IEEE P802.15

**Wireless Personal Area Networks**

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| Project | Task Group 15.6ma |
| Title | **TG15.6ma Meeting Minutes for January 2024**  |
| Date Submitted | January 18th , 2024 |
| Source | [Ryuji Kohno1,2 Marco Hernandez1 Takumi Kobayashi1,3 Minsoo Kim1, Daisuke Anzai3 [1; YRP-IAI (YRP International Alliance Institute), Japan, 2; YNU (Yokohama National University), Japan, 3; NiTech(Nagoya Institute of Technology)] | Voice: +81 90 5408 0611E-mail: kohno@ynu.ac.jp marco.hernandez@ieee.org kobayashi-takumi@yrp-iai.jp minsoo@minsookim.com anzai@nitech.ac.jp |
| Re: | Meeting Minutes |
| Abstract | Since PAR and CSD of SG15.6ma as amendment of existing IEEE802.15.6-2012 for WBAN with enhanced dependability was approved by NesCom in January, Task Group TG15.6ma has been drafting technical requirement in cases of WBAN for medical use case for human body(HBAN) and for automotive use case for vehicle body(VBAN) with their connected use cases. In January meeting, to summarize technical requirement TG15.6ma has reviewed focused uses cases necessary for enhanced dependability in which channel propagation and environment of HBAN and VBAN with their mixed use can be categorized and modeled. Particularly to perform enhanced dependability in dense environment coexisting multiple overlaid BANs and different UWB and narrow band WPAN, WSN, WLAN etc. necessary technical requirement has been summarized in PHY and MAC layers. Possible solutions to ensure enhanced dependability in PHY and MAC have been presented and discussed. Latest status of ETSI Smart BAN standard has been presented to find a way to make interoperability with IEEE802.15.6 and 6ma. To harmonize activities of TG15.6ma, 15.4ab using UWB PHY, TRD and technical guidance document(TGD) have been reviewed in the sessions.  |
| Purpose | Minutes of Dependability Electronic Interim Session on Webex, January 2024. |
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**TG15.6ma 1st Session**

**Monday, January 15th, 2024, 10:30 AM- 12:30 PM Local Panama Time**

**Ocean II in Floor M, Hilton Panama, Panama City, with Webex Virtual Room #2**

* 1. Meeting called to order 10:35 AM

By Chair Ryuji Kohno (YNU / YRP-IAI)

* 1. Roll Call *Ryuji Kohno*

Announcement to attendance by using IEEE Attendance Tool (IEEE IMAT).

Registration information.

By Chair Ryuji Kohno

* 1. Opening Report *Ryuji Kohno (YNU / YRP-IAI)* doc.# 802.15- 23-638-01-06a

Chair showed IEEE Patent policy.

Chair issued Call for Potentially Essential Patents.

Þ No essential intellectual property in the scope of TG6a was declared.

Chair presented agenda of this meeting doc.# 802.15- 23-0636-04-06a

Þ Approved.

* 1. Approval of previous meeting minutes *Takumi Kobayashi (YNU / YRP-IAI)*

Þ Upon no comments on the July meeting minutes, doc. #15-23-0608-00-06a was approved.

**[Review]**

* 1. Basic Consensus in MAC and PHY of Revision of IEEE802.15.6-2012 (IEEE802.15.6ma), *Ryuji Kohno* (YRP-IAI/YNU), doc.#23-0557-01-06a
		+ Classes 0,1, and 2 are most focused to manage contention in MAC while other classes are taken care by mitigation of interference in PHY and then managed in MAC for classes 0,1, and 2.
		+ Ranging between coordinators of coexisting BANs is unique in this revision and may be useful to recognize how close, incoming, and outgoing each other and to identify coexisting class state transition as well.
		+ Other key consensus is discussed.
	2. MAC superframe structure for coexisting multiple dependable BANs, *Marco Hernandez, Seong-Soon Joo,* doc.# 24-0013-00.
		+ Discussed on random or regular beacon frame and duration in management IE in which superframe length, NAP, CAP, CFP information are included etc.
	3. MAC frame formats based on harmonization agreements, *Marco Hernandez,* (YRP-IAI), doc.# 24-0034-00
		+ MAC frame commonality between modes 1 and 2 etc.
	4. TG6ma draft action items (Progress and Action Items for drafft#1.11), *Marco Hernandez,* (YRP-IAI), doc.# 23-0360-03.
		+ Remained uncompleted issues have been listed out and a way to complete them has been discussed.
	5. TG6ma Timeline (Rescheduling Timeline), *Marco Hernandez,* (YRP-IAI), doc.# 23-0361-03.
		+ draft#1 may be completed before March meeting and WG motion in March meeting for letter ballot. In expecting practical timeline, RevCom will be completed by next June.
	6. Discussion
		+ We can refer some discussions on 15.4ab from the viewpoint of our TG6ma inter-operability with them. (*Ryuji Kohno*)
	7. Report of joint works with 802.1, (*Marco Hernandez, Ryuji Kohno*), PAR doc.#23-0454-01, CSD doc.#23-0453-01.
		+ It may be explained in detail at 2nd session next day.
	8. Recessed at 12:25 PM by chair, *Ryuji Kohno*

**Attendees list**

Attendees 8

***Name Affiliation***

* Daisuke Anzai Nagoya Institute of Technology(Nitech)
* Iwao Hosako NICT
* Kamran Sayrafian NIST
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Menghuan Yang SKL-SatNav
* Ryuji Kohno YNU/YRP-IAI
* Takumi Kobayashi Nitech/YRP-IAI

**TG15.6ma 2nd Session**

**Tuesday, January 16th, 2024, 8:00 AM- 10:00 AM Local Panama Time**

**Ocean II in Floor M, Hilton Panama, Panama City, with Webex Virtual Room #2**

* 1. Meeting called to order 8:00 AM

By Chair Ryuji Kohno (YNU / YRP-IAI)

* 1. Roll Call *Ryuji Kohno*Announcement to attendance by using IEEE Attendance Tool (IEEE IMAT).
	Registration Information, By Chair *Ryuji Kohno*
	2. 802 Mtg. Non-Registration Consequences, by Chair *Ryuji Kohno*
	3. Confirmation of Agenda, doc.#23-0636-07-06ma, *Ryuji Kohno*
	4. MAC superframe structure for coexisting multiple dependable BANs, *Marco Hernandez, Seong-Soon Joo,* doc.#23-0476-12
		+ Continue to work with Dr Seong-Soon Joo. (*Marco Hernandez*)
	5. Comment-Resolution Database for Pre-Ballot WG, *Marco Hernandez,* doc.#15-23-467-12
		+ CID.57: Accepted in principle.
		+ CID.58: Reject. As revision.
			- He may misunderstand that the TG6ma is for revision however this task group is for revision. We have already omitted the other of UWB-PHY such as NB-PHY and HBC. (*Ryuji Kohno*)
		+ CID 59: Accepted in principle.
			- HRP UWB-PHY is mandatory, and legacy UWB-PHY is optional. (*Ryuji Kohno*)
		+ CID 60: Accepted in principle.
			- HRP-MAC is mandatory for HRP-UWB-PHY. Legacy MAC is for legacy PHY as optional. (*Marco Hernandez*)
			- New MAC is mandatory on new HRP UWB PHY, and legacy MAC is optional for legacy UWB PHY.
		+ CID 61: Accepted in principle.
			- Details will be provided. (*Marco Hernandez*)
		+ CID 62: Accepted in principle.
			- Details will be provided. Choosing BCC or LDPC is decide after association.
		+ CID 63: Accepted in principle.
			- Discuss the pulse shape for interference mitigation.
		+ CID 64: Accepted in principle. Details will be provided.
		+ CID 65: Accepted in principle. Details will be provided.
		+ CID 66: Accepted in principle. Details will be provided.
		+ CID 67: Accepted in principle. Delete 9.1.16.
			- 10.1 Inter-coordinator ranging description will be added. (*Ryuji Kohno*)
		+ CID 68: Accepted in principle. Make new figure 1.
		+ CID 69: Accepted in principle. Make new figure 1.
		+ CID 70: Accepted in principle. Make new figure 96.
		+ CID 71: Accepted in principle.
		+ CID 72: Accepted in principle. Delete BAP.
		+ CID 73: Accepted in principle. Add subclause title.
		+ CID 74 Accepted in principle. Add subclause title.
		+ CID 75: Accepted in principle. Rephrase the mandatory items and check QoS to 3.
		+ CID 76: Accepted. Delete 9.1.16.
		+ CID 77: Accepted in principle.
			- Ranging is in data channel. Check 3.6.7.
		+ CID 78: Accepted in principle. Check labels figures numbering.
		+ Database will be upload to Mentor as rev.13.

**[MAC & Ranging]**

* 1. Simulation results for Nagoya I. T. and YRP-IAI MAC proposal Based on TG6ma Channel Model, *Daisuke Anzai*, doc.#15-23-0352-03-006a
		+ In p.6, are 3 BANs collocated in equal distance? (*Ryuji Kohno*)
			- Yes, these are. (*Daisuke Anzai*)
		+ If one of them is in closer than the others, what will be happened? (*Ryuji Kohno*)
		+ What are three circles meaning? (*Ryuji Kohno*)
			- Circles meaning simplified human body. (*Daisuke Anzai*)
			- If *d* is increased, interference is decreases. (*Daisuke Anzai*)
		+ If *d* is much smaller, then performance degradation is not ignorable. (*Ryuji Kohno*)
			- We try to evaluate the performance against different *d.* (*Daisuke Anzai*)
	2. Preliminary Evaluation on Ranging Accuracy with Interference Cancellation in Coexistence Environments, *Daisuke Anzai*, doc.#15-24-0057-00-006a
		+ Two channel models are different path loss? (*Ryuji Kohno*)
			- Different path loss and PDP models have been applied. (*Daisuke Anzai*)
		+ How long M-sequence is used? (*Ryuji Kohno*)
			- Code length is 31 in our simulation. (*Daisuke Anzai*)
		+ This is 6ma ranging using sequences to achieve higher dependability. (*Ryuji Kohno*)
		+ Distance between humans or vehicles?
			- In bus simulation distance is between two BAN nodes on human bodies. (*Daisuke Anzai*)
			- Need to clarify and concrete application to clarify the applications of BAN ranging. (*Kamran Sayrafian*)
	3. ~~Discussion on Interoperability and Coexistence with 4ab(Class 4)~~
		+ Skipped
	4. ~~Discussion on Interoperability and Coexistence with Others(Class 3,5,6,7)~~
		+ Skipped
	5. ~~Discussion on Ranging in All Classes of Coexistence~~
		+ Skipped
	6. Joint work with 802.1; Draft PAR and CSD 802.1Acea: Amendment to IEEE Standard 802.1AC-2016, *Marco Hernandez*, doc.# 15-23-453-01 & 15-23-454-01
	7. Recessed (9:59 AM)

Attendees 9

***Name Affiliation***

* Daisuke Anzai Nagoya Institute of Technology(Nitech)
* Huan-Bang Li NICT
* Kamran Sayrafian NIST
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Ryuji Kohno YNU/YRP-IAI
* Takafumi Suzuki NICT
* Takumi Kobayashi Nitech/YRP-IAI
* Yasuharu Amezawa Mobile Techno

**TG15.6ma 3rd Session**

**Wednesday, January 17th, 2024, 9:00 AM- 10:00 AM Local Panama Time**

**Ocean II in Floor M, Hilton Panama, Panama City, with Webex Virtual Room #2**

* 1. Meeting called to order 9:05 AM

By Chair Ryuji Kohno (YNU / YRP-IAI)

* 1. Roll Call *Ryuji Kohno*Announcement to attendance by using IEEE Attendance Tool (IEEE IMAT).
	Registration Information, By Chair *Ryuji Kohno*
	2. 802 Mtg. Non-Registration Consequences, by Chair *Ryuji Kohno*
	3. Confirmation of Agenda, doc.#23-0636-08-06ma, *Ryuji Kohno*
	4. Review of the last session TG6ma, *Ryuji Kohno*
	5. ~~Comment-Resolution Database for Pre-Ballot WG,~~ *~~Marco Hernandez,~~* ~~doc.# 23-0476-13~~
		+ Skipped due to no new comments. (*Marco Hernandez*)
	6. Basic Consensus in MAC and PHY of Revision of IEEE802.15.6-2012 (IEEE802.15.6ma), *Ryuji Kohno*, doc.#23-0557-01
		+ Shortly explained that HARQ is optional even for high QoS and high classes of coexistence due to limited meeting time. (*Ryuji Kohno*)

**[Presentation and Discussion on Channel Coding Proposals for Revision]**

* 1. Hybrid ARQ Scheme for High QoS Packets in High Class of Coexistence of IEEE 802.15.6ma, *Kento Takabayashi*, doc.# 23-0576-01
		+ Code rate of LDPC code is hard to change unlike BCH code, is not it? (*Ryuji Kohno*)
			- Yes, it is. (*Kento Takabayashi*)
		+ How large retransmission number in your simulation? (*Kento Takabayashi*)
		+ Performance is not changed although number of overlayed BANs is changed changed in the simulations. (*Ryuji Kohno*)
			- Continue to try clarifying the results. (*Kento Takabayashi*)
	2. Evaluation of IEEE 802.15.6ma Ultra-wideband Physical Layer Utilizing Super Orthogonal Convolutional Code, *Kento Takabayshi*, doc.# 23-00562-07
		+ Essentially super orthogonal convolutional code(SOCC) is very low code rate such as 1/8, 1/32 etc. Although HARQ is requested for enhanced dependability in highest QoS 7, BMI application requires higher data rate, so it seems to be hard for BMI. So, BMI has to choose high error-correcting capability for lower data rate with SOCC or limited error-correcting capability for high rate rate with concatenated code. However, ranging application in which transmitted data like time and clock offset in two way ranging(TWR) needs limited data rate, HARQ may be applicable for ranging. (*Ryuji Kohno*)
		+ SOCC is a kind of binary convolutional code(BCC) but code rate is very low. So, for a typical combination of QoS levels and coexistence classes in practical usecases, we would like to ask you to provide what choice of FCC to satisfy technical requirement by showing comparison of performance between ususal BCC and SOCC. (*Ryuji Kohno*)
			- Yes, I agree with your requirement, (Kento Takabayashi)
			- That is quite depending on the code rate. (*Daisuke Anzai*)
		+ Better to make sure that how good to use SOCC in practical usecases in order to make sure advantages of combination of SOCC and UWB in a case that total occupied bandwidth is wide as it is obvious in theory. (*Ryuji Kohno*)
	3. Performance Evaluation of Channel Coding Based on TG6ma Channel Model for Some Classes of Coexistence, *Daisuke Anzai,* doc.# 15-24-0051-00
		+ Our requirement document has some information about which code rate is necessary to achieve BER performance in technical requirement document. We need to carefully choose RS code parameters such as code rate. (*Ryuji Kohno*)
		+ In typical usecases of mixed random and burst errors such as a shadow fading channel, RS code as an outer non-binary code is used to apply for burst error-correction while inner binary code is applied for random errors. So, we hope you will compare performances between only LDPC and concatenated LDPC and RS code in channels with mixed random and burst errors. We suppose that the concatenated code can significantly improve error performance that only LDPC for high QoS and high coexistence classes in a channel with some balance of random and burst errors. We hope your further performance analysis and result in appropriate code sets and code parameters. (*Ryuji Kohno*)
			- You mentioned so important view points. We will try to satisfy your hope or request next time. (*Daisuke Anzai*)
		+ Previous results in previous sessions last year illustrated burst error correction performance in my memory. (*Marco Hernandez*)
		+ Yes, it was a limited result, so more complimentary analysis would be welcome and result in complete appropriate standard code parameters. (*Ryuji Kohno*)

Recessed (10:02 AM)

Attendees 11

***Name Affiliation***

* Daisuke Anzai Nagoya Institute of Technology
* Huan-Bang Li NICT
* Kamran Sayrafian NIST
* Kento Takabayashi Toyo University
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Ryuji Kohno YNU/YRP-IAI
* Takafumi Suzuki NICT
* Takumi Kobayashi Nitech/YRP-IAI
* Thomas Almholt TI
* Yasuharu Amezawa Mobile Techno

**TG15.6ma 4th Session**

**Thursday, January 18th, 2024, 8:00 AM- 10:00 AM Local Panama Time**

**Ocean II in Floor M, Hilton Panama, Panama City, with Webex Virtual Room #2**

* 1. Meeting called to order 8:00 AM
	2. Roll Call *Ryuji Kohno*
	Announcement to attendance by using IEEE Attendance Tool (IEEE IMAT).
	Registration Information, By Chair *Ryuji Kohno*
	3. 802 Mtg. Non-Registration Consequences, by Chair *Ryuji Kohno*
	4. Confirmation of Agenda, doc.#23-0636-08-06ma, *Ryuji Kohno*
	5. Review of the last session TG6ma, *Ryuji Kohno*
	6. Comment-Resolution Database for Pre-Ballot WG, *Marco Hernandez*, doc.#23-0476-13

**[Summary of Channel Models, Channel Coding, and Interference Mitigation]**

* 1. TG6ma Channel Model Document for Enhanced Dependability, *Takumi Kobayashi*, doc.#22-0519-04
	2. Comments to channel-model-document, *Takumi Kobayashi*, doc.#23-0605-01
		+ Almost of all comments have been resolved with editorial correction. Several items to be continued to fix. Updated version is uploaded as doc.# 22-0519-05
		*Kamran Sayrafian, Marco Hernandez*
	3. Interference Mitigation Schemes in Class 3, 5, 6, and 7 of Coexisitence in TG6ma, *Takumi Kobayashi,* doc.#24-0073-00

**[Summary of MAC Protocol]**

* 1. Overview and convergence of MAC proposals for 15.6ma, Marco Helnandez, doc.#24-0076-00
		+ Skipped due to time limitation.

**[Progress and Timeline]**

* 1. Progress report of 802.15.6ma, *Marco Hernandez,* doc.# 23-0056-04
		+ draft#1.11 has been updated much while MAC subclauses are still imperfect yet and need minor revision in interference mitigation and ranging.
		+ Channel Model Documents(CMD) has been mostly completed. doc.#22-0519-04
	2. TG6ma Timeline(Rescheduling Timeline), *Marco Hernandez,* doc.#23-0361-03
		+ Two months extended. (*Marco Hernandez*)
	3. Draft discussion, *All*
		+ Draft1 should be completed within February and prepared for pre-Ballot in March meeting.and letter ballot,
	4. Any other business?
		+ No.
	5. Adjourn (10:01 AM)

Attendees 7

***Name Affiliation***

* Kamran Sayrafian NIST
* Marco Hernandez YRP-IAI
* Ryuji Kohno YNU/YRP-IAI
* Takafumi Suzuki NICT
* Takumi Kobayashi Nitech/YRP-IAI
* Yasuharu Amezawa Mobile Techno
* Masayuki Hirata Osaka University