**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 | [28 Mar, 2023] | |
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| Re: | [Mar 802.15 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, 13 Mar, 2023 – PM1

**Opening**

**1:36 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.  
(*15-23-0143-01-04ab*)

* >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. No discussion heard. No one objected to approve the agenda. It was approved by unanimous consent.  
*(doc. # 15-23-0104-03-04ab)*

Chair raised the motion of minutes for Jan interim *(doc. # 15-22-0110-00-04ab)* and telecons between Jan and Mar *(doc. # 15-23-0111-00-04ab)*. No discussion heard. 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. # 15-23-0104-03-04ab)* Chair proceeding with running the meeting.

Huan-Bang Li (NICT) presented “Further discussion on NB CCA”

(*doc. # 15-23-0144-00-04ab*)

This presentation provides further explanation and discussion on NB-assisted UWB channel access.

Questions/comments raised include the encoding method, interference to WLAN, the bandwidth of LBT, CCA values for narrow band, and complexity from multicarrier transmission.

Steve Shellhammer (Qualcomm) presented “CIR Report Size”

(*doc. # 15-23-0120-00-04ab*)

This presentation calculates the maximum CIR Report size and discuss whether it makes sense to perform scaling and quantization to reduce the report size.

Questions/comments raised include complexity of CIR report especially with frequency stitching.

Steve Shellhammer (Qualcomm) presented “CIR Scaling and Quantization”

(*doc. # 15-23-0121-00-04ab*)

This presentation discusses the scheme for scaling and quantization to reduce the CIR report size.

Questions/comments raised include

* the effects of scaling and quantization to CIR in time domain
* higher accuracy and dynamic range, especially with frequency stitching

Chenchen Liu (Huawei) presented “Follow-up of length 121 Ipatov sequence”

(*doc. # 15-23-0148-00-04ab*)

This presentation compares the MSE of CIR with different sequences and the impact of MIIT’s regulations on sensing sequences.

Questions/comments raised include that

* Ipatov 91 and 121 are interference to each other
* Fair balance between benefits and complexity. Need to think more about the exact way.

Chair recessed the mtg. @ 3:16pm ET, until Mon. PM2.

# Monday, 13 Mar, 2023 – PM2

**4:05 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.  
(*15-23-0143-01-04ab*)

* >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. # 15-23-0104-03-04ab)* Chair proceeding with running the meeting.

Aniruddh Rao Kabbinale (Samsung) presented “control and scheduling information for UWB sensing”

(*doc. # 15-23-0136-01-04ab*)

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

Mingyu Lee (Samsung) presented “control and scheduling information for UWB sensing”

(*doc. # 15-23-0150-00-04ab*)

This presentation introduces the text for coordination feature in NBA-UWB-Ranging TFD.

Questions/comments raised include the reason why the responder needs to listen to AP, the concept of AP and the interval definition, etc.

Collaboration breakout: There are two rooms for breakout/ad-hoc discussions. Pooria Pakrooh (Qualcomm) requested to use one room for sensing discussion.

Chair recessed the mtg. @ 4:55pm ET, until Tue. AM1.

# Tuesday, 14 Mar, 2023 – AM1

**8:04 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.  
(*15-23-0143-01-04ab*)

* >90 attendees joined the meeting

## Legal

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

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**TG Meeting Activity**

Using the updated agenda *(doc. # 15-23-0104-04-04ab)* Chair proceeding with running the meeting.

Youngwan So (Samsung) presented “Status update on Hyper block-based mode”

(*doc. # 15-23-0155-00-04ab*)

This presentation explains changes at Hyper block-based mode contribution based on some feedback.

Lei Huang (Huawei) presented “UWB channel usage coordination for hyper block based mode”

(*doc. # 15-23-0109-00-04ab*)

This presentation proposes to enable UWB channel usage coordination for hyper-block mode.

Hongwon Lee (LG) presented “UWB Native Discovery for Ranging Session and Channel Usage Coordination”

(*doc. # 15-23-0123-01-04ab*)

This presentation discusses in-band 802.15.4 radio native discovery for Ranging Session and Channel Usage Coordination.

Steve Shellhammer (Qualcomm) presented “Importance of NBA-MMS-UWB and 802.11 Coexistence”

(*doc. # 15-23-0119-00-04ab*)

This presentation discusses the importance of coexistence between NBA-MMS-UWB and 802.11.

There were lots of questions and comments related to the simulation results and potential methods.

Chair recessed the mtg. @ 9:57am ET, until Tue. PM1.

# Tuesday, 14 Mar, 2023 – PM1

**1:33 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.  
(*15-23-0143-01-04ab*)

* >90 attendees joined the meeting

## Legal

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

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**TG Meeting Activity**

There was a request to change the agenda*.* No objection heard. The updated agenda *(doc. # 15-23-0104-07-04ab)* was approved with unanimous consent.

Using the updated agenda *(doc. # 15-23-0104-07-04ab)* Chair proceeding with running the meeting.

Boris Danev (3dB) presented “Proposed Text for NBA UWB Framework TFD - Optional RIF waveform”

(*doc. # 15-23-0166-00-04ab*)

This presentation introduces the proposed text for optional RIF waveform.

Kuan Wu (Huawei) presented “Follow up on one-to-many NBA-MMS UWB”

(*doc. # 15-23-0125-01-04ab*)

This presentation introduces the proposed text for optional RIF waveform.

Bin Qian (Huawei) presented “Support of frequency stitching based sensing and sensing by proxy”

(*doc. # 15-23-0126-01-04ab*)

This presentation introduces the necessary information for stitching and sensing in proxy mode.

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

(*doc. # 15-23-0129-00-04ab*)

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

Collaboration breakout: Carlos Aldana (Meta) and Alexander Krebs (Apple) requested to have ad hoc meetings. Based on the discussions, chair changed the agenda to r8. The updated agenda *(doc. # 15-23-0104-08-04ab)* was approved with unanimous consent.

Chair recessed the mtg. @ 2:42pm ET, until Wed. PM1.

# Wednesday, 15 Mar, 2023 – PM1

**1:33 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.  
(*15-23-0143-01-04ab*)

* >100 attendees joined the meeting

## Legal

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

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**TG Meeting Activity**

Using the agenda *(doc. # 15-23-0104-09-04ab)* Chair proceeding with running the meeting.

Kangjin Yoon (Meta) presented “Updates on UWB Discovery and Association” (*doc. # 15-23-0173-00-04ab*) and “Text for UWB Discovery and Association” (*doc. # 15-23-0174-01-04ab*)

This presentation introduces the design for UWB in-band discovery protocol.

Questions/comments raised include the details of the procedure, and discovery for device without NB.

Kangjin Yoon (Meta) presented “Text for Application Control IE”

(*doc. # 15-23-0061-01-04ab*)

This presentation introduces the updated draft text for Application Control IE.

Xiliang Luo (Apple) presented “Recommended NBA-UWB Operating Parameter Sets”

(*doc. # 15-23-0128-00-04ab*)

This presentation recommends a list of parameter sets for NBA-UWB operations and provide the underlying rationale.

Vinod Kristem (Apple) presented “Some thoughts on 4ab device categories”

(*doc. # 15-23-0177-00-04ab*)

This presentation discusses the feasibility of defining the device categories and device classes in 4ab.

Questions/comments raised include mandatory features and optional features for data devices, feature sets for various devices, a sensing device capable of data transmission, and necessity of multiple types of devices.

Discussions on the order of breakout time and presentations in PM2 today. No changes to the agenda.

Chair recessed the mtg. @ 3:21pm ET, until Wed. PM2.

# Wednesday, 15 Mar, 2023 – PM2

**1:33 PM ET** Vice chair, Clint Chaplin (SRA), called the meeting to order and opened the TG Agenda.  
(*15-23-0143-01-04ab*)

* >100 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. # 15-23-0104-09-04ab)* Chair proceeding with running the meeting.

Xiliang Luo (Apple) presented “NBA-UWB Technical Framework (for Draft0)”

(*doc. # 15-23-0100-02-04ab*)

This presentation further updates the text for NBA-UWB.

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

(*doc. # 15-22-0649-01-04ab*)

This presentation further updates the text for data communication.

Collaboration breakout: Alexander Krebs (Apple) volunteered to have an ad hoc meeting on MAC of NBA-MMS.

Vice chair Clint Chaplin (SRA) recessed the mtg. @ 4:39pm ET, until Thu. AM1.

# Thursday, 16 Mar, 2023 – AM1

**9:01 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.  
(*15-23-0143-01-04ab*)

* >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:

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

Using the agenda *(doc. # 15-23-0104-10-04ab)* Chair proceeding with running the meeting.

Alexander Krebs (Apple) presented “Discussion on MMS MAC TFD”

(*doc. # 15-23-0185-00-04ab*)

This presentation introduced the progress of MMS MAC discussions.

Frank Leong (NXP) presented “Frequency Stitching Considerations”

(*doc. # 15-23-0178-01-04ab*)

This presentation introduced detailed considerations of frequency stitching.

Questions/comments raised include the coexistence of frequency stitching sensing with other functions, e.g., ranging, upper bound of the sequence, stitching at transmitter or receiver, regulatory requirements, and sensing field to align in time domain.

There were some discussions on the progress of draft formation and further work based on Draft 0.

Chair recessed the mtg. @ 9:49am ET, until Thu. PM1.

# Thursday, 16 Mar, 2023 – PM1

**1:33 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.  
(*15-23-0143-01-04ab*)

* >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
* IEEE Anti-Trust statement
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**TG Meeting Activity**

Using the updated agenda *(doc. # 15-23-0104-10-04ab)* Chair proceeding with running the meeting.

Pooria Pakrooh (Qualcomm) presented “Latest Consensus on UWB Sensing for 802.15.4ab” (*doc. # 15-23-0079-01-04ab*) and “proposal of sensing framework” (*doc. # 15-22-0538-03-04ab*)

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

Chair requested updated reports from subgroups on hyper-block and SSBD channel access.

Chair asked for inclusion of documents (sensing, datacom, hyper block, SSBD channel access, UWB wake-up radio, NBA-MMS, Scheduling IE, Control IE, UWB discovery, AIFS, narrow band CCA…) into the draft baseline. Questions raised to list all the documents for further check. No objection heard after some further clarity.

Discussions on the teleconference schedule. No objection to the updated schedule.

Chair reviewed the schedule major milestones, which will be updated based on current progress.

Chair adjourned the mtg. @ 3:30pm ET.