Junhwan Park – Telecommunication and Technology Association**
* **Nikola Serafimovski – pureLiFi**
* Meeting called to order.
* Plan for Agenda.
* **Vinayagam Mariappan** presented the comments resolution document **doc. 16-0833-r0.**
* **Trang Nguyen** presented the comments resolution document **doc. 16-0835-r0.**
* **Rick Roberts** lead to discuss about the PHY VI modulations.
* Meeting recessed until PM1 Session 9 (10 November 2016).

**PM1 (13:30 – 15:30) Session 9 (10 November 2016)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* **Yeong Min Jang – Kookmin University**
* **Rick Roberts – Intel**
* **Dobroslav Tsonev – pureLiFi**
* **Prof. Soo Young Chang – California State University Sacramento**
* **Hideki Aoyama – Panasonic**
* **Volker Jungnickel – Fraunhofer HHI**
* **Trang Nguyen – Kookmin University**
* **Nam Tuan Le – Kookmin University**
* **Eunjun Rhee – Electronics and Telecommunications Research Institute ( ETRI)**
* **Sunghee Lee - Electronics and Telecommunications Research Institute ( ETRI)**
* **Vinayagam Mariappan – Seoul National University of Science & Technology**
* **Prof. Jaesang Cha – Seoul National University of Science & Technology**
* **Junhwan Park – Telecommunication and Technology Association**
* **Nikola Serafimovski – pureLiFi**
* Meeting called to order.
* **Prof. Jaesang Cha** discussed about the name and scope of receiver technology of new groups in case of split between LIFI and OWC.
* **Nikola Serafimovski** discussed about the PAR of new group and current group.
* **Rick Roberts** discussed about the two scopes PAR of two groups.
* **Prof. Jaesang Cha** discussed about the conflict of high rate between two groups.
* **Prof. Soo Young Chang** discussed the PAR scopes.
* **Nikola Serafimovski** discussed about the scope reduction of current PAR.
* The discussion on PAR modification is postponed until January meeting.
* Meeting recessed until PM2 Session 10 (10 November 2016).

**PM2 (13:30 – 15:30) Session 10 (10 November 2016)**

Yeong Min Jang (Kookmin University) – Chair

Attendees:

* **Yeong Min Jang – Kookmin University**
* **Rick Roberts – Intel**
* **Dobroslav Tsonev – pureLiFi**
* **Prof. Soo Young Chang – California State University Sacramento**
* **Hideki Aoyama – Panasonic**
* **Volker Jungnickel – Fraunhofer HHI**
* **Trang Nguyen – Kookmin University**
* **Nam Tuan Le – Kookmin University**
* **Eunjun Rhee – Electronics and Telecommunications Research Institute ( ETRI)**
* **Sunghee Lee - Electronics and Telecommunications Research Institute ( ETRI)**
* **Vinayagam Mariappan – Seoul National University of Science & Technology**
* **Prof. Jaesang Cha – Seoul National University of Science & Technology**
* **Junhwan Park – Telecommunication and Technology Association**
* **Nikola Serafimovski – pureLiFi**
* Meeting called to order.
* Chair presented the comments resolution document **doc. 16-0847-r0.**
* Meeting recessed until PM2 Session 10 (10 November 2016).