**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 Nov, 2022] |
| Source | [David Xun Yang][][Bantian, Shenzhen, China] | Voice: [+86.159.1411.7462]Fax: [--]E-mail: [david.yangxun@huawei.com] |
| Re: | [Nov 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, 14 Nov, 2022 – PM1

**Opening**

**1:35 PM ICT** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0605-02-04ab*)

* >80 attendees joined the meeting

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

Chair reminded people to join without audio or disable their device audio completely if they join the Webex in the meeting room.

## 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. After reviewing the agenda, there were some comments to update the document number. No one objected to approve the modified agenda. it was approved by unanimous consent.
*(doc. # 15-22-0541-05-04ab)*

Chair raised the motion of minutes for Sep interim *(doc. # 15-22-0533-00-04ab)* and telecons between Sep and Nov *(doc. # 15-22-0586-00-04ab)*. No one objected to approve the motion. The motion was approved by unanimous consent.

Chair emphasized the session objectives of this week.

Chair announced the rules for the mix mode meetings in this week. Chair asked every attendee to announce his name and affiliation before he speaks.

**TG Meeting Activity**

Using the agenda *(doc. # 15-22-0541-05-04ab)* Chair proceeding with running the meeting.

Youngwan So (Samsung) presented “Update on Hyper Block-based Mode”

(*doc. # 15-22-0593-00-04ab*)

This presentation updates on Hyper block-based mode for flexible slot resources usage.

There were several discussions on the details. More discussions are recommended offline in the email reflector.

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

(*doc. # 15-22-0585-00-04ab*)

This presentation extends NBA-MMS usage to one-to-many use cases.

Questions/comments raised include concept clarity and possible optimization methods.

Kuan Wu (Huawei) presented “Improvements on scheduling IE design in 802.15.4ab”

(*doc. # 15-22-0568-01-04ab*)

This presentation proposes to mitigate the flexibility and message redundancy drawbacks in current scheduling IE design.

Bin Qian (Huawei) presented “Time domain mask for pulse shape in 802.15.4ab”

(*doc. # 15-22-0588-00-04ab*)

This presentation discusses the time domain mask for sensing pulse shape.

Questions/comments raised include symmetric or asymmetric mask, and how to have the exact number.

Chair asked if there was anybody wanting to circle back. No response heard.

Chair asked if anyone wanted to use the remaining time to discuss. No response heard.

Chair recessed the mtg. @ 3:04pm ICT, until Mon. PM2.

# Monday, 14 Nov, 2022 – PM2

**4:00 PM ICT** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0605-02-04ab*)

* >80 attendees joined the meeting

## Legal

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**TG Meeting Activity**

Using the agenda *(doc. # 15-22-0541-05-04ab)* Chair proceeding with running the meeting.

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

(*doc. # 15-22-0604-00-04ab*)

This presentation proposes an efficient MAC control signal format suitable for a baseline feature set supported by low-rate O-QPSK narrowband PHYs.

Questions/comments raised include security, new PHY, and future extension.

Håkon A. Hjortland (Novelda AS) presented “Pulse Burst Sensing - Phase Noise Proof Supercomplementary Set of Sequences”

(*doc. # 15-22-0592-00-04ab*)

This presentation proposes pulse burst sensing to fix the problem of extra noisy regions every PRI in the CIR resulted by high-PRF bistatic sensing.

There were several discussions on the feasibility and simulation settings. More discussions are recommended offline or to circle back later.

Jan Roar Pleym (Novelda AS) presented “Sensing Sequence Metrics”

(*doc. # 15-22-0602-00-04ab*)

This presentation discusses the metric for sensing sequence in 4ab.

Questions/comments raised include new sequences and simulation results.

Peng Liu (Huawei) presented “Spectrum Sensing Based Deferral Evaluation and Enhancement”

(*doc. # 15-22-0606-00-04ab*)

This presentation proposes a method to enhanced channel access to reduce latency and perform better performance in hidden node scenarios.

Questions/comments raised include CDF of latency, model of arrival, etc.

Chair circled back the questions/comments related to *doc. # 15-22-0592-00-04ab*. The questions/comments include simulation settings and results, performance of pulse bursts with phase shift, etc.

Chair recessed the mtg. @ 6:00pm ICT, until Tue. AM1.

# Tuesday, 15 Nov, 2022 – AM1

**8:07 AM ICT** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0605-02-04ab*)

* >80 attendees joined the meeting

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**TG Meeting Activity**

Chair updated the agenda to r7 based on the requests. No objection heard.

*(doc. # 15-22-0541-07-04ab)*

Using the updated agenda *(doc. # 15-22-0605-07-04ab)* Chair proceeding with running the meeting.

Carlos Aldana (Meta) presented “Advanced Coding for Data Communications in 802.15.4ab”

(*doc. # 15-22-0506-04-04ab*)

This presentation further discusses the performance of LDPC, joint design with PHR repetition, and the length selection of LDPC codes.

Questions/comments raised include coding gain in the simulations of independent design and the performance gap between PHR and data part.

Alexander Krebs (Apple) presented “Header IE Extension”

(*doc. # 15-22-0608-01-04ab*)

This presentation proposes an efficient MAC control signal format suitable for a baseline feature set supported by low-rate O-QPSK narrowband PHYs.

Questions/comments raised include the influence to link budget, criteria of message selection, etc.

Pooria Pakrooh (Qualcomm) presented “Narrow Band Channel Hopping for NB-Assisted UWB”

(*doc. # 15-22-0609-00-04ab*)

This presentation proposes an efficient NB channel hopping in NB-assisted UWB.

Questions/comments raised include the case of missing ack frame, details of the state machine and channel selection, etc.

Steve Shellhammer (Qualcomm) presented “Channels for Frequency Stitching”

(*doc. # 15-22-0574-00-04ab*)

This presentation proposes channels for Frequency Stitching in RF Sensing.

Questions/comments raised include stitching in non-adjacent channels, etc.

Chair suggested people with 4z experience to attend AM2 discussions.

Chair suggested presenters to share documents through telecon link in advance in PM2 session, especially in case that the sharing problem is not solved.

Chair recessed the mtg. @ 9:59am ICT, until Tue. PM2.

# Tuesday, 15 Nov, 2022 – PM2

**4:00 PM ICT** Vice Chair, Clint Chaplin (Samsung), called the meeting to order and opened the TG Agenda.
(*15-22-0605-02-04ab*)

* >80 attendees joined the meeting

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**TG Meeting Activity**

Using the updated agenda *(doc. # 15-22-0541-07-04ab)* vice chair Clint Chaplin proceeding with running the meeting.

Lochan Verma (Apple) presented “Follow-up on UWB Channel Usage Coordination”

(*doc. # 15-22-0573-01-04ab*)

This presentation introduces further details on UWB channel usage coordination for better UWB coexistence.

Questions/comments raised include details of AP MAC payload, procedure of UWB RAN coordination, and the target scenario and influence.

Tayoung Ha (Samsung) presented “Updates for the Multiple Transmissions in a Ranging Slot”

(*doc. # 15-22-0572-01-04ab*)

This presentation provides updates of multiple transmissions in a ranging slot scenario.

Vice Chair Clint Powell (Meta) encouraged people to discuss on considerations of coexistence. There were discussions on the viewpoints on coexistence between 802.15.4ab and 802.11.

Chair recessed the mtg. @ 6:00pm ICT, until Wed. AM1.

# Wednesday, 16 Nov, 2022 – AM1

**10:02 AM ICT** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0605-02-04ab*)

* >80 attendees joined the meeting

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**TG Meeting Activity**

Chair updated the agenda to r8 based on the requests. No objection heard.

*(doc. # 15-22-0541-08-04ab)*

Using the updated agenda *(doc. # 15-22-0541-08-04ab)* Chair proceeding with running the meeting.

Chair announced the second half of PM2 session today is at the 3rd floor.

Igor Dotlic (Qorvo) presented “SCZ Code Blocks: A Good Candidate for the Sensing Sequences in 4ab”

(*doc. # 15-22-0632-00-04ab*)

This presentation compares performances of the SZC code blocks and Ipatov codes under conditions of ADC clipping. The peak cross-correlation performance is also compared.

Questions/comments raised include CFO, quantization setting and sidelobes in the simulations and complexity issues.

Aniruddh Rao Kabbinale (Samsung) presented “Co-scheduling Ranging and Sensing - continued”

(*doc. # 15-22-0613-00-04ab*)

This presentation continues the discussion for scheduling ranging and sensing together.

Questions/comments on *doc. # 15-22-0632-00-04ab* were circled back. Normalization and quantization were further discussed.

Chair recessed the mtg. @ 9:55am ICT, until Wed. PM2.

# Wednesday, 16 Nov, 2022 – PM2

**4:04 PM ICT** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0605-02-04ab*)

* >80 attendees joined the meeting

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**TG Meeting Activity**

Using the updated agenda *(doc. # 15-22-0541-08-04ab)* Chair proceeding with running the meeting.

Xiliang Luo (Apple) presented “RSF and MMRS in Multi-Millisecond UWB”

(*doc. # 15-22-0632-00-04ab*)

This presentation is a joint contribution on ranging sequences for MMS UWB.

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

(*doc. # 15-22-0514-02-04ab*)

This presentation proposes optional PHY layer parameters aimed at non-coherent data comms while ensuring orthogonality with secure ranging applications. Coexistence with legacy devices is considered in this proposal.

Questions/comments raised include the interreference resulted by channel plan, etc.

Vice Chair Clint Powell (Meta) shared the summarized talking points yesterday.

(*doc. # 15-22-0647-00-04ab*)

Chair recessed the mtg. @ 4:55pm ICT. The formal discussions on coexistence were moved to 802.11 COEX SC.

# Thursday, 17 Nov, 2022 – AM1

**8:10 AM ICT** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0605-02-04ab*)

* >80 attendees joined the meeting

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

## Legal

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**TG Meeting Activity**

Using the updated agenda *(doc. # 15-22-0541-08-04ab)* Chair proceeding with running the meeting.

Kangjin Yoon (Meta) presented “Inter Frame Spacing Follow Up”

(*doc. # 15-22-0645-00-04ab*)

This presentation is a joint contribution on AIFS definition.

Questions/comments raised include the basis of the proposed value, the impact to throughput and reasons of multiple options.

Kangjin Yoon (Meta) presented “UWB In-band Discovery”

(*doc. # 15-22-0646-00-04ab*)

This presentation proposes to have the UWB in-band discovery protocol.

Questions/comments raised include more generic discovery design for many other cases, etc.

Pooria Pakrooh (Qualcomm) presented “Consensus on UWB Sensing for 802.15.4ab”

(*doc. # 15-22-0650-02-04ab*)

This presentation introduced the current progress of consensus on UWB sensing.

Questions/comments raised include the details of pulse bursts and pulse pattern, related scenarios and sampling rates.

Boris Danev (3dB) presented “Recap and New Considerations on NBA MMS Ranging Integrity Fragments”

(*doc. # 15-22-0651-00-04ab*)

This presentation further discusses considerations on ranging integrity.

Questions/comments raised include design for HRP, combination methods RSF and RIF, non-ideal settings in the simulation results and number of RSFs and RIFs.

Chair recessed the mtg. @ 10:08am ICT, until Thu. AM2.

# Thursday, 17 Nov, 2022 – AM2

**10:35 AM ICT** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0605-02-04ab*)

* >80 attendees joined the meeting

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

## Legal

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**TG Meeting Activity**

Using the updated agenda *(doc. # 15-22-0541-09-04ab)* Chair proceeding with running the meeting.

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

(*doc. # 15-22-649-00-04ab*)

This document is a joint proposal of UWB PHY design for higher data rate.

Peng Liu and Kuan Wu (Huawei) presented “Further thoughts on the MAC of the NBA-MMS UWB”.

(*doc. # 15-22-659-01-04ab*)

This document discusses the information element for AFH in NB, fragment number and time hopping in UWB.

Questions/comments raised include coexistence analysis with other systems, and clarity of the details of time hopping.

Chenchen Liu (Huawei) presented “Interference analysis of initial synchronization sequence”.

(*doc. # 15-22-659-01-04ab*)

This presentation provides interference analysis of initial synchronization sequence.

Questions/comments raised include rejection target, sequence details for length 121, and simulation details.

Chair amended the agenda by moving Billy Verso’s presentations to this session. No objection heard. It passed unanimously.

(*doc. # 15-22-0541-10-04ab*)

Billy Verso (Qorvo) presented “An updated PHY Header Proposal”

(*doc. # 15-22-653-00-04ab*)

This presentation promotes further discussion and convergence on the content for the IEEE 802.15.4ab amendment.

Questions/comments raised include details of PHR1 design.

Billy Verso (Qorvo) presented “Draft text for UWB wake-up radio”

(*doc. # 15-22-654-00-04ab*)

This presentation specifies the new text and amendments necessary to IEEE Std 802.15.4, to incorporate the UWB wake-up radio functionality as proposed by contribution 15-21-0557-00-04ab.

Questions/comments raised include low power at the receiver, false alarm on waking up, and link budget issues.

Chair recessed the mtg. @ 12:13pm ICT, until Thu. PM1.

# Thursday, 17 Nov, 2022 – PM1

**1:36 PM ICT** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0605-02-04ab*)

* >80 attendees joined the meeting

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

## Legal

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**TG Meeting Activity**

Using the updated agenda *(doc. # 15-22-0541-09-04ab)* Chair proceeding with running the meeting.

Wei Lin (Huawei) presented “Code Length Selection of 11n Based LDPC Codes for 15.4ab”.

(*doc. # 15-22-660-00-04ab*)

This presentation proposes to follow the LDPC code length selection logic of 11n/ac and introduces the details.

Xiliang Luo (Apple) presented “NBA-UWB Technical Framework Proposal”.

(*doc. # 15-22-571-00-04ab*)

This presentation introduces the recent updates to NBA-UWB document.

Chair asked if there is anybody wanting to circle back the previous discussions. No response heard.

Chair encouraged people to converge through all the possible ways. Chair proposes to have several sessions focusing on text draft in Jan meeting next year.

Discussions on the teleconference schedule. People preferred to fix the date of teleconferences and keep them at 6am PT. People also preferred to have bi-weekly meetings with 1.5 hours instead of 1-hour weekly meeting. No objection to the updated schedule.

Discussions on the formulation of the initial draft.

Chair adjourned the mtg. @ 2:48pm ICT.