**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 | [10 May, 2022] |
| Source | [David Xun Yang][][Bantian, Shenzhen, China] | Voice: [+86.159.1411.7462]Fax: [--]E-mail: [david.yangxun@huawei.com] |
|  | [Clint Powell][][Chandler, AZ] | Voice: [+1.480.586.8457]Fax: [--]E-mail: [cpowell@ieee.org] |
| Re: | [May 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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# Tuesday, 10 May, 2022 – EV1

**Opening**

**5:10 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0258-00-04ab*)

* >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 based on requests, no one objected to approve the modified agenda. it was approved by unanimous consent.
*(doc. # 15-22-0216-06-04ab)*

Chair raised the motion of minutes for March Plenary *(doc. # 15-22-0202-00-04ab)* and telecons between March and May *(doc. # 15-22-0239-00-04ab)*. No one objected to approve the motion. The motion was approved by unanimous consent.

Chair introduced the details of hybrid meeting and how to operate the meeting.

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0216-07-04ab)* Chair proceeding with running the meeting.

Shang-Te Yang (Apple) presented “Review of UWB Coexistence Contributions”.

*(doc. # 15-22-0242-00-04ab)*

This presentation raises the challenges of UWB coexistence and reviews the current mitigations methods.

Questions/comments raised include interference source, difference between CCA and LBT, staggered PRF, performance metric, etc.

Wei Lin (Huawei) presented “Discussion on Advanced Channel Coding for 15.4ab”.

*(doc. # 15-22-0265-00-04ab)*

This presentation summarized the current discussions on advanced channel coding.

Questions/comments raised include packet length and options of LPDC codes.

Chair recessed the mtg. @ 6:42pm ET, until Wed. EV1.

# Wednesday, 11 May, 2022 – EV1

**5:10 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0258-02-04ab*)

* >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
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**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0216-07-04ab)* Chair proceeding with running the meeting.

Bin Qian (Huawei) presented “Simultaneous ranging solutions”.

*(doc. # 15-22-0256-00-04ab)*

This presentation discusses the solutions for simultaneous ranging.

Questions/comments raised includes considered scenarios, CFO of responders, delay of different users, effects of preamble sequences, and simulation results.

Bin Qian (Huawei) presented “CIR Feedback Scheme-continue”.

*(doc. # 15-22-0257-00-04ab)*

This presentation further discusses the compression methods of CIR feedback.

Questions/comments raised includes CIR pulse interval, coherent processing interval in real environment, the CIR feedback frequency, and offsets/impairments from realistic measurements.

Kuan Wu (Huawei) presented “MAC considerations on unified control for UWB sensing and ranging”.

*(doc. # 15-22-0255-00-04ab)*

This presentation discusses MAC considerations on unified control for UWB sensing and ranging in 802.15.4ab.

Questions/comments raised includes new IE, key challenges to identify simultaneous ranging and sensing, the number of modes and reuse of existing modes.

Chair recessed the mtg. @ 6:48pm ET, until Thu. AM1.

# Thursday, 12 May, 2022 – AM1

**9:10 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0258-02-04ab*)

* >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
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**Announcements**

Chair reviewed the updated agenda based on requests, no one objected to approve the modified agenda. it was approved by unanimous consent.
*(doc. # 15-22-0216-08-04ab)*

Chair will run a poll to collect information who will participate in-person/virtually in July meeting.

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0216-08-04ab)* Chair proceeding with running the meeting.

Huan-Bang Li (NICT) presented “Proposal of NB PHY assisted CCA for UWB medium access”.

*(doc. # 15-22-0275-00-04ab)*

This presentation discusses the basic concept of Narrow band assisted CCA.

Li Sun (Huawei) presented “Privacy preserving and performance enhancement for UWB sensing”.

*(doc. # 15-22-0248-00-04ab)*

This presentation proposes a collaborative sensing scheme.

Aniruddh Rao Kabbinale (Samsung) presented “Details of NB Mirroring Channel”.

*(doc. # 15-22-0276-01-04ab)*

This presentation provides addition of details on NB mirroring channel - how NB and UWB signaling can cooperate to mirror UWB Channel usage with channel hopping and collision avoidance.

Chair recessed the mtg. @ 11:00am ET, until Thu. PM1.

# Thursday, 12 May 2022 – PM1

**Opening**

**1:10 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0258-02-04ab*)

* ~83 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:

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	+ No essential patent claims were brought forth
* IEEE Anti-Trust statement
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**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0216-08-04ab)* Chair proceeding with running the meeting.

Carlos Aldana, Chunyu Hu, Kangjin Yoon, Claudio da Silva all (of Meta), Billy Verso, Jarek Niewczas, Carl Murray, Michael McLaughlin (all of Qorvo), Frank Leong, Riku Pirhonen, Wolfgang Küchler, Abdul Wahid Abdul Kareem, Jianxuan Du (all of NXP Semiconductors) presented:
"High Data Rates and Coding"
(*doc. #* [*15-22-0274-00-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=274&is_year=2022))Representing a collaborative approach to 802.15.2 UWB higher data rates and coding.

Xiliang Luo, Moche Cohen, Ayman Naguib, Yong Liu, Shang-Te Yang (all of Apple), Rias Al-Kadi, Frank Leong, Wolfgang Kuchler, Riku Pirhonen (all of NXP),  Mingyu Lee, Taeyoung Ha, Karthik Srinivasa Goplan, Aniruddh Rao Kabbinale, Ankur Bansal, Clint Chaplin (all of Samsung Electronics), Huan-Bang Li, Takeshi Matsumura (both of NICT), Boris Danev, David Barras, Bharat Bhatia (all of 3db), Bjoern Scharfen (of Infineon), Jean-Marie Andre (of ST), Sven Zeisberg, Erik Mademann (both of Zigpos), Eberhard Wahl (of Trumpf), Zhenzhen Ye, Chunjie Duan, Yongsen Ma (all of Redpoint Positioning), Bin Tian, Pooria Pakrooh, Koorosh Akhavan (all of Qualcomm), Bin Qian, Peng Liu, Li Sun, Rani Keren, Wei Lin, David Xun Yang, Ziyang Guo, Kuan Wu, Shimi Shilo, Chenchen Liu, Xiaohui Peng, Stephen McCann, Edward Au, Jia Jia (all of Huawei), Billy Verso, Michael McLaughlin, Luc Darmon, Carl Murray, Jarek Niewczas, Igor Dotlic, Ciaran McElroy (all of Qorvo) presented:

"NBA-UWB Technical Framework Proposal"
(*doc. #* [*15-22-0262-01-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=262&is_year=2022))
Representing a highly collaborative approach to narrow band assisted UWB.

Igor Dotlic and Michael McLaughlin (both of Qorvo) presented:

“Deterministic STS Field for Sensing"
(doc. # [15-22-0280-01-04ab](https://mentor.ieee.org/802.15/documents?is_dcn=280&is_year=2022))
Covering the introduction of super-complementary zero-sum cross-correlation (SZC) code blocks and describes their properties and benefits for usage as a deterministic STS field.

Chair recessed the mtg. @ 3:00pm ET, until Thu. EV1.

# Thursday, 12 May 2022 – EV1

**Opening**

**5:07 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0258-02-04ab*)

* >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
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	+ No essential patent claims were brought forth
* IEEE Anti-Trust statement
* IEEE Copyright Policy, including Code of Ethics

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0216-08-04ab)* Chair proceeding with running the meeting.

Bin Tian (Qualcomm) presented “Coexistence discussion on NB assisted UWB”

*(doc. # 15-22-0261-00-04ab)*

This presentation proposes LBT and duty cycle limit for narrow band.

Questions/comments raised include LBT working with channel hopping, NB modes, UWB only, frame-based LBT, low duty cycle, and prioritized channel.

Pooria Pakrooh (Qualcomm) presented “Discussion on NB assisted UWB message sequence and synchronization”

*(doc. # 15-22-0266-00-04ab)*

This presentation discusses NBA UWB message sequence and time/frequency synchronization schemes.

Peng Liu (Huawei) presented “Channel Access Considerations on Fragmented UWB Format”

*(doc. # 15-22-0150-02-04ab)*

This presentation continues to discuss the necessity and benefits of CCA for fragmented UWB.

Chair recessed the mtg. @ 6:46pm ET, until Mon. AM1.

# Monday, 16 May 2022 – AM1

**Opening**

**9:10 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

*(15-22-0258-02-04ab)*

* ~60 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

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0216-09-04ab)* Chair proceeding with running the meeting.

Ziyang Guo (Huawei) presented “Time hopping for fragmented UWB transmission in MMS-UWB systems”.

*(doc. # 15-22-0289-01-04ab)*

This presentation proposes to enable time hopping for fragmented UWB transmission in MMS-UWB systems to avoid consecutive multi-user interference.

Questions/comments raised include interference due to duty cycle, simulation results, regulatory consideration and coordination with narrow band CCA.

Chitao Goe (Qorvo) presented “The Advantage of UWB Wakeup”.

*(doc. # 15-22-0282-00-04ab)*

This presentation highlights the advantages of UWB wakeup radio over NB solutions.

Jarek Niewczas (Qorvo) presented “Multi-millisecond Ranging and Data transmission”

*(doc. # 15-22-0283-00-04ab)*

This presentation discusses Multi-millisecond Ranging and Data Transmission.

Jarek Niewczas (Qorvo) presented “multi-user interference mitigation”

*(doc. # 15-22-0284-00-04ab)*

This presentation discusses multi-user interference mitigation by using sequences at preamble.

Chair recessed the mtg. @ 11:02am ET, until Mon. EV1.

# Monday, 14 March 2022 – EV1

**Opening**

**5:10 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

(*15-22-0258-02-04ab*)

* > 60 attendees joined the meeting

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

## Legal

SG 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

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0216-09-04ab)* Chair proceeding with running the meeting.

Xiliang Luo (Apple) presented “Golay Complementary Sequences: Preamble construction for UWB Ranging beyond 4z Ipatov”

*(doc. # 15-22-0243-00-04ab)*

Reviewing the benefits of preamble sequences based on Golay complementary pairs and recommending a preamble sequence construction scheme for ranging beyond 4z.

Frederic Nabki (Spark) presented “Non-coherent HRP Option for data communication”

*(doc. # 15-22-0297-00-04ab)*

Covering a PHY proposal to support low power operation for data communication applications to create data communication-optimized packets that can complement current ranging-focused

Koorosh Akhavan (Qualcomm) presented “A Higher Data Rate Proposal For UWB”

*(doc. # 15-22-0296-01-04ab)*

Proposing a baseline higher data rate of 62.4 Mbps with optional features.

**Strawpoll: Will you attend the July meeting:**

1. in person?
2. virtually?
3. not at all?

Results: in person: 28(24+4 email responses); virtual: 13; not at all: 3

Chair recessed the mtg. @ 6:52am ET, until Tue. AM1.

# Tuesday, 17 May 2022 – AM1

**Opening**

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

(*15-22-0258-02-04ab*)

* ~60 peak participants 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
* IEEE Copyright Policy, including Code of Ethics

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0216-09-04ab)* Chair proceeding with running the meeting.

Xiaohui Peng (Huawei) and Pooria (Qualcomm) presented “Proposal of sensing framework”
*(doc. #* [*15-22-0291-01-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=181&is_year=2022)*)*This presentation provides a framework for UWB sensing in 802.15.4ab that will be developed into a draft.

 Billy Verso (Qorvo) presented “A summary of proposals and interests”

*(doc. #* [*15-22-0305-00-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=178&is_year=2022)*)*This presentation presents an overview summary of various items of interest proposed at TG4ab for inclusion into the IEEE 802.15.4ab amendment.

Zhenzhen Ye (Redpoint) presented “Converging Downlink TDOA (DL-TDOA) Location Service Proposals in 802.15”

*(doc. #* [*15-22-0298-00-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=178&is_year=2022)*)*This presentation summarized the presentations related to DL-TDOA.

Chair made changes to the agenda based on the pending request and asked if there is any objection to the agenda. No objection heard.

*(doc. # 15-22-0216-10-04ab)*

Chenchen Liu (Huawei) presented “preamble only packet for UWB”

*(doc. # 15-22-0267-01-04ab)*

This presentation proposes preamble only packet for UWB ranging and sensing application.

Chair encouraged people to think about volunteering for topic areas in the next meeting slot.

Chair recessed the mtg. @ 10:49am ET, until Tue. EV1.

# Tuesday, 17 May 2022 – EV1

**Opening**

**5:08 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

(*15-22-0258-03-04ab*)

* > 60 attendees joined the meeting

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

## Legal

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

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* 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
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**TG Meeting Activity**

Using the agenda *(doc. # 15-22-0216-10-04ab)* Chair proceeding with running the meeting.

Håkon A. Hjortland (Novelda AS) presented “Air-Time Efficiency Improvements”

*(doc. # 15-22-0308-00-04ab)*

This presentation includes pulse burst sensing, where bursts of pulses is transmitted instead of single pulses. Also presents the super packet, which uses the same transmitted energy to provide communication, ranging, and sensing.

Vice chair Clint Powell (Meta) reviewed “TG4ab Presentations by TGD Categories”

*(doc. # 15-21-0638-03-04ab)*

Chair introduced the concept of point of contact (PoC) who should report the progress of each topic area, and encourage people to volunteer. Volunteers can also help the editor to transit the contributions into draft text.

Chair introduced his idea on convergence by combining collaboration and voting. There are lots of discussions on the topic areas.

(*doc. # 15-22-0258-04-04ab*)

Chair asked if there is any question on the interim TC planning, including frequency, phase and time duration. No question heard.

* Weekly on Tuesday 6am PT commencing on 31 May, 2022

Chair asked if there is any other business. No response heard.

Chair adjourned the mtg. @ 7:00pm ET.