**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 | [11 Jul, 2022] |
| Source | [David Xun Yang][][Bantian, Shenzhen, China] | Voice: [+86.159.1411.7462]Fax: [--]E-mail: [david.yangxun@huawei.com] |
| Re: | [July 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, 11 Jul, 2022 – PM1

**Opening**

**1:32 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0359-01-04ab*)

* >60 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 from inside 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, no one objected to approve the modified agenda. it was approved by unanimous consent.
*(doc. # 15-22-0328-04-04ab)*

Chair raised the motion of minutes for May Interim *(doc. # 15-22-0326-00-04ab)* and telecons between May and Jul *(doc. # 15-22-0368-00-04ab)*. No one objected to approve the motion. The motion was approved by unanimous consent.

Chair announced the rules for the mix mode meetings in this week.

Chair asked every attendee to come to mic and announce his name and affiliation before he speaks.

Chair reviewed the timeline and milestones and encourage people to converge on topics. Chair reviewed his plan for telecons after Jul plenary. Chair reminded that the baseline text will be reviewed on Jul 26.

**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0328-04-04ab)* Chair proceeding with running the meeting.

Kangjin Yoon (Meta) presented “HRP PHY Inter frame spacing”

*(doc. # 15-22-0369-00-04ab)*

This presentation discusses on IFS values for 4ab.

Questions/comments raised include deferring Strawpoll, value of LIFS on BPRF, etc.

Strawpoll was deferred to conference calls.

Igor Dotlic (Qorvo) presented “More on Supercomplementary Zero-sum Cross-correlation Code Blocks”

*(doc. # 15-22-0380-00-04ab)*

This presentation introduces super complementary zero-sum cross-correlation (SZC) code blocks and describes their properties and benefits for usage as a deterministic STS field.

Questions/comments raised include correlation of Ipatov with CFO.

Jarek Niewczas (Qorvo) presented “High-speed data-rates for impulse ultra-wideband radio”

*(doc. # 15-22-0373-00-04ab)*

This presentation introduced pulse hopping for high speed data rates.

Questions/comments include the probability of bad delays, channel estimation settings, receiver scheme, hopping pattern and more channel models.

Shang-Te Yang (Apple) presented “UWB Interference Considerations”.

*(doc. # 15-22-0372-00-04ab)*

This presentation discusses the interference between RANs by using an example and proposed to further study interference.

Chair recessed the mtg. @ 3:29pm ET, until Mon. PM2.

# Monday, 11 Jul, 2022 – PM2

**4:01 PM ET** Vice Chair, Clint Chaplin (Samsung), called the meeting to order and opened the TG Agenda.
(*15-22-0359-01-04ab*)

* >52 attendees joined the meeting

Vice Chair Clint Chaplin (Samsung) reminded the group of registration for 802 LMSC and wireless interim.

## Legal

Vice Chair Clint Chaplin (Samsung) reminded the group of the following from the 802.15 opening meeting:

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**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0328-04-04ab)* Chair proceeding with running the meeting.

Claudio da Silva (Meta) presented “4ab Channelization Discussion”

(*doc. # 15-22-0330-00-04ab*)

This presentation discusses the validity of defining additional channels to take advantage of a potential extension of the UWB band in certain regulatory domains.

Mingyu Lee (Samsung) presented “Coexistence with Wi-Fi by using Narrowband Mirroring Channel”

(*doc. # 15-22-0358-00-04ab*)

This presentation explains the necessity of collision avoidance between UWB and Wi-Fi, and proposes the considerations for the band of NB mirroring channel.

Questions/comments raised include:

* both Wi-Fi and UWB have to decode packets in NB channel
* multiple antennas supporting
* mirroring channel is preferred to be fixed

Alexander Krebs (Apple) presented “Narrowband Channel Allocation for NBA-MMS-UWB”

(*doc. # 15-22-0339-01-04ab*)

This presentation discusses rationale and simulation results for optimized spectral efficiency of narrowband O-QPSK PHY radio 2.5 MHz channel grid allocation in UNII-3 and UNII-5 bands and coexistence aspects of 802.11 radio.

Questions/comments raised include existing analysis on channelization, benefits of narrower channels, spectral shaping of OQPSK, necessity of this number of narrow band channels, etc.

Alexander Krebs (Apple) presented “Narrowband Channel Access and Interference Mitigation for NBA-MMS-UWB”

(*doc. # 15-22-0340-01-04ab*)

This presentation proposes methods for signaling of coordinated NB access between NBA-MMS-UWB initiator and responder, frequency diversity achieving methods in coexistence with 802.11 radio, and proposal of LBT access methods for regulatory compliance.

Questions/comments raised include details of NB channel switching, LBT for the response, duration of narrow band, etc.

Vice chair Clint Chaplin (Samsung) recessed the mtg. @ 5:43pm ET, until Tue. AM1.

# Tuesday, 12 Jul, 2022 – AM1

**8:02 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0359-01-04ab*)

* >60 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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**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0328-06-04ab)* Chair proceeding with running the meeting.

Huan-Bang Li (NICT) presented “NB-assisted UWB channel access follow-up”

(*doc. # 15-22-0383-00-04ab*)

This presentation clarifies some concerns on NB-assisted UWB channel access.

Rani Keren (Huawei) presented “On the selection of number of fragments in MMS-UWB”

(*doc. # 15-22-0378-00-04ab*)

This presentation discusses various approaches for managing number of fragments selection in MMS-UWB.

Zhenzhen Ye (Redpoint) presented “Status on Downlink TDOA (DL-TDOA) Location Service Proposals in 802.15”

(*doc. # 15-22-0385-00-04ab*)

This presentation uses a superframe to unify different location service designs introduced some progress on new data rates and coding.

Wei Lin (Huawei) presented “Preliminary Discussion on Possible LDPC Codes for 15.4ab”

(*doc. # 15-22-0391-01-04ab*)

This presentation proposes a raptor-like LDPC code and shows it performance gain over 11n LDPC.

Chair recessed the mtg. @ 9:34am ET, until Tue. PM2.

# Tuesday, 12 Jul, 2022 – PM2

**4:00 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0359-01-04ab*)

* >50 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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**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0328-07-04ab)* Chair proceeding with running the meeting.

Youngwan So (Samsung) presented “Flexible block structure”

(*doc. # 15-22-0357-01-04ab*)

This presentation introduces flexible block structure for efficient slots resource usage and for accommodation of various 4ab applications.

Questions/comments raised include use cases of hyper block structure, intention of these two different ways, and comparison between these two options.

Youngwan So (Samsung) presented “Text Proposal for Multiple Transmissions in A Ranging Slot”

(*doc. # 15-22-0356-00-04ab*)

This presentation provides details of multiple transmission feature in a ranging slot.

Mingyu Lee (Samsung) presented “Narrow Band Mirroring channels”

(*doc. # 15-22-0386-00-04ab*)

This presentation provides details of MAC features for NB assisted UWB - NB mirroring channels feature.

Questions/comments raised include whether NB is mandatory or not, necessity of this feature for narrow band assisted device, etc.

Pooria Pakrooh (Qualcomm) presented “Discussion on preamble sequence options for detection and channel estimation”

(*doc. # 15-22-0390-00-04ab*)

This presentation compares auto-correlation and cross-correlation of Golay, M and Ipatov sequences for packet detection and channel estimation.

Questions/comments raised include:

* Consideration of receiver processing complexity, non-coherent detection, interference source
* Both packet detection and channel estimation are considered
* How many sequences do we need
* Details of sequence lengths for comparison

Chair recessed the mtg. @ 5:31pm ET, until Wed. PM1.

# Wednesday, 13 Jul, 2022 – PM2

**4:04 PM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0359-01-04ab*)

* >63 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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**TG Meeting Activity**

Chair asked if there is any comment to the updated agenda. No objection heard.

*(doc. # 15-22-0328-08-04ab)*

Using the modified agenda *(doc. # 15-22-0328-08-04ab)* Chair proceeding with running the meeting.

Chenchen Liu (Huawei) presented “Considerations on sequences in 4ab”

(*doc. # 15-22-0400-00-04ab*)

This presentation compares the performance of multiple sequences for preamble, STS and spreading sequence in payload.

Questions/comments raised include:

* Payload: the bits per symbol for the payload, should be considered with channel code and constellation together
* Preamble sequence: simulation settings, gap analysis, and comparison with M-sequence, etc.

Xiliang Luo (Apple) presented “Way Forward on Preamble Sequences beyond 4z Ipatov”

(*doc. # 15-22-0405-02-04ab*)

This presentation proposes a preamble sequence construction scheme for ranging beyond 4z.

Questions/comments raised include selection of sequence, criteria for sequences, and the number of sequences we need to have.

Frederic Nabki (Spark Microsystems) presented “Non-coherent HRP Option for data communication - channel plan and experiment”

(*doc. # 15-22-0409-01-04ab*)

This presentation proposes optional non-coherent PHY that can complement current HRP PHY, supporting low power operation for data communication applications.

Questions/comments raised include non-coherent scheme, new proposed channel plan with overlapping and its influence to preamble sequences, latency, LBT details, and frequency hopping to avoid interference from Wi-Fi signals.

Chair recessed the mtg. @ 5:49pm ET, until Thu. AM1.

# Thursday, 14 Jul, 2022 – AM1

**8:02 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0359-01-04ab*)

* >58 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 modified agenda *(doc. # 15-22-0328-09-04ab)* Chair proceeding with running the meeting.

Carlos Aldana (Meta) presented “New Data Rates and Coding”

(*doc. # 15-22-0362-00-04ab*)

This presentation introduced some progress on new data rates and coding.

Libra Xiao (NRT) presented “A Wake Up Radio Scheme for UWB”

(*doc. # 15-22-0421-00-04ab*)

This presentation introduced some progress on new data rates and coding.

Questions/comments raised include details of receiving process.

David Barras (3dB) presented “Performance analysis of ranging integrity fragment (RIF) with distance commitment”

(*doc. # 15-22-0413-00-04ab*)

This presentation introduces the concept of distance commitment for ranging integrity checks.

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

(*doc. # 15-22-0404-01-04ab*)

This presentation introduces scheduling ranging and sensing together.

Chair recessed the mtg. @ 9:34am ET, until Thu. AM2.

# Thursday, 14 Jul, 2022 – AM2

**8:02 AM ET** Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda.
(*15-22-0359-01-04ab*)

* >58 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 modified agenda *(doc. # 15-22-0328-09-04ab)* Chair proceeding with running the meeting.

Yong Liu (Apple) presented “NBA-MMS-UWB ranging text proposal for 15.4ab TFD”

(*doc. # 15-22-0381-00-04ab*)

This presentation proposed the initial text for details of NBA-MMS-UWB ranging which include the related contributions.

Xiliang Luo (Apple) presented “More on Mixed MMS for Ranging Integrity”

(*doc. # 15-22-0392-00-04ab*)

This presentation provides more details regarding the mixed MMS format for secure ranging.

Xiliang Luo (Apple) presented “NBA-UWB Technical Framework Proposal (2022-July)”

(*doc. # 15-22-0341-01-04ab*)

This presentation provides several updates to the NBA-UWB technical framework, which does not exclude different opinions.

Claudio Anliker (ETH) presented “NBA-MMS UWB - Security Considerations”

(*doc. # 15-22-0410-00-04ab*)

This presentation discusses security implications of the NBA-MMS UWB proposal.

Chair recessed the mtg. @ 12:26pm ET, until Thu. PM1.

# Thursday, 14 July 2022 – PM1

**Opening**

**1:34 PM** ET Chair, Ben Rolfe (Blind Creek Associates), called the meeting to order and opened the TG Agenda

(*15-22-0359-01-04ab*)

* ~60 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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**TG Meeting Activity**

Using the modified agenda *(doc. # 15-22-0328-09-04ab)* Chair proceeding with running the meeting.

Frank Leung (NXP) presented “UWB Sensing - Scheduling”
*(doc. #* [*15-22-0422-00-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=181&is_year=2022)*)*This presentation provides the concept of scheduling procedure and information for UWB sensing.

Questions/comments raised include interference of overlapping channel, sensing control IE, sensing fragments, phase between channels, control message overhead, and range of sensing.

Xiaohui Peng (Huawei) presented “Sensing pulse shape consideration in 802.15.4ab”
*(doc. #* [*15-22-0418-00-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=181&is_year=2022)*)*This presentation proposed the pulse shape for sensing.

Questions/comments raised include definition of spectral efficiency, root mean square bandwidth, etc.

Bin Qian (Huawei) presented “NB considerations for NBA-MMS UWB”
*(doc. #* [*15-22-0420-00-04ab*](https://mentor.ieee.org/802.15/documents?is_dcn=181&is_year=2022)*)*This presentation discusses the symbol-to-chip mapping and frequency hopping of narrow band design.

Questions/comments raised include diversity gain of frequency hopping, link budget of narrow band may be good enough, and comparison between AES and traditional hopping seed.

Editor Billy Verso (Qorvo) introduced his thoughts on the convergence of each topic area.

Chair reviewed the project schedule. Chair further introduced his idea on the technical framework text.

Chair reminded people to take attendance.

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

Chair adjourned the mtg. @ 3:12pm ET.