**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 | [18 May, 2023] |
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| Re: | [May 802.15 Interim Plenary Meeting held in Hybrid Mode] |
| Abstract | [IEEE 802.15 Task Group 4ab minutes] |
| Purpose | [Official minutes of IEEE 802.15 TG 4ab] |
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# Monday, 15 May, 2023 – AM2

**Opening**

**10:38 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0245-00-04ab*)

* >80 attendees joined the meeting

Chair introduced the hybrid meeting logistics.

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**

Chair announced the agenda doc. # for the week. Riku Pirhonen (NXP) requested one hour for break discussion.

Motion #1: Move to approve the agenda. *(doc. # 15-23-0205-05-04ab)*

No one objected to approve the agenda. It was approved by unanimous consent.

Chair raised the motion of minutes for Mar plenary *(doc. # 15-22-0196-00-04ab)* and telecons between Mar and May *(doc. # 15-23-0235-00-04ab)*. No discussion heard.

Motion #2: Move to approve the minutes for Mar plenary *(doc. # 15-22-0196-00-04ab)* and telecons between Mar and May *(doc. # 15-23-0235-00-04ab)*.

No one objected to approve the motion. The motion was approved by unanimous consent.

Chair emphasized the session objectives, process and goals of this week.

Chair introduced the time management of this meeting.

**TG Meeting Activity**

Using the agenda *(doc. # 15-23-0205-05-04ab)* Chair proceeding with running the meeting.

Presentation #1:

Huan-Bang Li (NICT) presented “O-QPSK PHYs for NB CCA for UWB channel access”

(*doc. # 15-23-0238-01-04ab*)

This presentation proposes O-QPSK as NB PHYs to improve coexistence among UWB systems.

Questions/comments raised include feasibility of NB CCA, clarity of the transmission ideas, etc.

Presentation #2:

Bin Qian (Huawei) presented “Considerations on CIR scaling and quantization”

(*doc. # 15-23-0239-01-04ab*)

This presentation proposes a modified scheme on CIR scaling and quantization based on that of 11bf.

Questions/comments raised include clarity of simulation results, real data analysis, need to verify more cases and think of the limit of mantissa.

Presentation #3:

Bin Qian (Huawei) presented “Intra-packet frequency stitching considerations”

(*doc. # 15-23-0240-00-04ab*)

This presentation proposes to consider the time for frequency stitching and extend the gap duration in intra-packet frequency stitching.

Presentation #4:

Dries Neirynck (Ultra Radio Ltd) presented “Non-Coherent PHY Layer proposal for 15.4ab TFD”

(*doc. # 15-22-0514-05-04ab*)

This presentation introduced the updates on optional HRP-LE mode.

Presentation #5:

Rojan Chitrakar (Huawei) presented “Secured compressed frames for MMS ranging”

(*doc. # 15-23-0216-00-04ab*)

This presentation discusses mechanism to provide security for frames used for MMS ranging (NBA or UWB).

Questions/comments raised include the necessity of security in MAC, how to define which part in MAC layer, further think fully reliable ranging session, etc.

Chair recessed the mtg. @ 12:30pm ET, until Mon. PM2.

# Monday, 15 May, 2023 – PM2

**4:03 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0245-00-04ab*)

* >90 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 agenda *(doc. # 15-23-0205-05-04ab)* Chair proceeding with running the meeting.

Presentation #6:

Tim Harrington (UWB Alliance) presented “UWB Aggregation and Wi-Fi 6E Test”

(*doc. # 15-23-0221-02-04ab*)

This presentation introduces designs of control and scheduling information for UWB sensing.

Questions/comments raised include clarity of the testing details.

Presentation #7:

Mingyu Lee (Samsung) presented “NB Assisted Data Communications”

(*doc. # 15-23-0243-02-04ab*)

This presentation explains the need to offload UWB communications to NB, and proposes an operation to support UWB ranging triggered NB.

Questions/comments raised include relation between the proposed design and NBA-MMS, details of NB resource allocation, transmission duration of NB, etc.

Chair reminded authors to upload contributions for presentations tomorrow.

Collaboration breakout: Alexander Krebs (Apple) used this timeslot for discussing compressed PSDU and discovery MAC.

Chair recessed the mtg. @ 5:04pm ET, until Tue. AM1.

# Tuesday, 16 May, 2023 – AM1

**8:07 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0245-00-04ab*)

* >90 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 updated agenda *(doc. # 15-23-0205-05-04ab)* Chair proceeding with running the meeting.

Presentation #8:

Carlos Aldana (Meta) presented “Coherent PHY Layer Proposal for 15.4ab TFD”

(*doc. # 15-22-0649-03-04ab*)

This presentation further updates the text for data communication.

Presentation #9:

Carlos Aldana (Meta) presented “Some thoughts on 4ab capabilities”

(*doc. # 15-23-0264-00-04ab*)

This presentation provides authors’ thoughts on defining the 4ab capabilities.

Presentation #10:

Vinod Kristem (Apple) presented “Minimal 4ab feature set”

(*doc. # 15-23-0263-03-04ab*)

This presentation further discusses the minimal 4ab feature set with consensus.

Presentation #11:

Chenchen Liu (Huawei) presented “Device Type Discussion”

(*doc. # 15-23-0256-01-04ab*)

This presentation discusses device type and corresponding features.

Questions/comments raised were related to mandatory or optional PPDU configuration.

Presentation #12:

Chenchen Liu (Huawei) presented “CIR Bitmap Pattern”

(*doc. # 15-23-0257-00-04ab*)

This presentation discusses the CIR bitmap patterns and corresponding signaling method to save the CIR feedback overhead.

Questions/comments raised include limits of patterns, transmitted signal and compressed information, etc.

Presentation #13:

Kuan Wu (Huawei) presented “More considerations on one-to-many NBA-MMS UWB initialization”

(*doc. # 15-23-0217-01-04ab*)

This presentation discusses one-to-many NBA-MMS UWB by harmonizing latest discussion results on NBA-MMS UWB initialization and coordination.

Questions/comments raised are related to the details of the procedure and IE contents.

Presentation #14:

Rojan Chitrakar (Huawei) presented “Round hopping and block assignment in hyper blocks-follow up”

(*doc. # 15-23-0214-00-04ab*)

This presentation intends to resolve issues with round hopping and block assignment in hyper blocks.

Questions/comments raised include the intention and details of the information of the next assigned block and HBS IE.

Chair reminded there are two rooms for collaboration breakout: Alexander Krebs (Apple) and Riku Pirhonen (NXP) will make use of them for ad hot meetings.

Chair recessed the mtg. @ 9:45am ET, until the second half of Tue. PM2.

# Tuesday, 16 May, 2023 – PM2

**5:04 PM ET** Vice Chair, Clint Chaplin (Samsung Research America), called the meeting to order and opened the TG Agenda.
(*15-23-0245-00-04ab*)

* >90 attendees joined the meeting

## 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
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**TG Meeting Activity**

Using the updated agenda *(doc. # 15-23-0205-05-04ab)* Vice Chair proceeding with running the meeting.

Presentation #15:

Lei Huang (Huawei) presented “Negotiation of Short-Term Operating Parameters during the MMS Ranging Phase”

(*doc. # 15-23-0207-00-04ab*)

This presentation discusses the protocol for negotiating short-term operating parameters during the MMS ranging phase.

Presentation #16:

Hongwon Lee (LGE) presented “Scheduling IE update for Hyper Block scheduling” and “Text for Scheduling IE update for Hyper block scheduling”

(*doc. # 15-23-0247-00-04ab & doc. # 15-23-0248-00-04ab*)

This presentation discusses the scheduling IE update for hyper block-based mode to reduce power consumption.

Questions/comments raised include harmonization with Rojan’s contribution *doc. # 15-23-0214-00-04ab*.

There were three more requests on collaboration breakout.

Chair recessed the mtg. @ 5:42pm ET, until Wed. PM1.

# Wednesday, 17 May, 2023 – PM1

**1:33 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0245-00-04ab*)

* >100 attendees joined the meeting

## 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
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**TG Meeting Activity**

Using the agenda *(doc. # 15-23-0205-06-04ab)* Chair proceeding with running the meeting.

Presentation #17:

Alexander Krebs (Apple) presented “Details on Compressed PSDU for NBA-UWB MMS”

(*doc. # 15-23-0258-02-04ab*)

This presentation introduces efficient MAC control signals suitable for a baseline feature set supported by low-rate O-QPSK narrowband PHYs.

Questions/comments raised include details of ADV-POLL settings, privacy protected address and message control design.

Presentation #18:

Jinjing Jiang (Apple) presented “Compressed PSDU for One-to-Many Ranging using NBA-MMS”

(*doc. # 15-23-0260-00-04ab*)

This presentation introduces basic frame exchange sequences for one-to-many ranging using NBA-MMS.

Questions/comments raised include details of the control/initialization/poll frame, limitation of the responders, etc.

Presentation #19:

Steve Shellhammer (Qualcomm) presented “Channel Impulse Response (CIR) Signal to Quantization Noise (SQNR) Analysis”

(*doc. # 15-23-0267-00-04ab*)

This presentation provides simulation results of the signal to quantization noise level when scaling and quantizing the CIR for the CIR Report.

Presentation #20:

Claudio Anliker (ETH Zurich) presented “More on clock-related attacks against UWB ranging”

(*doc. # 15-23-0274-00-04ab*)

This presentation introduces two security issues: Mix-Down (MD) and Stretch-and-Advance (S&A), two attacks related to device clocks of UWB transceivers.

Questions/comments raised include the details of S&A attack and frequency offset in MD attack.

Presentation #21:

Kangjin Yoon (Meta) presented “Text for UWB Discovery and Association”

(*doc. # 15-23-0174-02-04ab*)

This presentation introduces the update to draft text for device discovery and association protocol for HRP UWB devices.

Chair updated the agenda into a new version*.* No objection heard.

*(doc. # 15-23-0205-07-04ab)*

Chair recessed the mtg. @ 3:26pm ET, until Wed. PM2.

# Wednesday, 17 May, 2023 – PM2

**5:03 PM ET** Vice chair, Clint Chaplin (SRA), called the meeting to order and opened the TG Agenda.
(*15-23-0245-00-04ab*)

* >100 attendees joined the meeting

## 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 agenda *(doc. # 15-23-0205-07-04ab)* Chair proceeding with running the meeting.

Presentation #22:

Hongwon Lee (LGE) presented “Public advertisement for NBA-MMS-UWB native discovery”

(*doc. # 15-23-0249-02-04ab*)

This presentation introduces public advertisement for NBA-UWB MMS native discovery to support various use cases.

Questions/comments raised include how the initiator receives multiple messages, clarity on one-to-one ranging or one-to-many ranging, etc.

Presentation #23:

Alexander Krebs (Apple) presented “Update on NBA-UWB MMS MAC TFD”

(*doc. # 15-22-0381-03-04ab*)

This presentation introduces the updates to NBA-UWB MMS MAC technical framework document.

Chair recessed the mtg. @ 5:46pm ET, until Thu. AM1.

# Thursday, 16 Mar, 2023 – AM1

**8:01 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0245-00-04ab*)

* >90 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
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* IEEE Copyright Policy, including Code of Ethics

**TG Meeting Activity**

Using the agenda *(doc. # 15-23-0205-07-04ab)* Chair proceeding with running the meeting.

Presentation #24:

YoungWan So (Samsung) presented “Round Hopping in Hyper Block Mode”

(*doc. # 15-23-0254-01-04ab*)

This presentation introduces how to manage round hopping in Hyper block-based mode

Questions/comments raised include the available fields to indicate Hyper Block Index.

Presentation #25:

Carlos Aldana (Meta) presented “Effect of no-LBT NB on 802.11 devices”

(*doc. # 15-23-0285-00-04ab*)

This presentation provides experimental results of how no-LBT NB affects 802.11 devices and suggests to use LBT for narrow band.

Questions/comments raised include

* the definition of several parameters in the simulations, e.g., duty cycle
* all systems should coexist well, e.g., through energy detection like WLAN
* channel switching/hopping for NB in the simulation

Presentation #26:

Aniruddh Rao Kabbinale (Samsung) presented “re-purpose transmissions for sensing”

(*doc. # 15-23-0277-01-04ab*)

This presentation proposes the re-use of transmission for sensing, also provides updates to control message to enable re-use of transmissions for sensing.

Presentation #27:

Taeyoung Ha (Samsung) presented “Updates for Multiple Transmission”

(*doc. # 15-23-0236-02-04ab*) and “Multiple RSF Transmission Framework Proposal” (*doc. # 15-23-0237-01-04ab*)

This presentation provides updates for multiple RSF Transmissions in a slot scenario.

Questions/comments raised include the use cases and problems, bound of the ranging error, and synchronization requirements on receiver ability.

Chair mentioned that there will be a room for collaboration break at AM2. Several people can use this time slot for further discussion.

Chair recessed the mtg. @ 9:34am ET, until Thu. PM1.

# Thursday, 18 May, 2023 – PM1

**1:33 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0245-01-04ab*)

* >100 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
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**TG Meeting Activity**

Using the updated agenda *(doc. # 15-23-0205-08-04ab)* Chair proceeding with running the meeting.

Presentation #28:

Pooria Pakrooh (Qualcomm) presented “Latest Consensus on UWB Sensing for 802.15.4ab” (*doc. # 15-23-0284-00-04ab*) and “proposal of sensing framework” (*doc. # 15-22-0538-04-04ab*)

This presentation introduced the latest consensus among co-authors on UWB sensing topics and the corresponding text updates for 802.15.4ab.

Chair reviewed the progress of TFD updates.



Presentation #29:

Rojan Chitrakar (Huawei) presented “Block assignment in hyper block - TFD”

(*doc. # 15-23-0215-02-04ab*)

This presentation updates the details of MAC features for 4ab especially for Hyper block-based mode.

No objection to put this text document into the TFD list.

Discussions on regulatory related content in *doc. # 15-22-0381-04-04ab,* e.g., LBT in 5GHz, primary channels in 6GHz. Chair proposed to have an offline discussion to reach consensus.

There were several requests to defer the motion due to lack of time to review the details of the TFD list as in *doc. # 15-23-0245-01-04ab*.

Chair recessed the meeting to give more time for Alexander Krebs (Apple) to modify *doc. # 15-23-0381-04-04ab*.

Alexander Krebs (Apple) updated his doc into *doc. # 15-23-0381-05-04ab* based on the comments from Carlos Aldana (Meta).

Motion#3: move to forward the TFD as in page 27 to technical editor.

Move: Clint Chaplin (Samsung)

Results: passed with unanimous concert.

Editor Billy Verso (Qorvo) introduced his progress of draft writing. Chair encouraged authors to explain to Billy on how to split text. There were some discussions on the organization of draft text.

Discussions on the teleconference schedule. There were several requests to use teleconference to discuss. No objection to the updated schedule.

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

Chair adjourned the mtg. @ 2:51pm ET.