IEEE P802.11
Wireless LANs

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| IEEE 802.11 TGbb Task Group on Light Communications July, 2019 Vienna Minutes |
| Date: 2018-07-15 |
| Author: |
| Name | Affiliation | Address | Phone | Email |
| Tuncer Baykas | Vestel.IMU |  |  | tbaykas@ieee.org |
| Matthias Wendt | Signify |  |  | matthias.wendt@signify.com  |
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Abstract

This document contains the Task Group on Light Communications (TGbb) meeting minutes from the IEEE 802.11 Vienna meeting, July 2019.

**IEEE 802.11 Task Group TGbb**

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**Monday, July 15, 2019, AM1 Adhoc Session**

Attendance: around 16 people.

1. The IEEE 802.11 TGbb meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi). Tuncer Baykas (Vestel) 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 overall agenda for the week
* Submissions to be discussed
	+ Evaluation Framework document
	+ Draft text structure
	+ Hear PHY proposals
	+ Hear MAC proposals
	+ Coexistence
	+ Conference call schedule
1. Nikola Serafimovski (pureLiFi) presented doc. 11-19/1000r1 as MAC evaluation simulation method.
	* During this discussion, Tuncer Baykas (Vestel) took over the role as Chair to allow Nikola Serafimovski to contribute to the technical discussion.
2. Strawpoll: Should the cumulative distirbutive functions (CDFs) be shown for all oft he relevant key performance indicators defined fort he TGbb MAC simulation parameters in doc. 11-19/848r2?

Y/N/A

C- Yes it would be beneficial. In 3GPP it is shown

Yes 10

No 0

Abstain 2

Document will be changed accordingly

C- Traffic classes of 802.11 should be included

C- Simulations can be on only one class

C- 2016 based standard Section 9.4.2.31 part oft he mpdu table 9-44 shows the traffic classes

C- How to do a Mac standart? Start apllication model and phy and mac layers and select traffic classes an implementer can select one class or multiple classes to experiment the system.

C- 2016 based standard Section 9.4.2.31 part oft he mpdu table 9-44 shows the traffic classes

C- The authors can send an email to Nikola Seramovski to be included in the authors

1. Mathias Wendt presented ”Practical experiences in implementing an LC-optimized PHY proposed for TGbb “doc. 11-19/1208r0

Q- Will there be only one modulator?

A- Depends on the room size 1 or 2

Q- How do you deal with interference in the cables?

A- We need to have good cables.

Q- How do you have baseband transmit filter?

A- You can have digital filters.

Group recessed.

**Monday, July 15, 2019, PM2 Session**

Attendance: around 26 people.

1. 16:00 The IEEE 802.11 TGbb meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi). Matthias Wendt (signify) 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 overall agenda for the week
* Submissions to be discussed
	+ Evaluation Framework document
	+ Hear PHY proposals
	+ Hear MAC proposals
	+ Discuss TGbb draft text structure
	+ Coexistence within IEEE 802
	+ Conference call schedule
1. The Chair run a motion to approve the Agenda.

**Approve the proposed agenda in doc. 11-19/614r2 for the week**

**Move: Matthias Wendt**

**Second: Len**

**It was approved with unanimous consent.**

1. The Chair run a motion to approve the teleconference minutes

**Approve the minutes from the teleconferences 25/06/2019 in doc. 11-19/1037r01and 27/05/2019 in doc. 11-19/0999r00**

**Move: Stavridis**

**Second: Yee**

**Motion passed with unanimous consent.**

1. The Chair run a motion to approve the interim minutes

**Approve the minutes from the Atlanta interim in doc. 11-19/0934r00.**

**Move: Matthias Wendt**

**Second: Volker Jungnickel**

**Motion passed with unanimous consent.**

1. 16:15 Volker Jungnickel (Fraunhofer HHI) presented doc. 11-19/1053r1 as PHY layer proposal.

**Tuesday, July 16, 2019, PM2 Session**

Attendance: around 50 people.

1. 16:00 The IEEE 802.11 TGbb meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi). Matthias Wendt (signify) 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 overall agenda for the meeting as contained in doc. 11-19/0989r3

Submissions to be discussed today?

Agenda update

Hear PHY proposals

20min – Doc. 11-19/1054r2 – Simulation results for LC optimized PHY proposal

25min – Doc. 11-19/1261r2 – Straw Polls on LC Optimized PHY proposal

10min – Doc. 11-19/1224r1 – Simulation Results for 802.11a PHY in LC channel

35min – Doc. 11-19/1206r0 – Proposed Common-mode PHY for TGbb

Hear MAC proposals

30min – Doc. 11-19/1201r0 – LC MAC submission - follow up

1. The Chair runs a motion to approve the amended Agenda.

**Approve the proposed agenda in doc. 11-19/614r2 for the week**

**Move: Marc Emmelmann**

**Second: Matthias Wendt**

**It was approved with unanimous consent.**

16:05 Malte Hinrichs (Fraunhofer HHI) presents doc. 11-19/1054r2 “**Simulation results for LC-optimized PHY proposal**”

16:20 Volker Jungnickel (Fraunhofer HHI) presents doc. 11-19/1261r2 “**Straw polls on LC-optimized PHY proposal for TGbb**”

It contains a collection of prepared strawpolls:

#1

Adaptive bit loading is useful to optimize LC performance due to low-pass behavior of optical frontends and NLOS propagation in the wireless channel.

* + - 1. Some discussion lead finally to these words for the question:

Shall adaptive bit loading be supported by every TGbb STA with bandwidth larger than 20MHz?

Y 14 / N 16 / A: 12

#2

The physical layer of G.9991 supports adaptive bit loading natively unlike existing PHYs in 802.11.

Shall the existing PHY from G.9991 be supported by TGbb?

16:40 After extensive debate on technical and legal topics as well as the wording of this strawpoll question a motion was called:

Move to extend debate for 45 minutes until 5:30

Mover Marc Emmelmann

Second Kai Lennert Bober

Y 11 /N 2 / A 15

Motion passes

16:45 Volker Jungnickel (Fraunhofer HHI) presents couple of bitloading and LiFi channel characteristic slides found in doc. 11-19/1053r2 “**LC-optimized PHY proposal for TGbb**” (Slide discussed 31) and doc. 11-19/1208r0 “**Practical experiences in implementing an LC-optimized PHY proposed for TGbb**” (Slide discussed 10),

* + - 1. Discussion on Channel models, what is impact on line of sight, how much influence has the very optical frontend hardware.
			2. More slides from doc. 11-18/1574r5 “**LC frontend models**” (slide 7)

Back to the strawpoll, #2

Volker agreed to table the all the strawpolls until end of the technical presentations.

17:30 Nikola Serafimovski (pureLiFi) presents doc. 11-19/1206r0 “**proposed-common-mode-phy-for-tgbb**”

Discussion:

* + - 1. Please remove the logos on slides 8 and 9
			2. Let’s not now decide for or against being the mandatory PHY

Straw Polls:

11ax (High efficiency PHY specification) is to be considered as one of the operation-modes for TGbb.

* + - * Discussion on how such strawpolls could ever generate meaningful information when the technical details have not really ben discussed.
			* Finally, the discussion lead to pushing out all the open strawpolls to an upcoming meeting

18:05 Group recessed until Wednesday AM1

**Wednesday, July 17 2019, AM1 Session**

Around 25 people

1. 8:00 The IEEE 802.11 TGbb meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi). Tuncer Baykas (signify) 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.

Suhwook Kim presented 11-19/1201r1 “LC Mac Submission follow up”

Q: Is it assumed LC for both directional?

A: Omnidirectional for downlink.

C: 802.11 threshold exists for RTS, for small packets it can be turned off.

C: The threshold is only for frame size, we are suggesting it for number of users.

Q: It is used for different reason. Various vendors have algorithms on when to use RTS and CTS.

A: There are more hidden situations in LC.

Q: You didn’t show the comparison with existing solutions.

A: Yes but the complexity is low.

C: The simulations are too simplistic

Q: Do you assume the use the same color ?

A: Yes

Q: Does Using the different colors change anything in the system?

A: Nothing with this simulation?

1. Strawpoll:

Do you agree to define a MAC signal that the AP shall use in order to tell the non-AP STA(s) to use RTS/CTS or not

Strawpoll changed according to the discussion

Do you agree to define a MAC signal that the AP can order to tell the non-AP STA(s) to use RTS/CTS or not

Y:6

N:5

A:10

1. Athnasos Stavridis presented “Link Performance Models for System Level Simulations

”11-19/1221r0

Q: What are the assumption about the average power constraint? Is it an frequency selective channel?

A: It is a LC channel it finds the capacity over an LC channel.

Q: Chernoff bound and Union bound is used, why didn't use thighter bounds?

A: Yes they provide enough information?

Q: We are interested more in worst case scenarios than averages, link model simulatios provide more information?

A: In dense networks more parameters should be considered.

C: We need to determine the parameters for each PHY.

C: If we can use this work to tell us which link level simulations could be done?

C: We should start with the link budget simualtions.

Tuncer Baykas chaired the session for Nikola Seramovski to allow him to make a presentation.

1. Nikola Seramovski presetend “Simulation-results-for-802.11a-PHY-in-LC” 11-19/1224r1

C: 802.11ax simulations are coming in September.

Q: Is Shot and thermal noise is considered?

A: Yes

C: Shot noise is modeled as AWGN

Q: How is the SNR calculated?

A: AWGN is added according the SNR, shot noise depends on the signal power

Q: Since shot noise scales with signal, shot noise dominates SNR at higher values.

A: Yes there could be the cases, and receiver could be saturated as well.

C: Shot noise is relevant only in avalanche photodiodes.

C: Pin diodes could be used for simulations which do not have shot noise

C: Shot noise is added due to the requirement

C: Eb/no has a scientific definition please use that one

C: We assume flat response from the fron end

1. Strawpoll:

Volker Jungnickler presented “Strawpolls on LC optimized PHY proposal” on 19/1261r3

Adaptive bitloading is useful to optimize LC performance due to low-pass behavior of optical frontends and NLOS propagation in the wireless channel.

Strawpoll

“Should adaptive bit loading be supported as one mode of operation in TGbb”

Q: If it s not mandatory or optional can we change it to considered ?

A: Yes

Stawpoll changed

“Should adaptive bit loading be considered as one mode of operation in TGbb?”

Y 19

N 0

A 5

Strawpoll

“Tgbb PAR requires one PHY mode to reach 5 Gbit/s. Bandwidth of LC frontends can be scaled to 1 GHz and more by using lasers besides LEDS

Should extensions for 1 GHz bandwidth and more considered by TGbb?”

Q: Is there anything in the PAR about limiting the system below 1 GHz?

A: No

Question is called

Y 19

N 0

A 3

Distributed MIMO is useful to handle multiple optical frontends with overlapping coverage. MIMO is also useful at the non-AP STA e.g. to combat interference.

Should extensions for large MIMO setups ove LC be supported by TGbb?

C: non-AP is to indicate mobile stations

Q: Why did you the term large?

A: We are talking about 10-20 front ends. We are providing dense pilot signals in conference rooms.

Q: Do you mean larger than current 802.11 standards?

A: Yes

C: It would good to point out to states larger than 8X8 and and change the sentence considered to supported

Strapoll changed

Should extensions for larger than 8x8 MIMO setups ove LC be considered by TGbb?

Y17

N 0

A 3

Strawpoll:

The physical layer of G.9991 supports adaptive bit loading natively unlike existeing PHYs in 802.11. With an ongoing project (G.hn2) people work already on an extension to support more than 1 GHz bandwidth. Extensions to support MIMO setups larger than 8x8 have also been proposed

Should the G.9991 PHY be considered as one mode operation in TG bb

Q: Why do you take another stanards?

A: 802.11a came from ETSI. 802.11 can do it again. G.9991 is well worked standard which fits to the medium better than the 802.11ax

Q: If this strawpoll passes we need to start on establishing a liaison.

C: We need to work on PPDUs.

Y:14

N: 5

A: 3

Strawpoll

11ax (High efficiency PHY specification) is to be considered as one of operating modes for Tgbb

Q: What will be the scaling up?

A 802.11ax can reach 5gbits with MIMO

Q: 802.11ax requires 160 MHZ to reach high througputs.

A: Current TGbb documents show flat front ends and flat channelsas well.

Q: We have seen one flat end model which is not flat.

C: The strawpoll is about 802.11ax not frontends

Question is called

Y 17

N 1

A 6

Group is in recess

**Thursday, July 18 2019, PM1 Session**

Around 25 people

1. 1:30 PMThe IEEE 802.11 TGbb meeting was called to order at by the Chair, Nikola Serafimovski (pureLiFi). Tuncer Baykas (signify) 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.

Motion to approve agenda stated in 11-19/989r5

Move: Volker Jungnickel

Second Suhwook Kim

Approved by unanimous consent

Group discussed possible teleconferences.

C: Just reserve one time slot. If no contributions are received cancel it.

C: 1 teleconference would be enough

C: 2nd of September would be good.

C: 5th Septmeber at 8:30 AM Edt

Motion

Tgbb would like to request following teleconference times

5th Septwmber at 8:30 AM Edt 1 Hour

Move A. Stavridis

Seconded Kai Lennert Bober

Approved by unanimous consent

C: Chair will ask for 5 time slots.

Volker Jungnickel presented “Proposed Liasion from IEEE 802.11WG to ITU-TQ18/15 “ doc:11-19/1322r0

C: We should check who should be in the cc list.

C: The text should clear enough to use text for draft docuemnets.

C: We need to ask permission to study the documents before putting them

C: G.9991 is not available but the other ones are available

C: References should be added

C: Par reference is in the document

Motion:

Group discussed the text for the liaison motion

TGbb would like to request that the IEEE 802.11 WG approves sending the contents of 11-19/1322r1 draft LS to ITU-T Q18/15 and cc’ed to IEE 802 EC, granting WG Chair editorial license

Mover Volker Jungnickel

Seconded Matthias Wendt

Y 14

N 0

A 3

C: Tg Chair will make a motion for the LS in WG

C: Group discussed the coexistence document

C: 802.19 is having an epoll to change the CAD rules.

C: Group can postpone the discussion.

Chair asked for discussion on TGbb text structure.

C: No comments.

Group adjourned at 14:30