**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 | [14 Jul, 2023] |
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| Re: | [Jul 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, 10 Jul, 2023 – PM1

**Opening**

**2:36 PM CET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0370-00-04ab*)

* >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.

Motion #1: Motion to approve agenda contained in document 15-23-0305-04.

* Moved by Clint Chaplin (SRA)
* Second by Clint Powell (HID)

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

Chair raised the motion of minutes for May interim *(doc. # 15-23-0319-00-04ab)* and telecons between May and Jul *(doc. # 15-23-0320-00-04ab)*. No discussion heard.

Motion #2: Motion to approve minutes contained in documents 15-23-0319-00 and 15-23-0320-00

* Moved by: David Xun Yang (Huawei)
* Second by: Clint Chaplin (SRA)

No one objected to approve the motion. It 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. # 15-23-0305-05-04ab)* Chair proceeded with running the meeting.

Presentation #1:

Alexander Krebs (Apple) presented “NBA-UWB MMS ranging text for 15.4ab TFD change proposal”

(*doc. # 15-23-0371-00-04ab*)

This presentation proposes an initial version of text document of NBA-UWB MMS ranging for 15.4ab TFD change.

Questions/comments raised include the rationale to have a new document and MessageControl values.

Chair recessed the mtg. @ 3:30pm CET, until Mon. PM2.

# Monday, 10 Jul, 2023 – PM2

**4:01 PM CET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0370-00-04ab*)

* >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
* IEEE Anti-Trust statement
* IEEE Copyright Policy, including Code of Ethics

**TG Meeting Activity**

Using the agenda *(doc. # 15-23-0305-05-04ab)* Chair proceeded with running the meeting.

Presentation #2:

Bin Qian (Huawei) presented “Considerations on channel order in frequency stitching”

(*doc. # 15-23-0332-00-04ab*)

This presentation suggests that the in-sequence channel order shall be used for frequency stitching under 25% overlap.

Questions/comments raised include the case of frequency stitching for ranging.

Presentation #3:

Bin Qian (Huawei) presented “Follow-up on CIR scaling and quantization”

(*doc. # 15-23-0331-00-04ab*)

This presentation is a follow-up discussion on SQNR performance and complexity in CIR scaling and quantization.

Questions/comments raised include the parameter settings in the simulation.

Presentation #4:

Hongwon Lee (LG) presented “Public advertisement for NBA-UWB MMS native discovery follow-up” (*doc. # 15-23-0334-00-04ab*) and “Text proposal for public addresses of NBA-UWB MMS ranging” (*doc. # 15-23-0351-00-04ab*)

This presentation discusses public addressing method for initialization setup handshake and ranging session for NBA-UWB MMS.

Questions/comments raised include the responder of random address and potential issues of IRK especially in secure ranging.

Presentation #5:

Xiliang Luo (Apple) presented “Way Forward on RIF Waveform”

(*doc. # 15-23-0327-00-04ab*)

This presentation is to help converge on the waveform for ranging integrity in 4ab.

Questions/comments raised include what should be defined in standard for RIF waveform and the related rationales.

Presentation #6:

Chenchen Liu (Huawei) presented “UWB Wake up burst modulation method”

(*doc. # 15-23-0330-00-04ab*)

This presentation introduces a new wake-up burst (WUB) modulation method, which can work well under interference.

Presentation #7:

Friedbert Berens (FBConsulting) presented “UWB in ETSI ITS”

(*doc. # 15-23-0364-00-04ab*)

This presentation provides an initial overview over the further development of the WI [“UWB in ITS”](https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=68090) in ETSI TC ITS WG2.

Chair recessed the mtg. @ 5:54pm CET, until Tue. AM1.

# Tuesday, 11 Jul, 2023 – AM1

**8:02 AM CET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0370-00-04ab*)

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

Using the updated agenda *(doc. # 15-23-0305-05-04ab)* Chair proceeded with running the meeting.

Presentation #8:

Jinjing Jiang (Apple) presented “One-to-Many Ranging using NBA-MMS Technical Framework Proposal”

(*doc. # 15-23-0363-00-04ab*)

This presentation proposes text to for One-to-Many Ranging using NBA-MMS.

Presentation #9:

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

(*doc. # 15-23-0243-03-04ab*)

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 more comparison among options like different settings in NB, UWB, Wi-Fi, etc.

Presentation #10:

Mingyu Lee (Samsung) presented “UWB based Report in NBA-MMS”

(*doc. # 15-23-0372-00-04ab*)

This presentation proposes the way to provide UWB based report in NBA-UWB.

Questions/comments raised include

* whether more data rate is allowed in the report or not
* which is better to indicate the setting, NB PHY Config or UWB PHY Config?

Presentation #11:

Lei Huang (Huawei) presented “Proposed modifications on NBA-UWB MAC text proposal”

(*doc. # 15-23-0314-00-04ab*)

This presentation proposes modifications on NBA-UWB MAC text proposal.

Presentation #12:

Rojan Chitrakar (Huawei) presented “Text proposal for 15.4ab Secure compressed PSDU”

(*doc. # 15-23-0335-00-04ab*)

This presentation proposes the text for secure compressed PSDU.

Questions/comments raised include

* The potential issues of the design, e.g., block number is unknown, changes to existing key negotiation may result in other problems, etc.
* Requirements to send back frames with the same key
* How to combine privacy design with encryption

Chair encouraged people to discuss more offline.

Chair went through the updated agenda *(doc. # 15-23-0305-06-04ab)* with added time slots and rooms for collaboration break.

Chair recessed the mtg. @ 10:02am CET, until the second half of Tue. AM2.

# Tuesday, 11 Jul, 2023 – AM2

**11:32 AM CET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0370-00-04ab*)

* >90 attendees joined the meeting

## Legal

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

* IEEE-SA patent policy
* 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 updated agenda *(doc. # 15-23-0305-06-04ab)* Chair proceed with running the meeting.

Presentation #13:

Taeyoung Ha (Samsung) presented “Summary on Multiple Transmission in a slot”

(*doc. # 15-23-0356-02-04ab*)

This presentation proposes to increase air time efficiency by allowing the multiple MMRS transmission in a slot.

Questions/comments raised include

* the detailed feasibility of multiple RSF transmissions, e.g., how to obtain CFO at the beginning, etc.
* necessity to put the design into standard
* advantage of the proposed superposition scheme

Presentation #14:

Aniruddh Rao Kabbinale (Samsung) presented “Post Processing Information Exchange for UWB Sensing”

(*doc. # 15-23-0376-01-04ab*)

This presentation discusses on enabling local processing of UWB sensing and sharing by defining post processing information request and response information elements.

Questions/comments raised include synchronization in bi-static sensing, how the values are estimated, etc.

Chair recessed the mtg. @ 12:10pm CET, until Tue. PM1.

# Tuesday, 11 Jul, 2023 – PM1

**1:30 PM CET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0370-00-04ab*)

* >90 attendees joined the meeting

## Legal

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

* IEEE-SA patent policy
* 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 updated agenda *(doc. # 15-23-0305-06-04ab)* Chair proceeded with running the meeting.

Presentation #15:

Rojan Chitrakar (Huawei) presented “Grouped responders”

(*doc. # 15-23-0337-00-04ab*)

This presentation proposes schemes to enable efficient UWB operation for grouped responders.

Questions/comments raised include challenges to decide proxy responder, use cases and the current solutions.

Presentation #16:

Rojan Chitrakar (Huawei) presented “Enabling DS-TWR with MMS Ranging”

(*doc. # 15-23-0336-00-04ab*)

This presentation proposes schemes to enable double-sided two-way ranging (DS-TWR) with MMS ranging.

Questions/comments raised include the feasibility, simplicity, and the existing narrow band assisted synchronization instead of DS-TWR.

Chair updated the agenda with taking one more presentation in advance *(doc. # 15-23-0305-07-04ab)*. No objection heard.

Presentation #17:

Chenchen Liu (Huawei) presented “Follow up on CIR Feedback Patterns”

(*doc. # 15-23-0329-00-04ab*)

This presentation further discusses mandatory CIR bitmap patterns and the signaling method.

Questions/comments raised include clarity of the saving of the design and keeping bitmap length field unchanged.

Chair reviewed the ad hoc meetings tomorrow.

Chair recessed the mtg. @ 2:49pm CET, until the second half of Thu. AM1.

# Thursday, 13 Jul, 2023 – AM1

**9:43 AM CET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*doc. # 15-23-0370-00-04ab*)

* >80 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
* IEEE Copyright Policy, including Code of Ethics

**TG Meeting Activity**

Using the updated agenda *(doc. # 15-23-0305-06-04ab)* Chair proceeded with running the meeting.

Presentation #18:

Huan-Bang Li (NICT) presented “TFD of NB CCA for assisting UWB channel access”

*(doc. # 15-23-0296-02-04ab)*

This presentation continues to propose the text for transmission of NB patterns to signal.

There were questions/concerns on how it works well.

Chair recessed the mtg. @ 10:03am CET, until Thu. AM2.

# Thursday, 13 Jul, 2023 – AM2

**10:30 AM CET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*doc. # 15-23-0370-00-04ab*)

* >80 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
* IEEE Copyright Policy, including Code of Ethics

**TG Meeting Activity**

There was a request to add one presentation. The agenda was updated (*doc. # 15-23-0305-08-04ab*). It passed with unanimous consent.

Using the updated agenda *(doc. # 15-23-0305-08-04ab)* Chair proceeded with running the meeting.

Presentation #19:

Claudio Anliker (ETH) presented “Optional Spreading Factor L=16 for Ranging Integrity Fragments (RIF)”

*(doc. # 15-23-0403-00-04ab)*

This presentation is a recap of the benefits of an additional spreading factor for 4ab RIFs.

Presentation #20:

Rojan Chitrakar (Huawei) presented “NB Coexistence”

*(doc. # 15-23-0338-01-04ab)*

This presentation proposes schemes to enhance NB Coexistence.

Questions/comments raised include available options, analysis of pros and cons.

Presentation #21:

Vinod Kristem (Apple) presented “4ab Device(s) and feature sets”

*(doc. # 15-23-0308-03-04ab)*

This presentation is to advance the discussions on 4ab devices and help converge on the feature sets.

Presentation #22:

Alexander Krebs (Apple) presented “Consensus NBA-UWB MMS MAC TFD update proposal”

*(doc. # 15-23-0412-00-04ab)*

This presentation proposes the consensus NBA-UWB MMS ranging text.

Presentation #23:

Pooria Pakrooh (Qualcomm) presented “Latest Consensus on UWB Sensing PHY and MAC”

*(doc. # 15-23-0284-01-04ab)* and “Proposal of Sensing Framework” *(doc. # 15-22-0538-05-04ab)*

This presentation introduces the latest consensus on UWB sensing.

There were further discussions on “Optional Spreading Factor L=16 for Ranging Integrity Fragments (RIF)”.

Straw Poll: Do you agree to add spreading factor L=16 as in *doc. # 15-23-0403-00-04ab* into the TFD?

Results: Y: 13, N: 17

Chair recessed the mtg. @ 12:31pm CET, until Thu. PM2.

# Thursday, 13 Jul, 2023 – PM2

**4:03 PM CET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-23-0370-00-04ab*)

* >90 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
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There was a request to add one presentation. The agenda was updated *(doc. # 15-23-0305-09-04ab).* No objection heard. It passed with unanimous consent.

**TG Meeting Activity**

Using the updated agenda *(doc. # 15-23-0305-09-04ab)* Chair proceeded with running the meeting.

Presentation #24:

Huan-Bang Li (NICT) presented “TFD of NB CCA for assisting UWB channel access”

*(doc. # 15-23-0296-02-04ab)*

This presentation continues to propose the text for transmission of NB patterns to signal with changes based on the received comments in the previous meeting.

Questions/comments raised include

* necessity of this proposal in case there is an existing solution in UNI-3 band
* coexistence issues in narrow bands, especially with legacy devices
* reliability in the case of interference
* efficiently usage of the resource
* how to determine the detection level
* how the proposed pattern is transmitted with UWB signal
* always performing CCA before sending the pattern

Chair asked the group to include the document into draft 0.

Straw Poll: do you agree to include *doc. # 15-23-0296-02-04ab* into Draft 0

Y: 6, N: 18

Chair encouraged people to further discuss through email reflector.

Vinod Kristem (Apple), Pooria Pakrooh (Qualcomm) and Alexander Krebs (Apple) briefly introduced the progress of subgroups. Alex raised the issue of requesting collaboration breakout. WG Chair Clint Powell (HID) explained how the requests and responses work, and recommended people to request as early as possible.

Mingyu Lee (Samsung) recapped his contribution “NB Assisted Data Communications” (*doc. # 15-23-0243-03-04ab*) and requested the group to accept it into Draft 0. There were some concerns on the coexistence issues.

Chair encouraged people to further discuss coexistence issues in the coming teleconferences.

Editor Billy Verso (Qorvo) introduced the latest progress of preparing draft 0, which will be put into the private area first. Voting members can use password to access and review it then.

WG Chair Clint Powell (HID) further introduced how to proceed in the letter ballot. Comments can be made on the mentor. Tools like ePoll may be used.

Chair reviewed the schedule major milestones. The first letter ballot was expected to start in November.

Chair called for a volunteer to lead coexistence assessment document. Billy Verso (Qorvo) showed his interest. Carlos Aldana (Meta) wanted to be involved, too. There were coexistence documents in the previous standard versions.

Discussions on the teleconference schedule. The teleconference was changed back to be weekly. There was a request to alternate the meeting time by adding 10pm PT to accommodate people all around. The meeting will be cancelled if there is no request by the end of preceding Friday. No objection to the updated schedule.

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

Chair adjourned the mtg. @ 5:47pm CET.