IEEE P802.11
Wireless LANs

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| IEEE 802.11 TGbb Task Group on Light Communications September, 2018 Kona Meeting Minutes |
| Date: 2018-09-10 |
| Author: |
| Name | Affiliation | Address | Phone | Email |
| Volker Jungnickel | Fraunhofer HHI |  |  | volker.jungnickel@hhi.fraunhofer.de  |

Abstract

This document contains the Task Group on Light Communications (TGbb) meeting minutes from the IEEE 802.11 Kona meeting, September 2018.

**IEEE 802.11 Task Group TGbb**

**Monday, September 10, 2018, AM2 Session**

Attendance: around 20 people

1. The IEEE 802.11 TGbb meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi). As the secretary could not attend, Volker Jungnickel (Fraunhofer HHI) recorded the minutes.

1. The Chair Nikola Serafimovski (pureLiFi) 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 Chair Nikola Serafimovski (pureLiFi) introduced the schedule for the meeting
	* + Go through contributions related to channel models (doc. 1582r0 and doc. 1574r0)
		+ Go through contributions related to simulation scenarios (docs. 1423/r0, 1593r0)
		+ Go through evaluation methodology (doc. 1429r0)

It was decided not to finalize the Call for Proposals at the September meeting because this was considered unrealistic based on the current status of the required documents.

1. Tuncer Baykas (IMU) run a motion, seconded by Harry Bims (Bims Laboratories Inc.), to approve the agenda in doc 1379r1. Motion passes unanimously.
2. Tuncer Baykas (IMU) run a motion, seconded by Oliver Pengfei Luo (Huawei), to approve the minutes of the phone calls held between the July and September meeting. Motion passes unanimously.
3. Tuncer Baykas (IMU) run a motion, seconded by Volker Jungnickel (HHI) to approve the Minutes from July meeting in doc. 1251r4. Motion passes unanimously.
4. Tuncer Baykas (IMU) presented doc. 18/1582/r0 on the Reference Channel Models for LC.
	* It was again discussed that the illumination values should be represented in W/m² rather than Lumen because the Lumen value depends also on the sensitivity curve of the human eye. The value is currently given to indicate that normal lighting conditions are fulfilled.
	* Q: In Fig. 12 why D7 is different.
	* A: Because the Rx looks down and has constantly higher path loss than any other PDs.
	* Q: Do the channel impulse responses contain the LED or not?
	* A: There are both responses available in the document. The optical frequency response does not contain it, while the effective CIR contain the LED and PD models.
	* C: CIRs with mat files for all scenarios will be available on Mentor in 1603r0.
5. There was a straw poll to start comment collection for the proposed channel model document in doc. 1542r0. Comments should be submitted until 24 Sept. 2018. Y/N/A = 12/0/2
6. Straw poll: Should the channel model concerning the operating theater in doc. 1582r0. Y/N/A 0/5/9.
7. Should the Scenario 3: Hopitals from doc. 15-15-0514r0 be used in TG11bb : Y/N/A 5/0/8.
8. Volker Jungnickel (Fraunhofer) presented "LC Frontend Models" 802.11-18/1574r0.
	* Q: Slide 4 What is the bandwidth of the measurement?
	* A: 300 MHz.
	* Q: How could we add nonlinear effects of frontend model?
	* A:  We are planning to create material in the future and group may add effects in the future.
	* Q: The LED which is used one is red. Will you provide results with a white LED?
	* A: We may provide white led in the future.
	* C: We incorporate what is presented into the channel document and provide a simple model for the simulations.
	* A: It could be included as frontend model.

Meeting was recessed until Tuesday September 11, 2018 in PM2.

**Tuesday, September 12, 2018, PM2 Session**

Attendance: around 25 people

1. The IEEE 802.11 TGbb meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi). As the secretary could not attend, Volker Jungnickel (Fraunhofer HHI) recorded the minutes.

1. The Chair Nikola Serafimovski (pureLiFi) 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 Chair Nikola Serafimovski (pureLiFi) introduced the agenda of the meeting. The agenda was approved with unanimous consent.
3. Jeong Gon Kim (Korea Polytechnic University) presented doc. 1593r2 on simulation scenarios requesting to include that environment to increase the diversity.
	* Q: Are you going to create the CIRs for this scenario?
	* A: We are not ready for the preapration. We will come back when we have more results.
4. Oliver Pengfei Luo (Huawei) presented 1422r0 on Simulation Scenarios. He introduced the definition of a simulation scenarios. It was reminded that TGax needed more than 2 years to finish the similar document. TGbb is smaller and needs a way to go forward with the required effort. He proposed a unified set of scenarios, asking the question if the group would adopt these scenarios as a baseline set. If so, these scenarios will be used for refining the scenarios description.

Q: Why based on TGax and not TGay?

A: Based on TGax template. The Chair answered that the framework is very well defined in this document and it was the most mature. The TGax project has the most participants and required the most difficult consensus. Accordingly, it is also quite complex.

* + Q: But TGay is 60 GHz and propagation is closer to the LC considered here.
	+ A: The Chair explained that TGbb works on the basis of 802.11-2016 plus a number of previous and running amendments. So all the previous work has to be considered.
	+ Q: 60 GHz is more directional and better comparable to LC than TGax. There is lot of flexibility needed for LC and it is believed that the TGay may better provide this flexibility. The document goes more on the methodology.
	+ A: The document is a proposal of the author and he has choosen TGax. In TGay we cannot find a finalized simulation scenario document, while in TGax there is a mature structure of the document.
	+ Q: The channel modeling methodology for LC is much more similar compared to TGay. TGax is based on WINNER while TGay uses ray tracing same as TGbb.
	+ C: One should not mix the two points, selecting the ToC of a mature document as a baseline and what channel modeling approach is used.
	+ Q: What is the meaning of “managed”.
	+ A: ESS allows some coordination among adjacent APs while there is also an unmanaged mode where each AP works on its own. The definition will be included in the next version of the document.

1. Oliver Pengfei Luo (Huawei) presented 1423r0 on TGbb simulation scenarios. He went through the document in much detail and explained the details.
	* Q: Structure like in TGax, lot of content is taken from TGax. TGay is more generic and simpler instead of more sophisticated. The LC community is new and would be difficult to provide information with so much detail like required here, why not using less details.
	* A: The Chair answered that TGax basis is very detailed, to narrow down and compare different solutions. It is not so difficult to implement because there are many ns3 simulators in the open source, which do not contain everything but could be used with limited effort.
	* C: There are no simulators in ns3 for 11ax freely available. Things in the document are taken over without discussion in the group if it is reasonable or not. Using the structure of 11ax is fine but some content from 11ay could fit better here.
	* A: There is a 802.11-2016 ns3 simulator with many components for simulating the system, of course 11ax and 11ay are not available because they are new. One should aim at an open framework for LC.

**Oliver asked for volunteers to help complete the missing parameters in the document.**

* + C: Topology is fixed by the channel model and needs not to be defined.
	+ D: System level evaluation should let the positions be random.
	+ C: We are using ray tracing and our channel model is not statistical one. Geometric-statistical channel models like WINNER are not available for LC. For developing the technology and deciding which is the better PHY or MAC, TGbb is in a fortunate situation to have the deterministic approach already available based on ray tracing. We have the right methodology to create channel models and to evaluate the performance. Extensions towards geometric-statistical models may be available only in the future.
	+ Q: Did you choose the type of the document due to the better structure?
	+ A: Yes.
	+ C: The scenario should be representative, and the statistics needs not to be complete.
	+ C: The group is driven by contributions. Whoever wants to change things should make presentations and then the group may decide what to do.
1. Anthasios Stavridis (Ericsson) presented doc. 1546r2. The document is using the Fast session transfer (FST) mechanism to overcome eventual blocking and other mobility issues and the directive nature of the channel. The channel is very much dependent on the geometric setup of the transceivers, otherwise performance is bad. Blockage causes connectivity problems. There is the MIMO approach but has issues with backhauling and others. Alternative is the use of RF and LC in parallel. Once LC is possible, data transmission is redirected to LC. Multiband operation can be implemented with minor modifications. FST mechanism is defined in 802.11-2016 for switching between one MAC sublayer to another MAC sublayer. There are many advantages mentioned like increased connectivity, support of high mobility, increased coverage, cross-room connectivity and others. Thanks to the hybrid solution this can be solved.
	* There were only few question on clarification.

There was a straw poll if the group believes or not that the effective cooperation of 802.11bb with the rest of the IEEE 802.11 family of standards is beneficial for 11bb. Y/N/A: 14/0/1.

The second straw poll in doc. 1546r2 was not run because the question was considered unclear by the group.

The meeting recessed an 18:00.

**Wednesday, September 12, 2018, AM1 Session**

15 people in the room.

Chair opened the session at 8:05 AM.

Tuncer Baykas is acting as secretary until 8:40.

Nikola Serafimovski presented "TGbb Simulation Scenarios" 11/1423r1.

PHY parameters are discussed for industrial applications.

* + C: 11ax is too big to work w/o evaluation document. 11bb could work without these document.
	+ C: There are two different tracks. 802.11 and fixed networks. It is preferred to combine them.
	+ C: The specification documents won’t solve complications.
	+ C: Specifications document will lose time.
	+ C: One PHY and one MAC is suggested.
	+ C: But there will be competing proposals from the group.
	+ C: The LEDs should be considered as MIMO elements of a single AP in industrial applications.
	+ C: Transmit powers should be per LED.
	+ C: A-MSDU should be added.
	+ C: EDCA is only for Quality for Service.
	+ C: For Access Protocol HCF should be selected.
	+ C: RTS/CTS should be on or optional.
	+ C: RTS/CTS should be on.
	+ C: AX and AY defined the traffic model table.
	+ Q: What is the noise power?
	+ A: It is -70 dBm.
	+ But should be dependent on the bandwidth. Theremal noise power is -174 dBm/Hz. For 100 MHz this is around 84 less, hence -94 dBm is the lower bound on the noise power. Where the difference comes from?
	+ It includes a margin for the shot noise.
	+ C: 10 W optical is too high for the station, should be less.
	+ C: Is this LED one chip or multiple, we need to specify.
	+ C: Power Spectral Density should be used.
	+ C: 20 mm2 is too low for area receiver should be 1 cm2 or even more. This will also reduce the power as suggested in a previous comment. Math should be repeated again.

Straw polls:

Should the group issue a call for proposal at the end of the September meeting? Y/N/A = 2/8/4. Failed.

Should TGbb group issue a CfP only after the completion of the Evaluation Methodology and Spec. Framework documents? Y/N/A = 2/8/3. Failed

Should TGbb group continue work on the Simulation Scenario, Evaluation Methodology and Specification Framework documents until the end of the Nov. 2018 session and issue a Call for proposals at the end of the Nov. 2018 plenary session? Y/N/A = 11/1/1.

The group recessed.

**Wednesday, September 12, 2018, PM2 Session**

25 people in the room.

Chair opened the session at 4:00 PM.

1. Tuncer Baykas presented "IEEE 802.11bb Reference Channel Models for Indoor Environments" 11/1582r2.

The main change in the revised version has been to add the medical scenario from a previous document prepared for 802.15.7r1 according to the straw poll in a previous session.

There have been no questions.

1. Nikola Serafimovski (pureLiFi) presented “TGbb Simulation Scenarios” in doc. 1423r2.

Regarding the Scenario 2, the parameters were updated.

* + Q: What about the modulation index, i.e. percentage of optical power which is modulated?
	+ A: Should be left to the implementers and requested if needed.
	+ Q: Some comments on the MAC parameters in scenario 2. Some assumptions seem to be incorrect.
	+ C: In the ray tracing up to 5 reflections should be used, otherwise it is considered insufficient.
	+ Q: Rate adaptation method should be removed.
	+ A: It will have an impact.
	+ C: The current specification framework is over specified. It should leave more freedom to the implementer to introduce innovative technologies. Focus is considered too narrow and already looks like part of a pre-specification with a clear bias on 802.11ax. Examples are link adaptation, max. MCS, lengths of cyclic prefix, etc.. All these parameters should be left open because the effectively block other proposals.
	+ Q: Where the numbers are from?
	+ A: Parameters come from TIG phase. For any changes they can be introduced based on proposals. doc. 11-17/0479r0.
	+ C: The numbers should not pre-specify the technology and leave degrees of freedom to the proposers.
	+ C: There should be a deadline to provide comments to the document before the next phone conference.
	+ Jerome volunteered to provide traffic models.

Motion: Comments will be collected on the Simulation Scenario document (doc. 11-18/1423r3) by 1st Oct. 2018.

Moved by Gaurav Patwardhan, seconded by Volker Jungnickel Result: Y/ N / A = 6 / 0 / 2.

Although there was no consensus, the discussion was stopped because there is another contribution.

Nikola Serafimovski guided through doc. 1429r0. This is a big document which contains a lot of description. It needs careful reviewing by the group at many locations.

* + Q: The document is too complex and may keep people away from making contributions.
	+ A: A lot in the document is pseudo code and can be implemented easily.
	+ Q: The document is 95% copied from TGax and just commented by the Chair. Just letting the group commenting it and then using this is considered the wrong approach.
	+ A: This was mostly prepared through the telephone calls from a previous document 1356r0 uploaded in July.
	+ C: The group should leave the members more time to read and make comments. There was holiday time and there are too many surprises what has happened in this document in the meantime, although the discussion is reflected in the phone call meeting minutes, it seems to be new to several members of the group.
	+ C: What Nikolas say is not correct. The decision in the telco was to keep only the necessary complexity. What has happened was that the opposite to what was agreed in the teleconference.
	+ A: The author has taken the suggestion to make a new version which is now more complex compared to what was discussed before. The author is free to change and let the group decide if it is correct or not.
	+ C: What has been discussed at the teleconference should also be regarded but it has not been regarded by the author.
	+ C: If the people in the group feel that things happen that should not happen, the group should change the mode of operation. The documents should be worked out by one of the Editors and the group provides input in an agreed-upon manner. The problem with this is that this is the same effort like writing the draft. But it may be the better approach to build consensus than to dictate the content and use the group to agree upon what one person has decided.

Straw poll: Do you believe that doc. 1429r0 is an appropriate starting point for the Evaluation Methodology document for TGbb.

Y / N / A = 3 / 4 / 7.

Seems that a new way to come to a methodology document is needed.

Q: Do exactly the thing described in the telco. Start with the ToC and discuss if a feature needs to be evaluated and only if needed it is added to the document.

A: Nikola will provide a new version in which in appropriate text is deleted to be discussed at the next telco.

Discussion on the TGbb teleconference schedule.

Motion: Telefonferences of TGbb on 9:30 AM EDT for 1 hour on 5 Oct, 16. Oct. 30 Oct., 6 Nov. 2018.

TGbb adjourned.