**IEEE 802.15**

**Wireless Specialty Networks (WSN)**

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| Project | IEEE 802.15 Working Group for Wireless Specialty Networks (WSN) |
| Title | **IEEE 802.15 TG 4ab (NG-UWB) minutes** |
| Date Submitted | [25 Jan, 2022] |
| Source | [David Xun Yang][][Bantian, Shenzhen, China] | Voice: [+86.159.1411.7462]Fax: [--]E-mail: [david.yangxun@huawei.com] |
| Re: | [January 802.15 Interim Meeting held virtually] |
| Abstract | [IEEE 802.15 Task Group 4ab minutes] |
| Purpose | [Official minutes of IEEE 802.15 TG 4ab] |
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# Wednesday, 19 January 2022 – EV1

**Opening**

**5:07 PM** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0020-01-04ab*)

* >70 attendees joined the meeting

Chair reminded the group of registration for 802 LMSC and wireless interim.

## Legal

Chair reminded the group of the following from the 802.15 opening meeting:

* IEEE-SA patent policy
* Submission of Letter(s) of Assurance (LoA) or to identify patent claim(s)/patent application claim(s) and/or the holder of patent claim(s)/patent application claim(s) that the participant believes may be essential for any of the ongoing activities within the 802.15 WG.
	+ No essential patent claims were brought forth
* IEEE Anti-Trust statement
* IEEE Copyright Policy, including Code of Ethics

**Announcements**

Don’t forget to turn on your mic and announce your name and affiliation before you speak.

Chair announced the agenda doc. # for the week. After reviewing and making a few changes to the agenda, no one objected to approve the modified agenda. it was approved by unanimous consent.
*(doc. # 15-21-0644-06-04ab)*

Chair raised the motion of minutes for Nov plenary and telecons between November and January. No one objected to approve the motion. The motion was approved by unanimous consent.

**TG Meeting Activity**

Using the meeting slides *(doc. # 15-21-0020-01-04ab)* and meeting agenda (*doc. # 15-21-0644-06-04ab*) Chair proceeding with running the meeting.

Frederic Nabki (SPARK Microsystems) presented “MAC layer considerations for UWB data streaming”

*(doc. # 15-22-0047-01-04ab)*

This presentation discussed MAC layer enhancements on coexistence of UWB data streaming, e.g., channel access, CCA, etc.

Questions raised include CSMA backoff flexibility, CCA ED value range, regulations, coherent receivers, etc.

Xiaohui Peng (Huawei) presented “waveform design for UWB sensing”.

*(doc. # 15-22-0040-04-04ab)*

This presentation discussed the waveforms for UWB sensing.

Questions raised about ambiguity function and waveform performance.

Chair recessed the mtg. @ 6:46pm, until Thu. EV1.

# Thursday, 20 January 2021 – EV1

**5:07 PM** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0020-01-04ab*)

* >80 attendees joined the meeting

## Legal

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**TG Meeting Activity**

Using the modified agenda *(doc. # 15-21-0644-07-04ab)* Chair proceeding with running the meeting.

Pooria Pakrooh (Qualcomm) presented “UWB Sensing Scenarios for 802.15.4ab”.

*(doc. # 15-22-0012-01-04ab)*

This presentation introduced and compared the modes of UWB sensing.

Questions raised about scenarios of proxy application and data transfer related to sensing.

Wei Lin (Huawei) presented “Channel Coding Considerations for 802.15.4ab”.

*(doc. # 15-22-0050-00-04ab)*

This presentation introduced some analysis of advanced channel coding.

Questions raised include Rate matching of LDPC codes, payload size and decoder algorithms.

Straw Polls deferred for more discussions.

Ziyang Guo (Huawei) presented “UWB and NB link budget comparison”.

*(doc. # 15-22-0051-01-04ab)*

This presentation introduced some analysis of link budget calculation of UWB and narrow band technologies and discussed whether NB signaling is more efficient than UWB signaling.

Questions/comments raised include:

* Gating gain and Cramer-Rao bound are optimistic for ranging
* 10dBm transmit power of BLE in SYNC link margin calculation
* Suggest to consider antenna diversity gain
* OQPSK link margin

Frank Leung (NXP) presented “Sensing - Continued”.

*(doc. # 15-22-0061-00-04ab)*

This presentation introduced some concepts for sensing including terminology, multiple antennas, pulse shaping, carrier grid spacing, and CIR sharing.

Questions/comments raised include:

* CIR Range, multiple STS to support multiple antenna, hopping for sensing, range start index, sampling rate of 4 or 8, Bandwidth of carrier grid spacing
* The queue was cut off due to time limit. Several people were left in the queue. Chair encouraged people to ask questions/comment through emails.

Chair recessed the mtg. @ 7:04pm, until Fri. AM2.

# Friday, 21 January 2021 – AM2

**Opening**

**11:10 AM** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

(*15-22-0020-01-04ab*)

* > 80 attendees joined the meeting

## Legal

Chair reminded the group of the following from the 802.15 opening meeting:

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	+ No essential patent claims were brought forth
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**TG Meeting Activity**

Using the modified agenda *(doc. # 15-21-0644-07-04ab)* Chair proceeding with running the meeting.

Huan-Bang Li (NICT) presented “Pilot NB radio for assisting UWB channel access”

*(doc. # 15-22-0065-00-04ab)*

This presentation discussed cooperated UWB and NB radio for enhancing UWB channel access.

Questions/comments raised include:

* Link budget comparison, narrow band CCA
* Operating frequency, e.g., sub 1 GHz, 2.4 GHz

Pooria Pakrooh (Qualcomm) presented “Link budget analysis and CIR reporting for UWB RF sensing”

*(doc. # 15-22-0066-00-04ab)*

This presentation discussed the characteristics of Channel Impulse Response (CIR) for UWB RF sensing and the design of CIR report.

Questions/comments raised include:

* Feedback size, dynamic range, side lobe challenges
* Feedback size of HPR may be longer than the payload size
* Range of 10 meters may not be achieved

Ersen Ekrem (Apple) presented “Potential of narrowband assisted UWB”

*(doc. # 15-22-0066-00-04ab)*

This presentation introduced a harmonized view of narrow band assisted UWB.

Questions/comments raised include interference to Wi-Fi in UNII-3

Chair asked if anybody wanted to get back to the previous presentations. No request heard.

Chair encouraged people to work together offline on the same topics in parallel.

Chair reminded people for registration for attendance.

Chair recessed the mtg. @ 12:57pm, until Mon. AM1.

# Monday, 24 January 2022 – AM1

**Opening**

**9:09 AM** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

(*15-22-0020-01-04ab*)

* ~ 80 attendees joined the meeting

## Legal

Chair reminded the group of the following from the 802.15 opening meeting:

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	+ No essential patent claims were brought forth
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**Announcements**

Chair reviewed the agenda and made a few changes. No objection heard.

*(doc. # 15-22-0644-08-04ab)*

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0644-08-04ab)* Chair proceeding with running the meeting.

Libra Xiao (NewRadio Technology) presented “The Capacity and Accuracy optimization for DL-TDoA of UWB”.

*(doc. # 15-22-0070-00-04ab)*

This presentation proposed UWB related **c**apacity and accuracy solution for optimizing DL-TDoA.

Boris Danev and David Barras (3dB) presented “Proposal for extending NB-UWB for secure ranging”

*(doc. # 15-22-0076-00-04ab)*

This presentation discussed secure ranging concepts and PHY designs for narrow band assisted UWB.

Questions raised include the relation between narrow band and secure ranging, receiving procedure of burst, link budget improvement, etc.

Chair recessed the mtg. @ 11:00am, until Mon. EV1.

# Monday, 24 January 2022 – EV1

**Opening**

**5:09 PM** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

(*15-22-0020-01-04ab*)

* > 70 attendees joined the meeting

## Legal

SG Chair reminded the group of the following from the 802.15 opening meeting:

* IEEE-SA patent policy
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**TG Meeting Activity**

Using the agenda *(doc. # 15-22-0644-08-04ab)* Chair proceeding with running the meeting.

Erson Ekrem (Apple) presented “Link budget analysis for narrowband assisted multi-millisecond UWB”

*(doc. # 15-22-0074-00-04ab)*

This presentation compared the link budget of OQPSK, BPRF UWB and multi-millisecond integration.

Questions raised include fair comparison especially under fading, clarification of calculations, etc.

Sven Zeisberg (HTW) and Jean-Marie André (ST) presented “TDMA scheme enabling industrial DL-TDoA and UL-TDoA scenarios”

*(doc. # 15-22-0077-00-04ab)*

This presentation discussed the scheme of TDMA/TDoA.

Questions raised on the order of TDoA procedure.

More Q&A deferred to offline discussions or available time slots later.

Dag T. Wisland (Novelda AS) presented “UWB sensing concepts”

*(doc. # 15-22-0083-00-04ab)*

This presentation discussed sensing concepts and scenarios.

Q&A deferred to offline discussions or available time slots later.

Chair recessed the mtg. @ 7:00pm, until Mon. EV2.

# Monday, 24 January 2022 – EV2

**Opening**

**7:09 PM** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

(*15-22-0020-01-04ab*)

* > 50 attendees joined the meeting

## Legal

SG Chair reminded the group of the following from the 802.15 opening meeting:

* IEEE-SA patent policy
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	+ No essential patent claims were brought forth
* IEEE Anti-Trust statement
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**Announcements**

Chair reviewed the agenda and made a few changes. No objection heard.

*(doc. # 15-22-0644-08-04ab)*

**TG Meeting Activity**

Using the agenda *(doc. # 15-22-0644-08-04ab)* Chair proceeding with running the meeting.

Li Sun (Huawei) presented “Integrity protection to support secure ranging in IR-UWB”

*(doc. # 15-22-0072-00-04ab)*

This presentation discussed the method of integrity protection for PHY security of ranging of UWB.

Questions/comments raised include the attack categories, security issues related to receiver implementation, number in the assumptions and possible issues of single tap channel.

Li Sun (Huawei) presented “A method to evaluate the quality of ToF measurement for IR-UWB”

*(doc. # 15-22-0073-00-04ab)*

This presentation introduced the procedure design for integrity protection.

Yong Liu (Apple) presented “NBA-MMS-UWB MAC Followup”

*(doc. # 15-22-0080-00-04ab)*

This presentation is a follow-up design for narrow band assisted multi-millisecond UWB ranging protocol.

Questions raised include correlation between narrow band and UWB, comparison between CSMA/CA and channel hopping, simple and efficient narrow band, the time to transmit narrow band packet, and the time accuracy between narrow band and UWB.

Chair asked if anybody wants to circle back and continue the discussions on the previous presentations. No request heard.

Chair recessed the mtg. @ 8:48pm, until Tue. PM1.

# Tuesday, 25 January 2022 – PM1

**Opening**

**1:11 PM** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

(*15-22-0020-02-04ab*)

* ~ 70 attendees joined the meeting

## Legal

SG Chair reminded the group of the following from the 802.15 opening meeting:

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	+ No essential patent claims were brought forth
* IEEE Anti-Trust statement
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**Announcements**

Chair reviewed the agenda and made a few changes. No objection heard.

*(doc. # 15-22-0644-10-04ab)*

**TG Meeting Activity**

Using the agenda *(doc. # 15-22-0644-10-04ab)* Chair proceeding with running the meeting.

Carlos Aldana (Meta) presented “Advanced Coding for Data Communications in 802.15.4ab”

*(doc. # 15-21-0506-02-04ab)*

This presentation continued to discuss the performance of advanced coding schemes.

Questions raised include the BCC parameters, coding rate, payload length, and power consumption.

Michael Mclaughlin (Qorvo) presented “Link Budget UWB vs NB”

*(doc. # 15-22-0094-00-04ab)*

This presentation compared the link budget of UWB and NB.

Questions raised include the values of parameters in the calculation.

Vice chair Clint Powell (Meta) reviewed “Presentations by TGD Categories” *(doc. # 15-21-0638-00-04ab).* Clint requested people to send comments/brief introduction to complete/improve the matrix.

Chair emphasized that this matrix will be used to help the formation of draft, and called for volunteers to lead the topic subgroups. Discussions on how to proceed with these subgroups: categories, subgroup consensus, how to participate multiple subgroups, etc. More discussions are welcome through emails.

Chair reviewed the schedule major milestones. Chair reviewed the interim TC planning. 8 sessions will be proposed for March meeting. Chair reviewed the schedule for teleconferences. No objection received.

(*15-22-0020-02-04ab*)

Chair adjourned the mtg. @ 2:55pm.