IEEE P802.15
Wireless Specialty Networks

|  |
| --- |
| IEEE 802.15.13 November, 2018 Interim Meeting Minutes for Bangkok, Thailand |
| Date: 2019-01-12 |
| Author: |
| Name | Affiliation | Address | Phone | Email |
| Chong Han | pureLiFi |  |  | Chong.han@purelifi.com |
| Volker Jungnickel | Fraunhofer HHI |  |  | volker.jungnickel@hhi.fraunhofer.de |
|  |  |  |  |  |

Abstract

# This document contains the TG13 Multi-Gigabit/s Optical Wireless Communications Meeting minutes from the November Plenary meeting in Bangkok, Thailand.

**IEEE 802.15.13**

**Tuesday, November 13, 2018, AM1**

Attendance

Volker Jungnickel (Fraunhofer HHI)

Kai Lennert Bober (Fraunhofer HHI)

Tuncer Baykas (Mediopol Uiversity)

Nikola Serafimovski (pureLiFi)

Chong Han (pureLiFi)

Xu Wang (VLNComm, remote)

Arturo Campos (GiGaLiFi)

Vinayagam Mariappan (SNUST)

YEONG MIN JANG (Kookmin University)

1. The Chair Volker Jungnickel (Fraunhofer HHI) presented the agenda doc. 15-18/0530r0 and read the relevant attendance and IP elements.
2. The agenda (doc. 15-18/0530r1) was approved with unanimous consent.
3. Meeting minutes for September 2018 Interim in doc. 15-18/0525r1 were approved with unanimous consent.
4. Meeting minutes for the teleconferences between the September 2018 interim and the November 2018 plenary (doc. 15-18/0528r1) were approved with unanimous consent.
5. Xu Wang (vlncomm) presented doc. 15-18/0562r0 including GTS allocation/deallocation and HCM allocation frame.
	* It is proposed to remove receive GTS, requirement of ACK for GTS request.
	* It is proposed to balance the requests from all devices in the GTS assignment mechanism, and accept based on capacity.
	* New frame for HCM allocation is proposed.
	* Q: How to combine the GTS with HCM. Is HCM only good for UL, but what is the difference for DL?
	* A: Agreed with the benefits of HCM. But this proposal is for DL.
	* C: Type and subtype are to be confirmed once we have a comprehensive list of frames.
	* C: Type 00 is for management frames which has up to 16 in terms of numbers in total.
	* A: The list of the management frames is to be agreed since many of them may not be needed.
	* Q: Is it really necessary to duplicate the HCM info in both PHY and MAC?
	* A: Duplication of the info is necessary; every device needs to know the info before decoding.
	* A new frame is proposed for MCS request command to adjust MCS based on cannel condition.
	* C: This frame could be control frame instead of management frame.
	* It is agreed to deem this as control frame.
	* A new frame is proposed for LED selection request/respond in the multi-LED transmitter.
	* Q: How to select one or a group of LEDs. What about the delays?
	* A: It does not have to be a group of LEDs. Delay is not yet considered in the proposal.
	* The discussion is taken offline and will be continued on Thursday AM1.

The meeting is in recess.

**Tuesday, November 13, 2018, AM2**

Attendance

Volker Jungnickel (Fraunhofer HHI)

Kai Lennert Bober (Fraunhofer HHI)

Tuncer Baykas (Mediopol Uiversity)

Nikola Serafimovski (pureLiFi)

Chong Han (pureLiFi)

Xu Wang (VLNComm, remote)

Arturo Campos (GiGaLiFi)

Vinayagam Mariappan (SNUST)

Yeon Min Jang (Kookmin University)

Friedbert Behrens (FBconsulting)

Harry Bims (Bims Laboratories Inc.)

1. The Chair Volker Jungnickel (Fraunhofer HHI) presented the agenda in doc. 15-18/0530r1 and read the relevant attendance and IP elements.
2. Chong Han (pureLiFi) presented doc. 15-18/0487r0 which contains a high-level text description of the non-beacon enabled MAC.
* It has been discussed that this descriptive text goes into Chapter 4.
* The group needs a similar text for the beacon-enabled mode.
* A draft has been already prepared and will be uploaded as soon as possible.
1. Chong Han (pureLiFi) presented doc. 15-18/0488r0 which contains descriptive text for the non-beacon-enabled mode.
* There was a discussion about what text goes into what chapter and how to structure the draft. This discussion was postponed to the time when the to-do list is created.
* There was a discussion on the role of CFP and CAP in non-beacon-enabled mode.
* The switch between the different beacon-enabled/non-beacon-enabled MAC modes will be in the general MAC frame structure under “protocol version”.
* There was a discussion about the channel access in non-beacon-enabled mode.
* **From now on BE = beacon-enabled, NBE = non-beacon-enabled**
* Q: How to handle priority-classified traffic?
* A: This is handled after the “keep-it-simple-and-stupid” (KISS) mode. In the NBE MAC mode, there is no prioritization of traffic.
* **It was agreed to distinguish Contention-access based polling period (CAPP) and Contention-free Polling Period (CFPP) from now on to avoid confusion between NBE and BE mode**
* Mechanism for ACK/NACK for polled frames in Fig. 4: ACK is not for current but for previous DL frame.
* After 4 retransmissions a packet will be dropped
* Q: Where the coordinator is situated, there will be one in each light?
* A: Yes.
* Q: So a packet will be dropped even if it is received by another light.
* A: Yes, again using KISS.
* C: The NBE MAC mode is a very simple MAC, while maintaining a functional system. And there is the BE MAC mode which maybe more complex but handles all these issues.
* Q: Can we keep it KISS but without ACK to increase throughput.
* A: Possibly yes.
* There was an intense discussion on Fig. 2 in the document. It was mentioned that due to the polling of other devices, and the proposed aggregation of ACK and data, there is a delay of ACK information.
* Missing an ACK results in a retransmission which can be discarded.

1. Lai Lennert Bober (Fraunhofer HHI) presented doc. 15-18/0410r1 which contains an update of the slides on MAC support for multiple optical frontends.
* Q: You can ask for a reconnect?
* A: Only if there is no more beacon detected. Then the device goes into disconnected mode. Next time it will inform the coordinator if it has received a beacon.
* Q: Can we call this SDMA?
* A: There is some confusion on the use of the term SDMA in different communities. SDMA is often used for MIMO with zero forcing. But this is not used here. Here, the meaning of SDMA is that multiple links are maintained at the same time but in different parts of the room so that the transmissions do not interfere. This is ensured by the scheduler in the central coordinator based on feedback received from all devices.
* Some other terms were suggested but not found clearer either.
* TAP definition caused some discussion. It was clarified that the term tap comes from the tapped-delay-line which is a commonly used model for multipath channels. The channel from each frontend can have one or more taps, while one tap per OFE is typical because LOS propagation is normally dominant.

The meeting is recessed until PM1.

**Tuesday, November 13, 2018, PM1**

Attendance

Volker Jungnickel (Fraunhofer HHI)

Kai Lennert Bober (Fraunhofer HHI)

Carlos Cartras (Fraunhofer HHI)

Tuncer Baykas (Mediopol Uiversity)

Nikola Serafimovski (pureLiFi)

Chong Han (pureLiFi)

Arturo Campos (GiGaLiFi)

Vinayagam Mariappan (SNUST)

Yeon Min Jang (Kookmin University)

1. The Chair Volker Jungnickel (Fraunhofer HHI) presented the agenda in doc. 15-18/0530r1 and read the relevant attendance and IP elements.
2. The Chair asked how many sessions to be needed for next IEEE meeting in January. 8 sessions will be asked for in the 802.15 WG.
3. Kai Lennert Bober (Fraunhofer HHI) continued to present doc. 15-18/0410r1 which contains an update of the slides on MAC support for multiple optical frontends.
* The typical superframe was presented as an example.
* Q: Why there is IDLE period in the CFP?
* A: This is from the perspective of one device. Other devices will utilize the ‘IDLE’ period.
1. Kai Lennert Bober (Fraunhofer HHI) presented doc. 15-18/0563r0 to list the open points.
* Ethertype protocol discrimination is needed in any new 802 standard.
* C: This is outside the scope of TG13. This is to be checked.
* It was suggested to have aggregation of frames inside MSDU.
* Use 1 bit reserved in the Frame Control field in the MAC header to indicate the ‘Last fragment’ for defragmentation. The bit will be 1 if this is the last fragment; otherwise 0.
* Refer the related sections/subsections for security in 802.15.4y.
* To be continued in Wed. PM1.

The session is recessed until PM1 on Wed.

**Wednesday, November 14, 2018, PM1**

Attendance

Volker Jungnickel (Fraunhofer HHI)

Kai Lennert Bober (Fraunhofer HHI)

Tuncer Baykas (Mediopol University)

Nikola Serafimovski (pureLiFi)

Chong Han (pureLiFi)

1. The Chair Volker Jungnickel (Fraunhofer HHI) presented the agenda in doc. 15-18/0530r1 and read the relevant attendance and IP elements.
2. Kai Lennert Bober (Fraunhofer HHI) continued discussion of doc. 15-18/0563r0 open points on MAC.
* The first point is QoS. TG13 should have QoS support to support industrial traffic.
	+ Industrial traffic needs i) reliability, ii) limited latency at iii) moderate data rates
	+ Usually, there are 7 QoS classes: **Just use one type-of-service = industrial traffic**.
	+ First issue is delay and delay variation.
	+ Two types: a= priority based, b = reservation-based.
	+ Flow reservation would solve the problem for industrial traffic.
	+ Flow reservation is specified in 802.1 and then copied into other standards.
	+ The queuing mechanisms need to be checked. One queue per user.
	+ CFP gives the opportunity to have deterministic delay given that
		1. no packet is lost
		2. flow control is active for each user individually
		3. the queue remains empty or lightly filled
		4. there is no competition w.r.t. channel access from other networks
	+ Action:
		1. Figure out what is needed.
		2. Provide a specification how to realize QoS in TG13.
* Next topic is going back to Ethertype.
	+ There was a discussion about the role of Ethertype based on 802-2014 standard.
	+ 802.11 breaks the bridging of Ethernet traffic through not using Ethertype.
	+ 802.11 puts the source and destination fields in the auxiliary header.
	+ One solution is to support both methods
	+ That would waste some overhead, and allow 802.15.13 to be compatible with Ethernet bridging.
	+ One text proposal should add the required text
	+ Nikolas proposal is to copy and paste the text from 802.11-2016.
	+ There should be one sentence that says
		1. “EPD as defined in IEEE Std 802-2014 shall be used for transmission of MSDU”.
* Final open topic was aggregation.
	+ The group agrees to want MSDU aggregation.

The meeting was recessed.

**Thursday, November 15, 2018, AM2**

Attendance

Volker Jungnickel (Fraunhofer HHI)

Kai Lennert Bober (Fraunhofer HHI)

Carlos Cartras (Fraunhofer HHI)

Nikola Serafimovski (pureLiFi)

Chong Han (pureLiFi)

Arturo Campos (GiGaLiFi)

Tuncer Baykas (Mediopol)

1. The Chair Volker Jungnickel (Fraunhofer HHI) updated the agenda in doc. 15-18/0530r2 and read the relevant attendance and IP elements.
2. The group discussed the readability of the draft. Following points were identified
* No line numbers: is easily solved: Mark everything, Go to lay out, add line numbers
* No table of content: Recreate the heading with numbering, then create ToC
* Overlapping text and graph

The conclusion was to have a telco with John next week. We probably need some secretary or student assistant to help with the editing work.

1. The group discussed the finalization process for the TG13 draft. The tentative schedule is the following:
	* November meeting: Clarify open issues 🡪 see list
	* December/January: Create missing text, review existing draft, identify what functions are obsolete
	* January Meeting: Review text inputs, integrate them, request approval for WGLB
	* February: Create draft 4.0 as pdf, submit for WGLB 30 days before the March meeting (check operation manual manual), provide template for comments
	* March Meeting: Resolve all comments from WGLB, request recirculation
	* May Prepare everything for sponsor ballot
2. Kai Lennert Bober (Fraunhofer HHI) presented doc. 15-18/0600r0 with proposed ToC for TG13 draft.
* Section 4
	+ New subsection after 4.2 “Components of 802.15.13 networks” (TBD)
	+ 4.2 simplify topologies: Delete broadcast, Delete/revise coordinated topology,

heterogeneous RF/OWC 🡪 consider using media-independent handover,

* + Modulation domain spectrum 🡪 Coexistence: with other systems, how to handle various
	+ Functional overview: Quite redundant: should be shortened significantly
	+ Security 🡪 to be shortened, refer to 802.15.4y already here, get rid of chapter 7
	+ Concept of primitives
* Section 5
	+ Introduction and overview
	+ Put frame formats into own section 6
	+ Beacon-enabled MAC: with all subsections needed from old 5.1 (Lennert, Xu)
	+ Non-beacon-enabled MAC: with all subsections needed from old 5.1 and doc. 15-18/0488r1 (Chong)
	+ Take things that work for both modes in another chapter
	+ Neighboring OWPAN status monitoring: It is basically solved with handling all lights in one room as MIMO, re-associate to other coordinator, separated by beacon slots

The meeting was recessed.

**Thursday, November 15, 2018, PM1**

Attendance

Volker Jungnickel (Fraunhofer HHI)

Kai Lennert Bober (Fraunhofer HHI)

Carlos Cartras (Fraunhofer HHI)

Chong Han (pureLiFi)

Arturo Campos (GiGaLiFi)

Tuncer Baykas (Mediopol)

Vinayagam Mariappan (SNUST)

1. The Chair Volker Jungnickel (Fraunhofer HHI) read the agenda in doc. 15-18/0530r2 and the relevant attendance and IP elements.
2. Kai Lennert Bober (Fraunhofer HHI) finished discussion of doc. 15-18/600r0.
* Section 5
	+ Which parts are commonly needed in both MAC modes?
	+ 5.5. Synchronization 🡪 non-beacon enabled MAC
	+ Transaction handling: related to data transfers but unclear if it is needed in TG13: To be revised and made sure that it is applicable
	+ Transmission, reception and acknowledgement: To be revised and made sure that it is applicable, should be included individually in each MAC mode
	+ GTS allocation 🡪 moved to beacon-enabled mode
	+ Fast link recovery 🡪 shall be removed by adding a comment and resolving it
	+ CSI feedback and link adaptation: Shall be replaced by equivalent functions in each MAC mode
	+ Relaying remains as general functionality
	+ Interference coordination 🡪 is moved to beacon-enabled mode
	+ Mobility and handover 🡪 is moved to beacon-enabled mode
	+ General MAC frame format, MAC data frames, MAC management frames, MAC control frames 🡪 new Section 6 on MAC frame format
* Former Section 6
	+ Looks fine, keep as is
	+ Optical clock rate selection unclear why in service specification
* New Section 6 MAC Frames
	+ MAC data frame
	+ MAC management frames
	+ MAC control frames
* Old Section 9 🡪 discussed if it can be removed
	+ PHY service specification is not needed because there is no standalone PHY and MAC in most standards and the interfaces are only there for intuition
	+ Section should be revised and taken equal to 802.15.4-2015
1. Motion

“Update sections and subsections in draft D3.2 according to the Table of Content agreed in doc. 15-18/0600r1.”

Moved by Nikola

Seconded by Tuncer

Y/N/A = 4/0/0 Motion passed.

1. The Technical Editor conducted comment resolution according to document 15-18/0520r0.
2. Motion

“Approve the technical comments resolved in doc. 15-18-0520/r1 and update TG13 draft accordingly. The Technical Editor is granted the right to work in all accepted editorial comments.”

Moved by Nikola

Seconded by Chong

Y/N/A = 4/0/0 Motion passed.

1. Kai Lennert Bober (Fraunhofer HHI) presented doc. 15-18/410r2 which contains 3 new slides with the bit allocation table and the protocol to change it in TG13.
	* There has been some discussion about the variable subcarrier grouping. While the idea is clear, the control signaling is difficult to understand.

**Thursday, November 15, 2018, PM2**

Attendance

Volker Jungnickel (Fraunhofer HHI)

Kai Lennert Bober (Fraunhofer HHI)

Carlos Cartras (Fraunhofer HHI)

Chong Han (pureLiFi)

Arturo Campos (GiGaLiFi)

Tuncer Baykas (Mediopol)

Vinayagam Mariappan (SNUST)

1. The Chair Volker Jungnickel (Fraunhofer HHI) updated the agenda in doc. 15-18/0530r3 and read the relevant attendance and IP elements.
2. The group discussed the tasks before the next meeting in St. Louis.
* D3.2 word is ready by Nov. 23rd 2018
* Ask John to provide a pdf
* Comments are due Jan. 7
* Text input for D4 is due Jan. 10
1. The group discussed the tentative Agenda for the next meeting in St. Louis.
* 8 sessions have been requested
* Review text inputs
* Integrate them into the draft
* Do comment resolution against D4
* Start WGLB process
1. The group discussed the schedule for telcos before the next meeting in St. Louis. The following times were agreed upon.
* Nov. 21 9:30-10:30 U.K. editorial issues for D4
* Nov. 27 10:00-11:00 EDT review of first MAC text
* Dec. 12 9:30-10:30 EDT further MAC text
* Jan. 8 9:30-10:30 EDT preparing next Interim mtg.

The Chair will send around an invitation with agenda together with dial-in information over WebEx via the TG email distributor.

1. The group updated the timeline in doc.15-17/0288r7.
2. Motion

“Approve the new timeline in doc. 15-17-288r7.

Moved by Nikola

Seconded by Tuncer

Approved with unanimous consent.

1. The Chair asked for any other business for the Bangkok meeting. There was none.

The meeting adjourned until the next Interim meeting in St. Louis January 13-17, 2019.