IEEE P802.15

**Wireless Personal Area Networks**

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| Project | Task Group 15.6ma |
| Title | **TG15.6ma Meeting Minutes for May 2023**  |
| Date Submitted | May 18th , 2023 |
| 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; NIT(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 November, 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 November 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. Then technical requirement document(TRD) has been approved by TG motion. 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 joint and individual sessions. Next step has been discussed including telco for harmonization with TG15.4ab and change to revision from amendment.  |
| Purpose | Minutes of Dependability Electronic Plenary Session on Webex, May 2023. |
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**TG15.6ma 1st Session**

**Monday, May 15th, 2023, PM 4:00- PM 6:00 Orlando Local Time**

**at the room Edelweiss in 2nd Floor, Hilton Lake Buena Vista: Orlando, Florida with Webex Virtual Room #3**

* 1. Meeting called to order PM 4:12

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- 23-0232-01-06a

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- 23-0231-02-06a

Þ Approved.

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

Þ Upon no comments on the March meeting minutes, doc. #15-23-0190-00-06a was approved.

**[Review]**

* 1. Overview of IG-DEP, SG6a, TG6a and TG15.6ma for Revision of IEEE 802.15.6-2012 Wireless BAN with Enhanced Dependability, Ryuji Kohno (YRP-IAI/YNU), doc.# 22-0389-02-06ma

**[Presentation and Discussion on MAC Proposals for Revision]**

* 1. Definition of Coexistence Levels and How to Support Higher Levels, *Minsoo Kim, Marco Hernandez, Takumi Kobayashi, Ryuji Kohno*, doc.# 15-22-0631-03
		+ Level 4 to 6 are UWB systems but the others are not UWB system? *(Kamran Sayrafian)*
			- They are not inclusive. *(Minsoo Kim)*
		+ That would be a little bit complicated to understand. *(Kamran Sayrafian)*
			- Intensity of interference is quite depending on the source and distance. *(Minsoo Kim)*
		+ We can also split to UWB case and the others. Let us discuss. *(Ryuji Kohno)*
		+ I see in the column 1 & 2 are Multiple BANs but level 1 is only 802.15.6ma. *(Sang-Kyu Lim)*
			- Essential idea of definition of both of 1 & 2 is to define these different difficulty for each separately. Level 2 situation coexistence is more difficult than Level1. *(Ryuji Kohno)*
	2. MAC Protocol Proposal for Multiple BAN Environment (Level 1), *Minsoo Kim, Marco Hernandez, Ryuji Kohno*, doc.#15-22-0639-03
		+ To assign the priority is quite complicated. (*Kamran Sayrafian*)
		+ Let us discuss later (*Marco Hernandez*)
	3. Qualitative approach to coexistence and QoS mechanisms, *Marco Hernandez, Minsoo Kim, Takumi Kobayashi, Ryuji Kohno,* doc.#15-23-0101-02
		+ As my suggestion, “Coexsistence support level” should be changed to avoid misunderstanding. Someone may misunderstand as “higher is better”.
			- We understand. Let us consider about it. (*Marco Hernandez*)
	4. Simulation results for Nagoya I. T. and YRP-IAI MAC proposal, *Daisuke Anzai, Ryosuke Inuzuka, Minsoo Kim, Takumi Kobayashi, Marco Hernandez, Ryuji Kohno,* doc.# 15-23-06242-00
	5. Preliminary harmonization with 4ab: MAC operation, *Marco Hernandez,* doc.# 22-0634-03
	6. Recessed (5:47 PM)

**Attendees list**

Attendees 15

***Name Affiliation***

* Christy Bahn IEEE SA
* Clint Powel Meta
* Daisuke Anzai Nagoya Institute of Technology
* Hiroki Saito ARIS
* Iwao Hosako NICT
* Kamran Sayrafian NIST
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Minsoo Kim YRP-IAI
* Ryuji Kohno YNU/YRP-IAI
* Sang-Kyu Lim ETRI
* Tahsin AKALIN
* Takafumi Suzuki NICT
* Takumi Kobayashi Nitech/YRP-IAI
* Takunori Shimazaki Jikei University
* Yasuharu Amezawa Mobile Techno

**TG15.6ma 2nd Session**

**Tuesday, May 16th, 2023, AM 8:00- AM 10:00 Orlando Local Time**

**at the room Edelweiss in 2nd Floor, Hilton Lake Buena Vista: Orlando, Florida with Webex Virtual Room #2**

* 1. Meeting called to order AM 8:05

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.#23-0231-03-06ma, *Ryuji Kohno*
	4. Review of the last session TG6ma, *Ryuji Kohno*

**[Updated Channel Models]**

* 1. Propagation Channel Parameters of UWB Communication Applications for Human BAN(HBAN) Use Cases, *Daisuke Anzai, Sho Asano, Takumi Kobayashi*, doc.#15-23-0145-01-06ma
		+ Near field analysis should be considered when transmitter and receiver closed by each other. For example, in case like one person has transmitter on the head and another receiver on the chest. (*Ryuji Kohno*)
	2. Propagation Channel Parameters of UWB Communication Applications for Vehicle BAN(VBAN) Use Cases, *Daisuke Anzai, Yutaro Aoki, Takumi Kobayashi*, doc.#15- 23-0146-01-06ma
		+ In the bus model, we have observed standing wave phenomenon. We will check later about the frequency and bus length dependency. (*Daisuke Anzai*)
			- That is valuable from the view point to apply more longer vehicles like train or airplane. (*Ryuji Kohno*)
	3. Propagation Simulations of UWB Communication Applications for HBAN and VBAN Use Cases, *Daisuke Anzai, Ryosuke Inuzuka,Takumi kobayashi*, doc.#15-23-0020-03-06ma
		+ What about the engine compartment issues? (*Ryuji Kohno*)
			- Engine compartment results are missing in this presentation. We explained in doc.”15-23-0146-01-006a. (*Daisuke Anzai*)
			- This channel model should be included in channel model document. (*Ryuji Kohno*)
	4. Channel Modeling Activities for BANs of TG15.6ma for Human and Vehicle Body Area Networks, *Takumi Kobayashi, Daisuke Anzai, Marco Hernandez, Ryuji Kohno*, doc.#15-23-0241-00-06ma
	5. Summary Table of Channel and Environmental Modeling Activities for BANs on TG15.6ma, *Takumi Kobayashi, Daisuke Anzai, Marco Hernandez, Ryuji Kohno*, doc.#15-23-0045-05-06ma
	6. Preliminary Investigation of UWB Ranging under Multiple BAN Coexistence, *Daisuke Anzai, Shunsuke Ishiguro, Takumi Kobayashi,* doc.# 15-23-0265-00-06ma

**[Discussion]**

Is there any specific application? For only interference management? *(Kamran Sayrafian)*

 For both. We may suppose to extension of 4z like car security etc. *(Ryuji Kohno)*

There are two models for capsule endoscopy. (*Kamran Sayrafian*)

 We would like to keep both Kamran’s contribution for Low band, and Daisuke’s contribution for High or full band. Because in Japan, low-band UWB is higher difficulty to use by Japanese radio regulation. (*Ryuji Kohno*)

* 1. Recessed (9:51AM)

Attendees 12

***Name Affiliation***

* Daisuke Anzai Nagoya Institute of Technology
* Hiroki Saito ARIS
* Kamran Sayrafian NIST
* Kento Takabayashi Okayama Prefectural University
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Minsoo Kim YRP-IAI
* Ryuji Kohno YNU/YRP-IAI
* Takafumi Suzuki NICT
* Takumi Kobayashi Nitech/YRP-IAI
* Takunori Shimazaki Jikei University
* Yasuharu Amezawa Mobile Techno

**TG15.6ma 3rd Session**

**Wednesday, May 17th, 2023, AM 9:00- AM 10:00 Orlando Local Time**

**at the room Edelweiss in 2nd Floor, Hilton Lake Buena Vista: Orlando, Florida with Webex Virtual Room #2**

* 1. Meeting called to order AM 9:00

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.#23-0231-03-06ma, *Ryuji Kohno*
	4. Review of the last session TG6ma, *Ryuji Kohno*

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

* 1. Overview of FEC proposals for 15.6ma, *Marco Hernandez*, doc.#22-0611-03.
		+ How we can simulate and analyze evaluate MAC performance? (*Ryuji Kohno*)
			- PER vs SINR with noise and interference can be evaluated. (*Marco Hernandez*)
	2. Concept of channel coding for IEEE802.15.6ma, *Kento Takabayashi* , doc.# 23-0244-00
		+ QoS level 0 to 3 uses the same coding rate. QoS level 4 to 7 can apply external outer code etc. to achieve more higher dependability. (*Ryuji Kohno*)
		+ To have a compatibility with original 15.6-2012 as well as 4ab and 4z error coding, QoS level 0 to 3 can be applied external error coding. Let us discuss and will complete before July mtg. (*Ryuji Kohno*)
		+ Probably we can keep using BCH code as well as LDPC. (*Marco Hernandez*)
	3. Evaluation of IEEE 802.15.6 Ultra-wideband Physical Layer Utilizing Super Orthogonal Convolutional Code, *Kento Takabayashi,* doc.#22-0562-03-06ma
		+ We can choose *k* corresponds to QoS? Does receiver use the same algorithm like Viterbi decoder for different *k*? (*Ryuji Kohno*)
			- Yes. (*Kento Takabayashi*)
	4. Discussion on Harmonization in PHY with TG4ab, *Marco Hernandez*, doc.#15-22-0610-03-06ma
		+ Do you need to discuss more about the PHY issues with 4ab? (*Ryuji Kohno*)
			- We have previous agreement with 4ab. How we can implement is under discussion. (*Marco Hernandez*)
		+ To keep compatibility, original 15.6 and 4ab are exist. 4ab is higher priority as 4ab is a new standard. Same decoder for error coding is better to have compatibility each other. (*Ryuji Kohno*)
	5. QoS-aware Hybrid ARQ Scheme Utilizing Decomposable Error Correcting Codes for Wireless Body Area Networks, *Kento Takabayashi*, doc.#15-22-561-02-06ma

Recessed (9:57AM)

Attendees 19

***Name Affiliation***

* Ankur Samsung
* Daisuke Anzai Nagoya Institute of Technology
* Gary Stuebing
* Hiroki Saito ARIS
* Huan-Bang Li NICT
* Jarek Niewczas Qorvo
* Kento Takabayashi Okayama Prefectural University
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Minsoo Kim YRP-IAI
* Mohammad Rahmani SPARK microsystems
* Run Chen NRT
* Ryuji Kohno YNU/YRP-IAI
* Takafumi Suzuki NICT
* Takumi Kobayashi Nitech/YRP-IAI
* Takunori Shimazaki Jikei University
* Thomas Almholt TI
* Xiliang Luo Apple
* Yasuharu Amezawa Mobile Techno

**TG15.6ma 4th Session**

**Thursday, May 18th, 2023, AM 8:00- AM 10:00 Orlando Local Time**

**at the room Edelweiss in 2nd Floor, Hilton Lake Buena Vista: Orlando, Florida with Webex Virtual Room #2**

* 1. Meeting called to order AM 8:00

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.#23-0231-03-06ma, *Ryuji Kohno*
	4. Review of the last session TG6ma, *Ryuji Kohno*
	5. Overview of 802.15.6-2012 Std and use of the 802 Architecture, *Marco Hernandez, Ryuji Kohno,* doc.#15-23-0286-00-06ma
		+ Does 15.6ma support MAC address multicast? (*Tero Kivinen*)
			- Not decided yet. TBD. Marco (*Marco Hernandez*)
		+ Please clearly describe which part already done in current 15.6 and which will be in TG6ma. (*Clint Powell*)

**[Summary of MAC Protocol]**

* 1. Exploiting NB PHY and concurrent operation with UWB to assist UWB channel access, *Huan-Bang Li*, doc.#15-23-0238-01-04ab
		+ If too many wireless coexist, do you have any analysis? (*Ryuji Kohno*)
			- We have some results of analysis and simulations. (*Huan-Bang Li*)
		+ Why 2 PHYs is for NB? (*Clint Powell*)
			- According to local regulations. Some specific country cannot use one of two, then they can use another. (*Huan-Bang Li*)
	2. Draft0 of IEEE802.15.6ma, *Marco Hernandez, Ryuji Kohno*
	3. MAC Protocol Proposal for Multiple BAN Environment (Level 1,2,3), *Minsoo Kim,* doc.# 22-0639-02-06ma

**[Progress and Timeline]**

* 1. Timeline of TG15.6ma, doc.#15-23-0288-00-06ma, *Marco Hernandez, Ryuji Kohno*, 15- 23-0176-02-06ma
	2. Any other business?
		+ No.
	3. Adjourn (9:48AM)

Attendees 12

***Name Affiliation***

* Clint Powell PWC
* Hiroki Saito ARIS
* Huan-Bang Li NICT
* Kamran Sayrafian NIST
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Minsoo Kim YRP-IAI
* Ryuji Kohno YNU/YRP-IAI
* Takafumi Suzuki NICT
* Takumi Kobayashi Nitech/YRP-IAI
* Tero Kivinen Self
* Yasuharu Amezawa Mobile Techno