IEEE P802.11
Wireless LANs

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| IEEE 802.11 TGbb Task Group on Light Communications November, 2018 Bangkok Meeting Minutes |
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Abstract

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

**IEEE 802.11 Task Group TGbb**

**Monday, November 12, 2018, AM1 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 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 introduced the schedule for the meeting
* Approve minutes from Sept. 2018
* Approve minutes from the teleconferences
* Discussion on the Channel Model
* Discussion on the Simulations scenarios
* Doc. 11-18/1423r2,
* Discussion on the Evaluation Methodology
* Doc. 11-18/1429r2
* Call for proposal

The main goal of the meeting is to finalize the required documents and issue the Call for Proposals.

1. There has been a discussion to reconsider the PAR because the scope is quite limited with respect to the PAR. The Chair put the PAR on the screen. He argued that it was hard to get this together in the study group phase and it is a long process to change that. It was also mentioned that if there are enough contributions which justify particular changes the task group can bring up this point in the working group and aim to change the PAR.
2. Luo Pengfei (Oliver, Huawei) started comment resolution from the WG comment collection against doc. 11-18-1423r5 on simulation scenarios. Changes were directly made in the document.
* There are differences in Tx powers and size of detectors between the scenarios. Industrial use cases may have higher powers (1W) at the STA because more powering is available. In other scenarios, power is more restricted (200 mW). In the industrial scenario, also a larger PD receiver can be used (1 cm²) at the STA, which is hardly realistic at a mobile handset (20 mm²) where most likely an APD will be used. At the AP, using a large-area PD is more realistic (1 cm²). Note that power specification in channel model is electrical, not optical power.
* Parametrization should always be consistent with the channel model document.
* The number of lights per AP should not exceed 8 because 802.11 MAC so far supports at most 8 antennas per AP and the use of the existing MAC is foreseen in the TGbb PAR. Moreover, this allows handover studies in the same room and let the group draw conclusions from that.
* The discussion on traffic models was postponed.
* There was a discussion on how to realize Monte Carlo simulations in mobile scenarios where the ray tracing approach is not doable anymore. There was a proposal to use a simple LOS model for the individual links as this was the insight from both simulations and measurements except in the industrial scenario. Unlike RF, scattering play a minor role in most LC scenarios.
* The following text is added to the introduction of the simulation scenarios document:
	+ The Monte Carlo simulations necessary to show the statistical performance of the system should use the analytical LOS model contained in doc. 11-17-0479r0 for STAs at various locations and movement in the environment. Random blockages should be considered in the simulations as a break in the LOS between the AP and the STA.
	+ The implementation of blockages should be modelled by introducing an object in the space that models the spatial consistency of the blocking unlike correlated or uncorrelated blocking. It has been proposed to provide pseudo-code for the proposed blockage model in an additional document.
	+ The channel model for the movement of the STa within a given environment should be simulated as follows: 1) distribute the APs, 2) distribute the stations, 3) determine the LOS channel model (using CIRs provided in analytical channel modelprovided in doc. 11-17/0479r0), 4) determine the random blockages in the LOS channel model
	+ The movement of the STA should constitute multiple consecutive time instances where the location and orientation of the STA is spatially correlated. This is best modelled using a trajectory in the room.

Meeting was recessed until Monday Nov. 12, 2018 in PM1.

**Monday, Nov. 12 2018, PM1 Session**

Attendance: between 15-20 people

1. The IEEE 802.11 TGbb meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi).
2. The Chair 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 Chair introduced the schedule for the meeting
4. The Chair run a motion to approve the agenda in doc. 11-18/1719r1.
5. The Chair run a motion to approve the telco minutes in following documents.
* 16/10/2018 Teleconference Meeting Minutes: doc. 11-18/1783r0
* 30/10/2018 Teleconference Meeting Minutes: doc. 11-18/1813r2
* 06/11/2018 Teleconference Meeting Minutes: doc. 11-18-1863r1
1. The Chair run a motion to approve the TGbb September meeting minutes in doc. 11-18/1602r3.
2. Tuncer Baykas (Mediopol University) presented doc. 11-18-1582r3 on the channel model which contains few updates.
* The presentation triggered a discussion about the creation of the system-level channel model including mobility effects which might be based on a simplified LOS model. The discussion was it should be described in a separate document. Lennert will provide a first draft to be reviewed by Tuncer out of existing work. Then the group can decide if this is a good basis to be used for MAC layer simulations.
1. Next comment resolution was continued.
* There has been a discussion that optimized Tx deployments would be more appropriate than fixed setups as currently used. However, the question was how to get them and according to what (lighting vs. communication or both) optimization would have be performed.
* The question about eye safety has to be clarified. Transmitters should be eye safe and the implementer is responsible for this. In general, regulations of IEC are being applied to measure eye safety. Normally, the sun falls between risk classes 2-3, while LEDs are in class 0-1, however even then from marketing point it is important to consider eye safety. There has been a long discussion about the LED that has been used, its spectral properties and what has an impact on the eye safety.
* It was noted that the industrial wireless scenario the deployment should use IR for both uplink and downlink. It was decided to rerun ray tracing using the IR LED SFH4716AS data sheet already provided by Volker to Tuncer. The LED has ultra-wide beam width which was chosen to optimally support mobile communication by using the light.
* There was a discussion if the number of retransmissions in Table 6 is correct. Moreover the impact of interference due to overlapping APs in the medical scenario was discussed. OBSS is in the scope of TGbb. The role of multiple AP interference shall be considered in MAC layer simulations. Thereby, intentionally, not all optical frontends (OFEs) are handled as MIMO under a single AP. The proposers should clearly describe which OFEs are actually used together with a given AP.
* There has been a discussion about the traffic models e.g. due to limited data rates. It was found that some models were out of scope for TGbb and would need to be removed or changed. The discussion turned to the M2M traffic model and which one to apply. The Chair run a straw poll with multiple options. The group preferred having a table created out of documents from other groups.

Meeting was recessed until Tuesday Nov. 13, 2018 in PM2.

**Tuesday, Nov. 13 2018, PM2 Session**

Attendance: 25-30 people

1. The IEEE 802.11 TGbb meeting was called to order by the Chair, Nikola Serafimovski (pureLiFi).
2. The Chair 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 Chair introduced the schedule for the meeting.
4. Luo Pengfei (Oliver, Huawei) continued comment resolution in doc. 11-18/1760r1 from CC starting from comment No. 40. Oliver already corrected all editorial comments noted by commenters.
	* Comment #54 is mostly rejected except for the noise floor where a reference to the relevant TIG document has been added. Most parameters are near to those used in a recent pilot installation where they proved adequate. They were accepted by the group.
	* Comment to remove CP is rejected because it has to be specified by the proposer and can be 0.
	* Q: Why to fix the number of Tx and Rx per AP.
	* A: This was to setup the simulation but not to limit the PHY.
	* C: This approach would be in contrast to assuming each TX/RX is an individual AP what is always possible when using the channel model.
	* The resolution of the comment was paused to discuss with Dorothy Stanley (HPE) and Jon Rosdahl (QC) who are WG Chair and Vice Chair, respectively.

1. There has be a discussion with Dorothy Stanley (HPE) and Jon Rosdahl (QC) from 802.11 WG on how binding the wording in the PAR is.
* Dorothy outlined that the group will use cumulative changes in other task groups, like TGax that will finish before TGbb.
* Jon added that the PAR is quite binding, just like a contract with the WG. Once the PAR needs to be changed, the group goes to go through PAR modification process.
* One other possible way is to look if a change requested by this group is possible to be added to another TG finishing before TGbb finalizes. Then it can be used. TGbb could make a presentation there and stimulate those changes in that other TG, which then is fine to be used also by TGbb.
* The limitations refer to the corresponding function at the time 802.11bb is going to be published, so the limitation is to the latest version that is being available by then. So look into the other projects what changes are foreseen there.
* Operating under the current PAR, the TG has the right to change e.g. HCF as it is needed for operation of LC. Remind also that all members of the TG are members of the WG and vice versa. This means if TGbb removes mandatory parts from the overall specification that are necessary for other people, the probability to get this through the various ballots is next to zero.
* It is perfectly fine to say optional parts are not used for LC or how they would be used for LC. For the number of antennas, check the interface between MAC and PHY that is limiting the number of antennas and where exactly it is situated in the draft. If it is in the HCF part, TGbb can modify it, if it is in other parts of the MAC, it cannot be changed under the current PAR.
* The conclusion was that to finish the SFD, stick with the current PAR to work in a correct environment. The TG should study where in the existing standard those limitations are and come back to this point thereafter.

1. The group came back to the comment resolution.
	* One immediate action after the discussion was to leave the number of TX/RX controlled by a single AP to be defined by the proposer.
	* In the SFD, numbers should be left open to see what people have in mind. Add a sentence to the CfP that proposers should be prepared to provide further simulation results with fixed parameters in case they are requested by TGbb.
	* Discussion of comment 73 caused a discussion how to model mobility of the user. There may be a presentation tomorrow to see if more locations are needed. It is possible to use random waypoint mobility model instead of giving details of restrictions.
	* Jon confirmed that simulations could have their own flavor i.e. different settings and parameters and not be restrictive in the first round of proposals. **But do not bring an ocean if you are thirsty if a glass of water is enough.**
2. The chair run a straw poll to release the PM3 slot and meet again tomorrow morning. The proposal was agreed unanimously.

The meeting is in recess until Wednesday, Nov. 14 PM1.

 **Wednesday, Nov. 14 2018, PM1 Session**

Attendance: around 15 people

1. The IEEE 802.11 TGbb meeting was called to order by the Chair, Nikola Serafimovski (pureLiFi).
2. The Chair reviewed the IEEE-SA patent policy, logistics, and reminders, including meeting guidelines and attendance recording procedures.
	* It is reminded all to record their attendance.
	* The agenda for the meeting was proposed and agreed upon.
3. Luo Pengfei (Oliver) continued comment resolution in doc. 11-18/1760r2 from CC starting from comment No. 75.
* Oliver noticed that most of the remaining comments were already resolved during the previous comment resolution and marked those comments already in advance as resolved in doc. 11-18/1760r2.
* The RTS/CTS parameter in the second scenario was proposed to be specifiable by the proposer. But it was finally decided to either switch it on or off.
* There has been a discussion about traffic profiles and channel probing whether or not it is part of the HCF TGbb can change. The probing traffic is needed for association/re-association. It belongs to management traffic and adds to the overall traffic where it becomes noticeable in dense user scenarios like stadiums, metro lines etc.
* There was a question whether the probing is needed for LC because it has no parallel channels defined in the frequency domain and rather may use a single baseband channel up to some hundret MHz.
* Oliver suggested to consider dividing this wide band into multiple narrower bands and to do the same thing like in 802.11 that frequency reuse is used for avoiding the interference among multiple APs.
* The discussion was also around that this traffic was considered by 802.11ax specifically in dense environments which may not be appropriate for LC as the ratio between the numbers of APs and STAs is very different. In general, the management overhead should be quantified while doing MAC layer simulations.
* The discussion was that the channelization scheme for LC is not clear. Moreover, does this management traffic model really matter, in typical LC scenarios there are more APs than stations. This is not really comparable to an AP in a train station serving 600 users or so. That’s why the management traffic section should be removed from the document.
1. The Chair run a straw poll asking the question “Is a management traffic profile required for the simulation scenario document” (see meeting slides).
	* + The answer is Y/N/A = 1/4/6.
		+ Accordingly, the management traffic profile was deleted from the document.
2. Chair and Vice Chair went through the rest of the CC document and identified unresolved comments. The only open comment was about the tables on the traffic models for each scenario. It was unclear how to fill in this table.
	* + This table was originally thought as a template for proposers to be filled in when doing the simulations to characterize their simulation conditions.
		+ The Vice Chair downloaded doc. 11-14-0980r16ax from another group where a detailed table is contained on page 30/83.
		+ It is hard for TGbb to come up with good new traffic models in realistic timeframe. Traffic models are relatively easy to implement. Models for most traffic types are well known and can be implemented, just their parameters need to be defined.
		+ It is recommended not to redo the work of TGax but in some way refer to that or any other previous document, taking its length and huge revision number into account and assuming it is mature.
		+ The Chair mentioned that these models need to be fixed before finalizing the document.
		+ The question is that either the proposers define the parameters and mention them or if everything should be fixed in advance.
3. The document from 11ay was reviewed again 11-15/0866r4 on page 7.
4. The Chair run a straw poll asking the following question

Should the proposers be required to define the appropriate and relevant traffic model parameters using Table 6 in doc. 11-18/1423r6 as a template for any submitted simulation results?

Y/N/A = 11/0/4

1. Volker Jungnickel (Fraunhofer HHI) presented an update of the LC frontend models document 11-18-1574r4. It now contains Matlab models for the Tx and Rx filters that have been used to model the frontend characteristics. All details to reproduce the models should be contained in the document. Proposers should feel free to contact the authors in case any detail needs more clarification. Discussion on this contribution if any has been postponed to the next meeting.

The meeting is in recess until Wednesday, Nov. 14 PM2.

**Wednesday, Nov. 14 2018, PM2 Session**

Attendance: around 25 people

1. The IEEE 802.11 TGbb meeting was called to order by the Chair, Nikola Serafimovski (pureLiFi).
2. The Chair reviewed the IEEE-SA patent policy, logistics, and reminders, including meeting guidelines and attendance recording procedures.
	* It is reminded all to record their attendance.
	* The agenda for the meeting was proposed and agreed upon
	* The main goal of the meeting is to issue the call for proposals
3. Luo Pengfei (Oliver) continued comment resolution in doc. 11-18/1760r2 from CC starting with two more comments received after the last meeting.
	* First new comment is to copy and paste the 802.11ay traffic model table into the appendix and reference it in the document. This table should be used as a reference while the proposers are free to select from this table what traffic profiles they wish to use in their simulations.
	* Second new comment is that metrics for evaluation are missing and inconsistent. The proposed resolutions are
		+ System: Goodput, Delay, Packet loss rate
		+ MAC: Throughput, Latency, Frame loss rate
		+ PHY: BER (coded/uncoded) and Link throughput vs. SNR
	* These parameters should be added at the top of the simulation document.
	* The document was reviewed by the group and revised in 11-18/1574r8.
	* The blockage model will be described in doc. 11-18/2037r0
	* It was asked, when the analytical channel model from 11-17/0479r0 and the CIR-based model from 11-18/1582r3 should be used. It was clarified to use the CIR-based model for stationary scenarios and the analytical channel model for mobile scenarios.
4. The Chair run a motion to approve the simulation scenario document in 11-18/1423r8 as a baseline for illustrating technical proposals.

Moved by: Oliver

Seconded Tuncer

Y/N/A = 7/0/2

1. The Chair proposed the process outline for proposals.
	* Partial and complete technical proposals will be considered
	* Proposers are expected and encouraged to provide simulation results to validate their technical claims defined in the Simulation Scenarios document (doc. 11-18/1423r8) or the latest approved version of this document.
	* The merger of competing ideas and proposals is encouraged
	* Preliminary presentation of the high level ideas will be discussed (pre-proposals)
	* The TG will vote on the inclusion of any technical proposal in the draft
	* A 75% or more approval will be necessary for a technical proposal to be included in the draft
	* Proposers of successful ideas and concepts will be asked to provide the relevant descriptive and normative text no later than 2 months after the ideas and concepts have been accepted, unless agreed otherwise by the TG.
2. The Chair run a Motion to approve doc. 11-18/2036r1 as agreed-upon process for providing proposals.

Moved by Tuncer Baykas

Seconded by Volker Jungnickel

Y/N/A = 3/0/8

1. Deadlines. The PHY deadlines in March (pre-proposals) and May (full proposals) were supported. However, the MAC deadlines caused significant discussions and were shifted back and forth. The main concerns were that
2. setup and verification of MAC layer simulators e.g. in ns3 need significant time. The risk is that there is rather limited experience with doing 802.11 MAC simulations in TGbb.
3. the people in the room are likely to be interested in providing proposals. They should ask themselves how much time will be needed,
4. there are concerns that copy-and-paste proposals from other projects, such as 11ax, could come in which are quite complex and cause significant delay. Parties who setup the task group and contributed extensively need to deal with them extensively. The bar should be set high enough but fair to provide well-justified proposals and facilitate an efficient selection process.

Since the session was near to its end, it was agreed to remove the deadlines for MAC proposals and simulations from the CfP for now and come back to this issue at some later point in time. This proposal found obvious consensus in the group to get an agreement on the CfP text.

1. The Chair run a motion to accept the Call for Proposals in 11-18/1719r1. The question is

Issue the Call for proposals for TGbb (11-18/1719r1).

Moved by Tuncer Baykas

Seconded by Pengfei Luo (Oliver)

Y/N/A = 7/0/0

1. The Chair proposed the schedule for phone calls. They will be hold on

8:30-9:30 AM EDT on Dec. 5, 2018

8:30-9:30 AM EDT on Dec. 19, 2018

8:30-9:30 AM EDT on Jan. 8, 2019

The Chair will send out an invitation via the TGbb email reflector.

The November 2018 meeting adjourned until January 2019.