# IEEE P802.15

**Wireless Personal Area Networks**

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| --- | --- | --- |
| Project | Task Group 15.6a | |
| Title | **TG15.6a Meeting Minutes for January 2022** | |
| Date Submitted | January 26th, 2022 | |
| Source | [Ryuji Kohno1,2 Marco Hernandez1 Takumi Kobayashi2 Minsoo Kim1]  [1; YRP-IAI (YRP International Alliance Institute), Japan,  2; YNU (Yokohama National University), Japan] | Voice: +81 90 5408 0611  E-mail: kohno@ynu.ac.jp  marco.hernandez@ieee.org  kobayashi-takumi-ch@ynu.ac.jp  minsoo@minsookim.com |
| Re: | Meeting Minutes | |
| Abstract | Since PAR and CSD of SG15.6a as amendment of existing IEEE802.15.6-2012 for WBAN with enhanced dependability was approved by NesCom in September, Task Group TG15.6a 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 TG15.6a 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 6a. To harmonize activities of TG15.6a, 15.4ab and 15.14 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 TG15.4a and 14 and change to revision from amendment. | |
| Purpose | Minutes of Dependability Electronic Plenary Session on Webex, January 2022. | |
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**TG15.6a 1st Session**

**Wednesday, January 19th, 2021, AM 9:10-11:00 ET**

**Room: Webex Virtual Conference**

* 1. Meeting called to order AM 9:10

By Chair Ryuji Kohno (YNU / YRP-IAI)

* 1. Roll Call *Ryuji Kohno*

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

Registration for 802 LMSC Plenaries and 802 Wireless Interims, Information,

By Chair Ryuji Kohno

* 1. Opening Report *Ryuji Kohno (YNU / YRP-IAI)* doc.# 802.15- 22-0008-02-06a

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- 22-0007-04-06a

Þ Approved.

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

Þ Upon no comments on the November meeting minutes, doc. #15-21-0618-00-06a was approved.

**[Review]**

* 1. TG, SG15.6a & IG DEP Activity for Amendment of IEEE802.15.6 Wireless BAN with Enhanced Dependability, *Ryuji Kohno (YNU / YRP-IAI)* doc. # 21-0023-05-06dep
  2. Explanation to change amendment to revision of TG15.6a, *Ryuji Kohno* (YNU / YRP-IAI)
  3. ~~PAR and CSD of IEEE802.15.6a,~~ *~~Marco Hernandez, Ryuji Kohno,~~* ~~doc. # 21-0259-04-06a and doc.#21-0260-03-06a~~  
     => Skipped
  4. ~~Selection of Focused Use cases in IEEE802.15.6a~~  
     => Skipped

**[Review for Technical Requirement]**

* 1. Application Matrix: use cases for automotive industry, *Ryuji Kohno*, doc.# 17-0398-00-0dep, 19-0545-01-0dep and 21-0484-00-06a.
  2. Channel and Environmental Models Classification for Vehicle Body Area Network (VBAN) on TG15.6a, *Takumi Kobayashi*, doc.#21-0560-01-06a.

**[Presentation]**

* 1. Dynamic Channel and Environmental Modeling Scheme for BANs on TG15.6a, *Takumi Kobayashi (YNU),* doc.#22-0023-00-06a.
  2. TG6a Dynamic On-Body UWB Radio Channel Modeling, *Ryuji Kohno*, doc.# 22-0025-00-06a
  3. Pseudo-Cyclic Dynamic Channel Model of UWB-BAN, *Ryuji Kohno*, doc.# 22-0032-00-06a
  4. MAC Bridging for Time-Sensitive Networking of 802.15.6a, *Minsoo Kim (YRP-IAI)*, doc.# 22-0024-00-06a.
  5. Preparation for Joint Session with 802.1
  6. Recessed.

**Attendees list**

Attendees 38

***Name Affiliation***

* Akifumi Kasamatsu NICT
* Aniruddh Rao Samsung
* Benjamin Rolfe Blind Creek Associates
* Billy Verso Qorvo
* Carl Murray Qorvo
* Clark Palmer Meteorcomm LLC
* David Barras 3db
* Frederic Nabki Spark
* Friedbert Berens FBConsulting
* Hiroki Saito ARIS
* Hiroshi Harada Ukyoto
* Huan-Bang Li NICT
* Iwao Hosako NICT
* Juha Juntunen Meteorcomm
* Kai Lennert Bober Fraunhofer HHI
* Kamran Sayrafian NIST
* Kangjin Yoon Meta
* Kiyoshi Fukui OKI
* Kiyoshi Tada ARIS
* Kristian Granhaug Novelda
* Larry Zakaib Spark Microsystems
* Li Sun
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Minsoo Kim YRP-IAI
* Mohammad Rahmani SPARK microsystems
* Raphael Guimond
* Ryuji Kohno YNU/YRP-IAI
* Seong-Soon Joo ETRI
* Shang-Te Yang
* Stuart Kerry OK-Brit; Self
* Sven Zeisberg HTW
* Takumi Kobayashi YNU
* Tero Kivinen Self
* Tetsushi Ikegami Meiji University
* Thomas Kürner TU Braunschweig
* Warren Kumari Google
* Yasuharu Amezawa Mobile Techno

**802.1 / 802.15 Joint Session**

**Wednesday, January 19th, 2021, AM 11:00- PM 1:00 ET**

**Room: Webex Virtual Conference**

* 1. Meeting called to order AM 11:00

By Chair Glenn Parsons

* 1. Registration Information, *Glenn Parsons*, https://1.ieee802.org/2022-01-interim-joint-1-15-agenda/
  2. Roll Call *Glenn Parsons*  
     Announcement to attendance by using IEEE Attendance Tool (IEEE IMAT).  
     Chair showed IEEE Patent policy.  
     Chair issued Call for Potentially Essential Patents.
  3. Agenda, *Glenn Parsons*, https://1.ieee802.org/2022-01-interim-joint-1-15-agenda/

**[Presentations]**

* 1. MAC Bridging for Time-Sensitive Networking of 802.15.6a, *Minsoo Kim* (YRP-IAI), doc.# 22-0024-00-06a.
  2. List of Topics for 802.15/802.1, *Ben Rolfe*, doc.# 15-22-0036-00-0000.
  3. Bridging Frames with 64-bit addresses, *Roger Marks*
  4. Next Meeting, *Glenn Parsons*
     + Tele-conference will be held on February.
  5. Adjourn

**Attendees list**

Attendees 97

***Name Affiliation***

* Aniruddh Rao Samsung
* Ankur Bansal Samsung
* Atsushi Alex Sato Yokogawa
* Ayman Naguib Apple
* Balazs Varga Ericsson
* Benjamin Rolfe Blind Creek Associates
* Bernhard Groβwindhager NXP
* Bharat Bhatia 3dB
* Billy Verso Qorvo
* Bin Tian Qualcomm
* Cas Hiroki Nakano CAHI Corporation
* Christian Boiger b-plus technologies GmbH
* Chunyu Hu Meta
* Clark Palmer Meteorcomm LLC
* Claudio da Silva Meta
* Clint Powel Meta
* Craig Gunther LabN Consulting
* Daoud Serang CML Microcircuits
* David Barras 3db
* Dieter Proell Siemens AG
* Don Fedyk LabN Consulting
* Don Sturek Itron
* Feng Chen Siemens AG
* Frederic Nabki Spark
* Gavin Lai Moxa
* Geoff Garner Huawei
* Glenn Parsons Ericsson
* Godfrey, Tim
* Gunter Siemens AG
* heb
* Hiroki Saito ARIS
* Igor Dotlic Qorvo
* Iwao Hosako NICT
* Jack Zou
* Janos Farkas Ericsson
* Jay Holcomb Itron
* Jens Bierschenk Robert Bosch GmbH
* Jessy Rouyer Nokia
* Joeo Lopes Qualcomm
* Johannes Specht
* Josef Dorr Siemens AG
* Juha Juntunen Meteorcomm
* Kai Lennert Bober Fraunhofer HHI
* Kamran Sayrafian NIST
* Karl Weber Beckoff Automation
* Keitarou Kondou HRCP
* Kenji Kondo Yaskawa
* Larry McMillan
* Larry Zakaib Spark Microsystems
* Lily Lv Huawei
* Lochan Verma Apple
* Ludwig Winkel
* Maik Seewald
* Marc Holness Ciena
* Marcel Kiessling Beckoff Automation
* Marco Hernandez YRP-IAI
* Marius Stanica ABB Motion
* Mark Hantel RA
* Mark Hu Aptiv
* Minsoo Kim YRP-IAI
* Nemanja Stamenic Siemens AG
* Norman Finn Huawei Technologies Co. Ltd
* Oliver Klamser Pilz
* Pat Kinney Kinney Consulting
* Paul Bottorff Aruba
* Paul Congdon
* Phil Beecher WiSUN
* Radhakrishna Canchi Kyosera International Inc
* Rani Keren Huawei
* Raphael Guimond
* Razvan Petre Spirent
* Robert Golshan Apple
* Roger Marks EthAirNet Associates
* Rudy Belliardi Schneider Electric
* Ruibo Han CMCC
* Ryuji Kohno YNU/YRP-IAI
* Seong-Soon Joo ETRI
* Serkan Ayaz Denso
* Shang-Te Yang
* Shimi Shilo Huawei
* Shoichi Kitazawa Muroran IT
* Silvana Rodrigues Huawei
* Stephan Kehrer Hirscmann
* Stuart Kerry OK-Brit; Self
* Sven Zeisberg HTW
* T. Suzuki NICT
* Takumi kobayashi YNU
* Tero Kivinen Self
* Tetsushi Ikegami Meiji University
* Thomas Almholt TI
* Tongtong Wang Huawei
* Xiliang Luo Apple
* Xinyuan Wang Huawei
* Yasuharu Amezawa Mobile Techno
* Yongsen Ma Redpoint Positioning
* Yoshio Kashiwagi Nissin Systems
* Young Liu Apple

**TG6a 2nd Session**

**Thursday, January 20th 2022, AM 9:10-11:00 ET**

**Room: Webex Virtual Conference**

* 1. Meeting called to order AM 9:10

By Chair Ryuji Kohno (YNU / YRP-IAI) doc.#15-22-0007-05

* 1. Roll Call *Ryuji Kohno*Announcement to attendance by using IEEE Attendance Tool (IEEE IMAT).  
     Registration Information, By Chair *Ryuji Kohno,* doc.#15-22-0008-02-06a
  2. 802 Mtg. Non-Registration Consequences, doc.#21-15-0567, By Chair Ryuji Kohno (YNU / YRP-IAI)

**[Review]**

* 1. Review of Discussion in Joint Session between 802.1 and 802.15, *Marco Hernandez*, doc.# 15-22-0053-00-006a.
     + One of the point interesting to consider is MAC address uniqueness issue. *(Benjamin Rolfe)*
     + Check and refer IEC62657 to compare with our BAN concepts and consider coexistence with BANs. *(Ryuji Kohno)*
     + We do not need to consider about MAC issue for now. (*Marco Hernandez*)
     + TSN and/or multi-hop case, end-to-end latency and delay issues are also important in our application focused on. (*Ryuji Kohno*)
  2. Discussion for Harmonization with 802.1
  3. Harmonization with TG4ab and TG14, *Ryuji Kohno,* doc.#15-21-0497-02-006a

**~~[Change to Revision from Amendment]~~**

* 1. ~~Action plan for Revison,~~ *~~Ryuji Kohno, Marco Hernandez~~*
  2. ~~Change of PAR and CSD,~~ *~~Marco Hernandez,~~* ~~doc.# 15-22-0xxx-00-006a, 15-22-0yyy-00~~
  3. ~~Update of Technical Requrement Document for the Revision,~~ *~~Marco Hernandez,~~* ~~doc.#15-22-0zzz-00-06a~~=> Skipped

**[Presentation of Feasible Technologies for BAN to Satisfy the Technical Reqirement]**

* 1. Coordinator-to-coordinator communication for Body Area Networks, *Minsoo Kim*, doc.#15-21-0582-02-06a
     + HBAN node connects to VBAN coordinater? (*Kamran Sayrafian*)
       - Yes (*Minsoo Kim*)
       - Why it is needed? That may very application specific for high level communication such as medical use.
       - We have medical application use-case and also key-less application. (*Marco Hernandez*)
       - Not so specific application only. Vehicle application, brain machine interface and elderly driver support application. (*Ryuji Kohno*)
       - We will present use-cases presentation in next session. (*Marco Hernandez*)
  2. ~~MAC Protocol with Interference Mitigation Using Negotiation among Coordinators in Multiple Wireless Body Area Networks(BAN’s)~~ *~~Minsoo Kim~~*~~, doc.#15-19-0503-02-06a~~=> Skipped
  3. Considerations and countermeasure technology on radio environment surrounding BANs including EMC issues on PHY layer, *Takumi Kobayashi,* doc.#15-21-0387-02-06a.
  4. Recess

Attendees 39

***Name Affiliation***

* Akifumi Kasamatsu NICT
* Aniruddh Rao Samsung
* Ankur Samsung
* Benjamin Rolfe Blind Creek Associates
* Boris Danev 3db
* Carl Murray Qorvo
* Clark Palmer Meteorcomm LLC
* Frederic Nabki Spark
* Friedbert Berens FBConsulting
* Gary Stuebing
* Hiroki Saito ARIS
* Huan-Bang Li NICT
* Iwao Hosako NICT
* Joerg Robert TU Ilmenau/Fraunhofer IIS
* Kamran Sayrafian NIST
* Kangjin Yoon Meta
* Keitarou Kondou HRCP
* Kiyoshi Fukui OKI
* Kiyoshi Tada ARIS
* Larry Zakaib Spark Microsystems
* Masayuki Hirata Osaka University
* Minsoo Kim YRP-IAI
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* Raphael Guimond
* Rias Al-Kadi NXP
* Ryuji Kohno YNU/YRP-IAI
* Seong-Soon Joo ETRI
* Shigenobu Sasaki Niigata University
* Srivathsa NXP
* Stephan Sand German Aerospace Center DLR
* T. Suzuki NICT
* Takashi Kuromachi Lapis
* Takumi Kobayashi YNU
* Tero Kivinen Self
* Tetsushi Ikegami Meiji University
* Yasuharu Amezawa Mobile Techno
* Youngwan So
* Zhenzhen Ye Redpoint positioning

**802.15 TG6a / 4ab / 14 Joint Session**

**Friday, January 21st , 2022, AM 9:10- 11:00 ET**

**Room: Webex Virtual Conference**

* 1. Meeting called to order AM 9:10

By Chairs *Benjamin Rolfe, Clint Powel and Ryuji Kohno*

* 1. Roll Call *Benjamin Rolfe*  
     Announcement to attendance by using IEEE Attendance Tool (IEEE IMAT).  
     Chair showed IEEE Patent policy.  
     Chair issued Call for Potentially Essential Patents.
  2. Agenda, *Benjamin Rolfe*, doc.# 15-22-0037-0000
  3. Registration Information, *Benjamin Rolfe*, doc.# 15-22-0037-0000

**[Presentations]**

* 1. Dynamic Channel and Environmental Modeling Scheme for BANs on TG15.6a, *Takumi Kobayashi*, doc.#15-22-0023-00-06a.
  2. Measurement based BAN channel model for XR applications : Part I, *Calros Aldana*, doc.#150-22-0062-00-04ab.
     + What is a difference with current channel modes? *(Clint Powell)*
       - Frequency, and measurement method. *(Carlos Aldana)*
       - Channel characteristics is quite depending on standard antennas. Also we are assuming implant device as one of the use-case. We are making a common channel models for UWB against human body and the others. *(Ryuji Kohno)*
       - I think it is very hard to develop common channel universal model covering every situation. We need consider about the commonality of each use-cases *(Kamran Sayrafian)*
       - S1-1 is quite functional on distance between antennas. *(Kamran Sayrafian)*
       - Carlos mentioned about human body. How we can (Ryuji Kohno)
       - As Kamran said, channel characteristics is quite depending on use-cases. *(Huan-Bang Li)*
       - In device-to-device communication, it was quite simple because limited use-cases. *(Huan-Bang Li)*
  3. Snapshot of TG4ab PHY topics Jan 2022, *Benjamin Rolfe*, Doc.#15-22-0038-01-0000
  4. MAC Bridging for Time-Sensitive Networking of 802.15.6a, *Minsoo Kim*, doc.#15-22-0024-01-06a.
     + I think reason of one-hop is communication range. When in the scenario to use communication between BAN to WLAN, do we have security and privacy issues? *(Kamran Sayrafian)*
       - There are privacy issues. I believe that some use-cases routing scenario such as disaster case, position information is important and connectivity is most important thing. *(Minsoo Kim)*
       - Security provisions for 6a, encryption technique is applied. *(Marco Hernandez)*
  5. Next Steps? *all*
     + One joint meeting before March meeting.
  6. Adjourn

**Attendees list**

Attendees 66

***Name Affiliation***

* Ankur Samsung
* Ann Krieger U.S. DoD
* Ayman Naguib Apple
* Benjamin Rolfe Blind Creek Associates
* Bernhard Groβwindhager NXP
* Bharat Bhatia 3dB
* Billy Verso Qorvo
* Boris Danev 3db
* Carl Murray Qorvo
* Carlos Aldana Facebook
* Chunyu Hu Meta
* Clint Chaplin SRA
* Clint Powell Meta
* Dag T. Wisland Novelda AS
* David Barras 3db
* Dries Neirynck
* Edward Au Huawei
* Ersen Ekrem Apple
* Frederic Nabki Spark
* Friedbert Berens FBConsulting
* Gary Stuebing
* Hiroki Saito ARIS
* Hiroshi Harada Ukyoto
* Huan-Bang Li NICT
* Ido Bettesh
* Jack Zou
* Jerome Henry Cisco
* Joerg Robert TU Ilmenau/Fraunhofer IIS
* Jonghoe Koo Samsung
* Juha Juntunen Meteorcomm
* Junyoung Choi Samsung
* Kamran Sayrafian NIST
* Kiyoshi Tada ARIS
* Kristian Granhaug Novelda
* Larry Zakaib Spark Microsystems
* Libra Xiao
* Liu Peng Huawei
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Mingyu Lee Samsung
* Minsoo Kim YRP-IAI
* Mohammad Rahmani SPARK microsystems
* Nicolas Paillusseau Spark Microsystems
* Pooria Pakrooh Qualcomm
* Riku Pirhonen NXP
* Rorert Golshan
* Ruben Salazar
* Run Chen NRT
* Ryuji Kohno YNU/YRP-IAI
* Seong-Soon Joo ETRI
* Shang-Te Yang
* Shimi Shilo Huawei
* Srivathsa NXP
* Sven Zeisberg HTW
* T. Suzuki NICT
* Taeyong Ha Samsung
* Takumi Kobayashi YNU
* Tetsushi Ikegami Meiji University
* Volker Jungnickel Fraunhofer HHI
* Warren Kumari Google
* Wolfgang Kuechler NXP
* Xiliang Luo Apple
* Yongsen Ma Redpoint Positioning
* Yoshio Kashiwagi Nissin Systems
* Youngwan So Samsung
* Zhenzhen Ye Redpoint positioning

**TG6a 3rd Session**

**Tuesday, January 25th 2022, AM 9:10-11:00 ET**

**Room: Webex Virtual Conference**

* 1. Meeting called to order AM 9:10

By Chair Ryuji Kohno (YNU / YRP-IAI)

* 1. Roll Call *Ryuji Kohno*Announcement to attendance by using IEEE Attendance Tool (IEEE IMAT).  
     Registration Information, doc.#15-22-0008-02-006a, By Chair Ryuji Kohno
  2. Review of joint 15.4ab, 15.14, 15.6a session on Jan. 21st, doc.# 22-0078-00-06a, *Marco Hernandez*.
  3. Action Plan to Change Amendment to Revision, *Ryuji Kohno*
  4. Review of PAR amendment withdrawal and PAR revision submission, doc.# 21-0259-04, 22-0067-00, 22-0068-00, 22-0087-00, and 22-0086-00, *Marco Hernandez*
  5. 802.15.6a Revision CSD, *Marco Hernandez*, doc.#15- 21-0260-03-06a
     + Timeline introduction. *(Pat Kinney)*
     + TG6a will give explanation of timeline in closing plenary. *(Ryuji Kohno)*
     + PAR Revision draft has been uploaded as doc.#15-22-0088-00-06a (*Marco Hernandez*)
  6. **[TG Motion]**: Motion to approve amendment PAR withdrawal and revision PAR submission, doc.#15-22-0089-00-06a
     + **Motion1: PAR withdrawal**
       - Moved by Marco Hernandez (YRP-IAI)
       - Seconded by Minsoo Kim (YRP-IAI)
       - No objection. Unanimous consent. Approved.
     + **Motion2: PAR revision**
       - Moved by Marco Hernandez (YRP-IAI)
       - Seconded by Minsoo Kim (YRP-IAI)
       - No objection. Unanimous consent. Approved.

[Discussion on Technical Requirement for 802.15.6a Amendment/Revision]

* 1. Summary of Use Cases in 802.15.6a for HBAN + VBAN-Use Case Document, *Marco Hernandez,* doc.# 15-22-0079-00-06a.
     + Connection to the infrastructure can be considered. (*Sven Zeisberg*)
     + We just focused on the Bridging to accelerate this standardization at the moment. We can consider optionally such extension later. (*Ryuji Kohno*)
  2. Summary of Channel & Environment Models in 802.15.6a Considering Dynamic Channel Model, *Takumi Kobayashi,* doc.# 21-15-0091-00-06a
     + Standard antennas should be considered carefully. Off-body and On-body difference of channel characteristics also important. (*Kamran Sayrafian*)
  3. Summary of MAC in 802.15.6a Considering TSN-MAC Bridging for Time-Sensitive Networking of 802.15.6a, *Minsoo Kim,* doc.#15-22-0024-00-6a.
  4. 802.15.6a Technical Requirement Document (TRD), *Marco Hernandez*, doc.#21-0577-02-06a
  5. Other business.
     + No.
  6. Adjourn

Attendees 20

***Name Affiliation***

* Hiroki Saito ARIS
* Hiroshi Harada Ukyoto
* Iwao Hosako NICT
* Juha Juntunen Meteorcomm
* Kamran Sayrafian NIST
* Keitarou Kondou HRCP
* Kiyoshi Tada ARIS
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Minsoo Kim YRP-IAI
* Pat Kinney Kinney Consulting
* Rias Al-kadi NXP
* Ryuji Kohno YNU/YRP-IAI
* Seong-Soon Joo ETRI
* Sven Zeisberg HTW
* T. Suzuki NICT
* Takumi Kobayashi YNU
* Thomas Almholt TI
* Yasuharu Amezawa Mobile Techno
* Youngwan So Samsung