**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 | [8 Mar, 2022] |
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|  | [Clint Powell][Meta][Chandler, AZ] | Voice: [+1.480.586.8457]Fax: [--]E-mail: [cpowell@ieee.org] |
| Re: | [March 802.15 Plenary 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, 8 March, 2022 – EV1

**Opening**

**5:10 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0139-00-04ab*)

* >70 attendees joined the meeting

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

## 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. # 15-22-0114-02-04ab)*

Chair raised the motion of minutes for Jan Interim *(doc. # 15-22-0103-00-04ab)* and telecons between February and March *(doc. # 15-22-0133-00-04ab)*. No one objected to approve the motion. The motion was approved by unanimous consent.

Chair introduced TG officers and thanked all for volunteering.

Chair reviewed the proposed schedule. Chair reminded people of the major milestones. Chair asked for discussions on the process. No request heard.

Chair recessed the mtg. @ 5:49pm ET, until Wed. EV1.

# Wednesday, 9 March, 2022 – EV1

**5:07 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0139-01-04ab*)

* >70 attendees joined the meeting

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

## 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 *(doc. # 15-22-0114-03-04ab)*, no one objected to approve the modified agenda. It was approved by unanimous consent.

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0114-03-04ab)* Chair proceeding with running the meeting.

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

*(doc. # 15-22-0150-01-04ab)*

This presentation proposes to support CCA for fragmented UWB format to avoid interference or drop off invalid ToA estimation.

Questions/comments raised includes:

* Simulation settings of interference and performance, CIR combination of multiple fragments
* What kind of CCA and power level of CCA value, necessity of CCA

Kuan Wu (Huawei) presented “Use Cases of UWB sensing proxy application in 802.15.4ab”

*(doc. # 15-22-0144-01-04ab)*

This presentation introduces the use cases of UWB sensing proxy applications.

Questions/comments raised includes:

* Necessity of use case 1 and how it works
* Requesting device

Wei Lin (Huawei) presented “Further Considerations of Advanced Channel Coding on 15.4ab”.

*(doc. # 15-22-0154-00-04ab)*

This presentation introduced the advanced channel coding analysis of performance and power consumption.

Questions/comments raised includes:

* How to define short packet
* Details of new LDPC code
* How sensitive to the channel state information of different codes, study of real scenarios, e.g., impairments

Chair recessed the mtg. @ 6:40pm ET, until Thu. EV1.

# Thursday, 10 March 2022 – EV1

**Opening**

**5:07 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0139-01-04ab*)

* >70 attendees joined the meeting

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

## 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
* IEEE Copyright Policy, including Code of Ethics

**Announcements**

Chair reviewed the agenda (*doc. # 15-22-0114-05-04ab*) and made changes to the agenda based on requests. The modified agenda was approved by unanimous consent.

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0114-05-04ab)* Chair proceeding with running the meeting.

Bin Qian (Huawei) presented “CIR feedback scheme for UWB sensing”

*(doc. # 15-22-0155-00-04ab)*

This presentation proposes CIR feedback procedure and CIR compression methods.

Questions/comments raised include:

* Details of sensing CIR report procedure and formats
* Applications of CIR reports compression

Pooria Pakrooh (Qualcomm) presented “Discussion on UWB sensing report”

*(doc. # 15-22-0170-00-04ab)*

This presentation discusses details of CIR window and CIR report for sensing.

Questions/comments raised include:

* Antennas and RF chain calibration in the content of CIR report
* Timing accuracy, interpolation and deconvolution
* CIR window size, dynamic range

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

*(doc. # 15-22-0156-00-04ab)*

This presentation discusses on the coexistence of NB, options of signaling to assist UWB, etc.

Questions/comments raised include:

* Open interface for multiple technologies
* Duration of SHR and preambles
* Coexistence with other technologies in UNII-3
* How to define the details of initial synchronization
* Additional complexity to have many choices

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

# Friday, 11 March 2022 – AM2

**Opening**

**11:11 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0139-01-04ab*)

* >70 attendees joined the meeting

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

## 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**

Chair reviewed the agenda (*doc. # 15-22-0114-05-04ab*) and made changes to the agenda based on requests, no one objected to approve the modified agenda. It was approved by unanimous consent.

Huan-Bang Li (NICT) presented “U-NII band status of Japan for consideration to NB-assisted UWB”

*(doc. # 15-22-0174-01-04ab)*

This presentation discusses feasible bands for narrow band in Japan.

Questions/comments raised include the information for more countries, UNII-5 details in Japan, etc.

Dag T. Wisland (Novelda AS) and Frank Leung (NXP) presented “Sensing Device”

*(doc. # 15-22-0175-00-04ab)*

This presentation discusses sensing devices and networks, terminology, pulse shape, carrier grid spacing and CIR sharing.

Questions/comments raised include:

* Range-velocity pairs baseline
* Signaling for multiple TX antennas and details of ranging header
* Reuse of legacy designs
* Pulse shape options and equalization, details of duty cycle requirements and PRF for sensing

Rani Keren (Huawei) presented “Link budget calculator for NB and UWB”

*(doc. # 15-22-0145-00-04ab)*

This presentation proposes a calculator to assist in analyzing the link budget balance for NB and UWB hybrid operation.

Questions/comments raised include sensitivity of ranging packets, details in calculation, e.g., packet length, assumptions of SNRmin, etc.

Chair recessed the mtg. @ 1:01pm ET, until Mon. AM1.

# Monday, 14 March 2022 – AM1

**Opening**

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

*(15-22-0139-01-04ab)*

* ~70 attendees joined the meeting

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

## 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

**Announcements**

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

*(doc. # 15-22-0114-06-04ab)*

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0114-06-04ab)* Chair proceeding with running the meeting.

Li Sun (Huawei) presented “Privacy Issues in UWB Sensing”.

*(doc. # 15-22-0177-01-04ab)*

This presentation discusses the privacy issues in UWB sensing.

Questions/comments raised include:

* Encryption is not sufficient in privacy
* MAC address randomization may help

Aniruddh Rao (Samsung) presented “Recap of Narrowband / UWB Coupling MAC”.

*(doc. # 15-22-0180-00-04ab)*

This presentation discusses how NB and UWB signaling can cooperate to mirror UWB Channel usage with channel hopping and collision avoidance.

Questions/comments raised include:

* Available bands for NB considering interference
* Ranging block structures from different controllers, the length of advertisement packet
* RDT function, ACK for NB packet, mandatory channel, CCA for narrow band

Chair asked if there is anything to discuss in the remaining time. No request heard.

Chair recessed the mtg. @ 10:26am ET, until Mon. EV1.

# Monday, 14 March 2022 – EV1

**Opening**

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

(*15-22-0139-01-04ab*)

* > 60 attendees joined the meeting

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

## 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
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**TG Meeting Activity**

Using the agenda *(doc. # 15-22-0114-06-04ab)* Chair proceeding with running the meeting.

Mingyu Lee (Samsung) presented “Multiple Transmissions in A Ranging Slot”

*(doc. # 15-22-0179-00-04ab)*

This presentation introduces the concept of multiple transmissions in a ranging slot.

Questions/comments raised include:

* Timing and Synchronization
* Number of orthogonal sequences for simultaneous transmission
* Design concept and receiver complexity
* Preamble only

Kangjin Yoon (Meta) presented “MAC considerations for data communication”

*(doc. # 15-22-0172-00-04ab)*

This presentation discusses general direction for enhanced UWB data communication.

Questions/comments raised include:

* 4z data transmission procedure
* Duty cycle and interference avoidance
* Comparison between UWB and BT in case of low data rate

Kangjin Yoon (Meta) presented “Ack for data communication”

*(doc. # 15-22-0173-00-04ab)*

This presentation discusses existing ACK mechanisms in the specifications and evaluates if they are applicable to data communication.

Questions/comments raised include:

* Enhanced ACK may be broken because AIFS is too short
* The process when combined with narrow band

Chair recessed the mtg. @ 6:34pm ET, until Tue. PM1.

# Tuesday, 15 March 2022 – PM1

**Opening**

**1:09 PM** ET Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

(*15-22-0139-01-04ab*)

* ~55 peak participants 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
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**Announcements**

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

*(doc. # 15-22-0114-07-04ab)*

**TG Meeting Activity**

Using the agenda *(doc. # 15-22-0114-07-04ab)* Chair proceeding with running the meeting.

C. Murray, J. Niewczas, I. Dotlic, M. McLaughlin, B. Verso (all of Qorvo) presented: “New Data Rates”
*(doc. #* [*15-22-0181-00-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=181&is_year=2022)*)*Covering proposals for new data rates in UWB to help drive agreement on approach to specifying new data rates in UWB.

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

“A Novel Channel Sounding Sequence for 15.4ab”

*(doc. #* [*15-22-0178-00-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=178&is_year=2022)*)*Covering a proposal for a channel sounding sequence for 15.4ab to increase the range of the 802.15.4ab PHY by up to 20dB.

Ersen Ekrem, Moche Cohen, Ayman Naguib, Yong Liu, Shang-Te Yang (Apple), Rias Al-Kadi, Frank Leong, Wolfgang Kuchler, Riku Pirhonen (NXP) and Mingyu Lee, Taeyoung Ha, Karthik Srinivasa Goplan, Aniruddh Rao Kabbinale, Ankur Bansal, Clint Chaplin (Samsung Electronics), Huan-Bang Li, Takeshi Matsumura (NICT), Boris Danev, David Barras, Bharat Bhatia (3db), Bjoern Scharfen (Infineon), Jean-Marie Andre (ST), Sven Zeisberg, Erik Mademann (Zigpos), Eberhard Wahl (Trumpf), Zhenzhen Ye, Chunjie Duan, Yongsen Ma (Redpoint Positioning) presented:

“NBA-UWB Technical Framework Proposal”
(doc. # [15-22-0192-00-4ab](https://mentor.ieee.org/802.15/documents?is_dcn=192&is_year=2022))
Covering proposed text to for the IEEE Std 802.15.4ab specification framework document.

Chair recessed the mtg. @ 3:00pm ET, until Tue. PM1.

# Tuesday, 15 March 2022 – PM1

**Opening**

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

(*15-22-0139-01-04ab*)

* > 50 attendees joined the meeting

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

## 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
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**TG Meeting Activity**

Using the agenda *(doc. # 15-22-0114-06-04ab)* Chair proceeding with running the meeting.

Li Sun (Huawei) presented “Interference Detection for high-integrity of Ranging in UWB systems”

*(doc. # 15-22-0072-02-04ab)*

This presentation is an updated version of previous contribution “Integrity protection to support secure ranging in IR-UWB”, which continue the discussion on improving ranging performance especially in case of interference.

Chair asked if anybody wants to circle back and ask questions on the previous contributions. No request heard.

Vice chair Clint Powell (Meta) led the discussion on process and presented “TG4ab Draft Process”. Discussions about the process to make it more clear. Clint will upload the process document in the server.

Chair reviewed the meeting schedule and milestones. Discussions on the arrangement for TFD in the schedule milestones.

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 29 March, 2022
* Will cancel if no agenda items received 24 hours prior

Chair asked if there is any other business. Vice chair Clint Powell (Meta) reminded people of Straw Polls on July meeting in the coming closing plenary.

Chair adjourned the mtg. @ 6:47pm ET.