IEEE P802.15

**Wireless Personal Area Networks**

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| Project | Task Group 15.6a |
| Title | **TG15.6a Meeting Minutes for March 2022**  |
| Date Submitted | March 16th, 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 0611E-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, March 2022. |
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**TG15.6a 1st Session**

**Wednesday, March 9th, 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- 22-0106-02-06a

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- 22-0107-04-06a

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. #15-21-0093-01-06a 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 15.6a to revision of 15.6ma, *Ryuji Kohno* (YNU / YRP-IAI)
	3. PAR and CSD of the Revision IEEE 802.15.6ma, *Marco Hernandez, Ryuji Kohno,* doc. # 22-0087-01-06a and # 22-0088-00-06a
	4. Selection of Focused Use cases in IEEE802.15.6a
	5. Application Matrix: use cases for medical and automotive industry systems, #17-0398-00, #19-0545-01, #21-0484-00, *Ryuji Kohno* (YNU/YRP-IAI)
	6. Summary of Channel and Environmental Modeling Activities for BANs on TG15.6a, doc.#22-0091-00, *Takumi kobayashi* (YNU/YRP-IAI)
		+ Original HBAN is not includes BCI channel model. It should be defined additionally. *(Kamran Sayrafian)*
		+ Transmitter is not implanted. *(Marco Hernandez)*
		+ Where is receiver? *(Kamran Sayrafian)*
			- Near by the body. *(Marco Hernandez)*
		+ Also implanted transmitter is application of this BAN in the future. *(Ryuji Kohno)*
		+ We do not have UWB channel model for capsule endoscopy.
		+ Please put something concept in 1st page and focusing on UWB channel models for VBAN. *(Ryuji Kohno)*
	7. MAC Bridging for Time-Sensitive Networking of 802.15.6a, doc.#15-22-0024-01 *Minsoo Kim* (YRP-IAI)
		+ Does this architecture consider to connect coordinator and another coordinator? *(Kamran Sayrafian)*
			- Yes, it does. Especially in bus use case, passenger’s HBAN coordinators will communicate to bus VBAN coordinator. *(Minsoo Kim)*
			- BAN coordinator to BAN coordinator channel model can be considered as similar as BAN coordinator to BAN node on body. *(Ryuji Kohno)*
		+ Channel models between nodes or coordinators on the same body and the channel models between nodes or coordinators on the two different bodies are different. *(Kamran Sayrafian)*
	8. Recessed

**Attendees list**

Attendees 37

***Name Affiliation***

* Ryuji Kohno YNU/YRP-IAI
* Takumi Kobayashi YNU/YRP-IAI
* Marco Hernandez YRP-IAI
* Minsoo Kim YRP-IAI
* Pat Kinney Kinney Consulting
* Yoshio Kashiwagi Nissin Systems
* Yongsen Ma Redpoint Positioning
* Aniruddh Rao Samsung
* Ankur Samsung
* Benjamin Rolfe Blind Creek Associates
* Harry Bims Bim's Laboratories
* Stephan Sand German Aerospace Center DLR
* Jeong-Shiann Jiang Vertexcom
* Akifumi Kasamatsu NICT
* Billy Verso Qorvo
* Carl Murray Qorvo
* Claudio da Silva Meta
* Daoud Serang CML Microcircuits
* Frederic Nabki Spark
* Gary Stuebing
* Hiroki Saito ARIS
* Iwao Hosako NICT
* Jarek Niewczas Qorvo
* Juha Juntunen Meteorcomm
* Kamran Sayrafian NIST
* Keitarou Kondou HRCP
* Kristian Granhaug Novelda
* Masayuki Hirata Osaka University
* Mohammad Rahmani SPARK microsystems
* Norihiko Sekine NICT
* Rani Keren Huawei
* Sang-Kyu Lim ETRI
* Shang-Te Yang
* Sven Zeisberg HTW
* Takafumi Suzuki NICT
* Tetsushi Ikegami Meiji University
* Yasuharu Amezawa Mobile Techno

**TG6a 2nd Session**

**Thursday, March 10th 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, By Chair *Ryuji Kohno*
	2. 802 Mtg. Non-Registration Consequences, By Chair Ryuji Kohno (YNU / YRP-IAI)
	3. Opening Report Ryuji Kohno (YNU / YRP-IAI) doc.# 802.15- 22-0106-02-06a

**[Process for the Revision]**

* 1. Review and answer for comments for the Revision from EC and other 802 WGs, doc.#15-22-0167-00-06a, *Ryuji Kohno and Marco Hernandez* (YNU/YRP-IAI)
		+ What kind of dependability is focused in this TG? *(Pat Kinney)*
		+ Connectivity or some other network performance requested by medical use cases. *(Ryuji Kohno)*
		+ Medical use requires quite high-level dependability. *(Pat Kinney)*
		+ “Required for medical use cases” is added on PAR. *(Marco Hernandez)*
		+ Typo is corrected to “incur”.
	2. Agenda for next joint session with 4ab, 14, 6a, doc.#15-22-0130-00-0000, *Ryuji Kohno* (YNU/YRP-IAI)
	3. Summary of Channel Model Document for TG6ma, doc.#15-22-0091-01-06a, *Takumi Kobayashi* (YNU/ YRP-IAI)
		+ S8,9,10 are use cases. These can be included to S1~S7. *(Kamran Sayrafian)*
		+ We move these descriptions to use cases. *(Ryuji Kohno)*
		+ Body surface to body surface channel and HBAN coordinator to HBAN coordinator channel is different. *(Kamran Sayrafian)*
		+ Not large difference we assume. We will consider as the similar. *(Ryuji Kohno)*
	4. Recessed

Attendees 42

***Name Affiliation***

* Ryuji Kohno YNU/YRP-IAI
* Marco Hernandez YRP-IAI
* Takumi Kobayashi YNU/YRP-IAI
* Minsoo Kim YRP-IAI
* Akifumi Kasamatsu NICT
* Aniruddh Rao Samsung
* Ankur Samsung
* Benjamin Rolfe Blind Creek Associates
* Billy Verso Qorvo
* Carl Murray Qorvo
* Christos Strydis Erasmus MC
* Daoud Serang CML Microcircuits
* Frederic Nabki Spark
* Friedbert Berens FBConsulting
* Gary Stuebing
* Hiroki Saito ARIS
* Iwao Hosako NICT
* Jeng-Shiann Jiang Vertexcom
* Jinjing Jiang Apple
* Joerg Robert TU Ilmenau/Fraunhofer IIS
* Kamran Sayrafian NIST
* Keitarou Kondou HRCP
* Kristian Granhaug Novelda
* Lochan Verma Apple
* M. Ali Siddiqi TU Delft
* Masayuki Hirata Osaka University
* Mohammad Rahmani SPARK microsystems
* Norihiko Sekine NICT
* Oded Redlich Huawei
* Pat Kinney Kinney Consulting
* Rani Keren Huawei
* Sang-Kyu Lim ETRI
* Stefan Lemsitzer NXP
* Stephan Sand German Aerospace Center DLR
* Stuart Kerry OK-Brit; Self
* Sven Zeisberg HTW
* Takafumi Suzuki NICT
* Tero Kivinen Self
* Thomas Almholt TI
* Yasuharu Amezawa Mobile Techno
* Yongsen Ma Redpoint Positioning
* Yoshio Kashiwagi Nissin Systems

**802.15 TG 4ab / 14 / 6a Joint Session**

**Friday, March 11th , 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*
	2. 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.
	3. Agenda, *Clint Powel*, doc.# 15-22-0130-0000
	4. Registration Information, *Clint Powel*, doc.# 15-22-0130-0000

**[Presentations]**

**== Channel Model Updates, PAN & BAN ==**

* 1. Measurement based BAN channel model for XR applications: Part II, doc.#15-22-0169-00-04ab, *Carlos Aldana* (Meta)
		+ What is a reasonable channel model? When we evaluate model, how get easy to evaluate the model? If they are open source, we can use as a channel model of the standard. (*Ryuji Kohno)*
		+ Purpose of the evaluation of the channel model, what is a standard antenna? Implant devices as well. Not ideal mathematical antenna, easy implantable antenna we need to assume. More practical easy evaluate channel model is important.  *(Ryuji Kohno)*
		+ These are available for everyone. *(Carlos Aldana)*
		+ Japanese NICT has open-source phantom model of human body propagation. *(Ryuji Kohno)*
		+ You are never said about antenna issues. For the standard draft, we need to define typical antenna characteristics. *(Ryuji Kohno)*
		+ When we evaluate, antenna performance is quite important. *(Ryuji Kohno)*
		+ We want to know antenna position and characteristics in this presentation. Do you have more information? (*Kamran Sayrafian)*
		+ Doc.# 15-22-0062-01-04ab has some information. (*Calros Aldana)*
		+ When we discuss channel models in the joint session, we wish to discuss about common channel models of 6a, 4ab, and 14 as well as existing models like 4a. *(Ryuji Kohno)*

* + - Common channel models for UWB, Ryuji Kohno, doc.#15-22-0130-02-0000, *Ryuji Kohno* (YNU/YRP-IAI)

**== Channel Model Updates, HBAN & VBAN ==**

* 1. Summary of Channel and Environmental Model TG6a, doc.#15-22-0091-01-06a, *Ryuji Kohno* (YNU / YRP-IAI)
		+ 15.6 is addressed for more wider application. After standardization done, models are so useful for industry. *Benjamin Rolfe*
		+ For this collaboration and update, do we need some meeting in between this session and next May sessions? *Clint Powel*
		+ In BCI case, antenna is not allocated exact surface on the head. This issue is needed to discuss more about exact position of antennas. *Kamran Sayrafian*
		+ If we can compare BCI or head mounted device channel model and the other channel models, we can easily understand difference and can consider common channel model. *Kamran Sairafian*

**== TSN and Wireless ==**

* 1. TSN of 802.1 in wireless, doc.#15-22-0130-02-0000, *Ryuji Kohno*
	2. MAC Bridging for Time-Sensitive Networking of 802.15.6a, doc.# 15-22-0024-01-6a, *Minsoo Kim*
	3. Discussion
		+ Against 802.1 request, we need to answer about relevance issues. It is quite difficult that keeping full compatibility for TSN but TG6a is considering following partially. (*Ryuji Kohno*)
		+ On Relevance matrix, TSN => Yes, Dynamic Addr. => TBD, EPD => ? Bridging => Maybe on TG6 row. *(Ryuji Kohno, Marco Hernandez)*
	4. Any other business?
		+ No.
	5. Adjourn

**Attendees list**

Attendees 54

***Name Affiliation***

* Aniruddh Rao Samsung
* Benjamin Rolfe Blind Creek Associates
* Bharat Bhatia 3dB
* Billy Verso Qorvo
* Carl Murray Qorvo
* Carlos Aldana Meta
* Chitto Ghosh Meta
* Clark Palmer Meteorcomm LLC
* Clint Chaplin SRA
* Clint Powell Meta
* Daoud Serang CML Microcircuits
* David Barras 3db
* Frank Leong NXP
* Frederic Nabki Spark
* Friedbert Berens FBConsulting
* Gary Stuebing
* Godfrey, Tim
* Hiroki Saito ARIS
* Huan-Bang Li NICT
* Igor Dotlic Qorvo
* Jeng-Shiann Jiang Vertexcom
* Jinjing Jiang Apple
* Kamran Sayrafian NIST
* Kangjin Yoon Meta
* Libra Xiao
* Marco Hernandez YRP-IAI
* Masayuki Hirata Osaka University
* Mingyu Lee Samsung
* Minsoo Kim YRP-IAI
* Mohammad Rahmani SPARK microsystems
* Pat Kinney Kinney Consulting
* Phil Beecher WiSUN
* Pooria Pakrooh Qualcomm
* Riku Pirhonen NXP
* Robert Golshan Apple
* Run Chen NRT
* Ryuji Kohno YNU/YRP-IAI
* Santhoshkumar Mani
* Shang-Te Yang
* SK Yong
* Stuart Kerry OK-Brit; Self
* Sven Zeisberg HTW
* Taeyong Ha Samsung
* Takafumi Suzuki NICT
* Takumi Kobayashi YNU/YRP-IAI
* Tero Kivinen Self
* Tetsushi Ikegami Meiji University
* Thomas Almholt TI
* Wolfgang Kuechler NXP
* Yong Liu
* Yongsen Ma Redpoint Positioning
* Yoshio Kashiwagi Nissin Systems
* Zhenzhen Ye Redpoint positioning
* Ziqi Liu-vivo

**802.1 / 802.15 Joint Session**

**Wednesday, March 15th, 2021, AM 11:10- PM 1:00 EST**

**Room: Webex Virtual Conference**

* 1. Meeting called to order AM 11:10 EST

By Chairs *Glenn Parsons (Ericsson), Clint Powell (Meta)*

* 1. Registration Information, *Glenn Parsons, Clint Powell*
	2. Roll Call *Glenn Parsons, Clint Powell*
	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, Clint Powell*, doc.#15-22-0171-01-0000
		+ Approved.
	4. Intro and reminders, *Clint Powell*
	5. Recap, *Clint Powell*
	6. 802.1 Relevance to 802.15 MACs, doc.#15-22-0171-01-0000, *Benjamin Rolf* (CBA).

The discussion centers on the documented 22-0171-01 presented by Ben. Slide 19 presents the table with the different 802.15 WG with relevant activity for 802.1. Future meetings will aim to start addressing the different 802.15 MACs by 802.1.

* 1. Joint 802.1 / 802.15 Meeting Preparation, Clint Powell
	2. What now, Clint Powell
	3. Next Step, Clint Powell
		+ Discussion relating 802.3 bridging in TG6a, doc.# 15-22-0024-01-6a, *Ryuji Kohno(YRP-IAI)*
	4. Any other business?
		+ No.
	5. Adjourn

**Attendees list**

Attendees 105

***Name Affiliation***

* Akifumi Kasamatsu NICT
* Alex Atsushi Sato Yokogawa
* Amelia Andersdotter Sky
* Andreas Meisinger Siemens AG
* Aniruddh Rao Samsung
* Ann Krieger U.S. DoD
* Balazs Varga Ericsson
* Benjamin Rolfe Blind Creek Associates
* Billy Verso Qorvo
* Carlos Aldana Meta
* Chris Hett L+G
* Christian Boiger b-plus technologies GmbH
* Clark Palmer Meteorcomm LLC
* Claudio da Silva Meta
* Clint Powell Meta
* Craig Gunther LabN Consulting
* Dag T. Wisland Novelda AS
* Daisuke Takita Mitsubishi
* Daoud Serang CML Microcircuits
* David Barras 3db
* Dieter Proell Siemens AG
* Don Pannell NXP
* Don Sturek Itron
* Enrico Rantala Zeku
* Ersen Ekrem Apple
* Frank Schewe Phoenix Contact
* Frederic Nabki Spark
* Gary Stuebing
* Gavin Lai Moxa
* Geoff Garner Huawei
* Glenn Parsons Ericsson
* Godfrey, Tim
* Gunter Siemens AG
* Harry Bims Bim's Laboratories
* Hiroki Nakano CAHI Corporation
* Hiroki Saito ARIS
* Jack Zou
* Janos Farkas Ericsson
* Jarek Niewczas Qorvo
* Jens Bierschenk Robert Bosch GmbH
* Jessy Rouyer Nokia
* Jinjing Jiang Apple
* Joao Lopes Qualcomm
* Joe Gelish DDC
* Joerg Robert TU Ilmenau/Fraunhofer IIS
* Johannes Specht
* Josef Dorr Siemens AG
* Kai Lennert Bober Fraunhofer HHI
* Kangjin Yoon Meta
* Katsuyuki Akizuki NEC communication systems
* Keitarou Kondou HRCP
* Kenji Kondo Yaskawa
* Kristian Granhaug Novelda
* Larry McMillan
* Leon Wessels TSN Systems
* Lily Lv Huawei
* Lochan Verma Apple
* Ludwig Winkel
* Maik Seewald
* Marcel Kiessling Beckoff Automation
* Marco Hernandez YRP-IAI
* Marius Stanica ABB Motion
* Mark Gravel Hewlett Packard Enterprises
* Mark Hantel RA
* Martin Ostertag ZHAW
* Masayuki Hirata Osaka University
* Max Riegel Nokia
* Max Turner Ethernovia
* Michael Karl Marvell
* Mike Potts Molex
* Minsoo Kim YRP-IAI
* Mohammad Rahmani SPARK microsystems
* Nemanja Stamenic Siemens AG
* Norman Finn Huawei Technologies Co. Ltd
* Oded Redlich Huawei
* Oliver Klamser Pilz
* Paul Congdon
* Phil Beecher WiSUN
* Pooria Pakrooh Qualcomm
* Radhakrishna Canchi Kyosera International Inc
* Ralf Assmann Marvell
* Ramesh Sivakolundu CISCO
* Rodney Cummings NI
* Rodrigo F. Coelho Siemens AG
* Roger Marks EthAirNet Associates
* Rudy Belliardi Schneider Electric
* Ryuji Kohno YNU/YRP-IAI
* Satoko Itaya NICT
* Scott Mansfield Ericsson
* Shoichi Kitazawa Muroran IT
* Silvana Rodrigues Huawei
* SK Yong
* Stephan Kehrer Hirscmann
* Sven Zeisberg HTW
* Takahiro Yamamura Toshiba Coorporation
* Takumi Kobayashi YNU/YRP-IAI
* Tero Kivinen Self
* Tetsushi Ikegami Meiji University
* Thomas Kürner
* Tongtong Wang Huawei
* Yi yu Rockwell
* Yong Liu
* Yoshio Kashiwagi Nissin Systems
* Yoshiro Ito Nagoya Institute of Technology
* Zhenzhen Ye Redpoint positioning

**TG6a 3rd Session**

**Tuesday, March 15th 2022, AM 9:10-11:00 EST**

**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. Agenda, doc.# 15-22-0107-07, *Ryuji Kohno* (YNU/YRP-IAI)
	3. Review of joint 802.1 / 802.15 session on March 14th , doc.# 15-22-0171-01-0000, *Marco Hernandez* (YRP-IAI)
	4. Answer for comments from 802.3, doc.# 15-22-0167-02-06a, doc.# 15-22-0168-02-06a, *Marco Hernandez* (YRP-IAI)
		+ PAR 6.1.2, “may wish to” has been edited. (*Pat Kinney, Marco Hernandez)*
		+ We need to do TG motion to approve the edit. (*Pat Kinney*)
	5. Motion to approve resolutions to the comments from 802.1, 802.3, 802.11 WGs to the PAR Revision and CSD, doc.#15-22-0187-00-06a, *Ryuji Kohno*
		+ Move: Marco Hernandez, Second: Minsoo Kim
		+ Approved
	6. Review and update of PAR of the Revision, doc.#15-22-0088-02-06a, *Marco Hernandez*
	7. Review and update of CSD of the Revision, doc.#15-22-0087-02-06a, *Marco Hernandez*
	8. Motion to approve the updated PAR Revision and CSD according to resolutions to comments from 802.1, 802.3, 802.11 WGs, doc.#15-22-0188-00-06a, *Ryuji Kohno*
		+ Move: Marco Hernandez, Second: Minsoo Kim
		+ Approved

**[Discussion on Technical Requirement for 802.15.6 Revision]**

* 1. Considerations for MAC protocol in IEEE 802.15.6 BAN with Enhanced Dependability, doc.#15-22-0186-00-6a, *Minsoo Kim*
		+ How defines priority? What about permissible delay and packet error rate? (*Ryuji Kohno*)
		+ One of the possible way to define these priority order is like 3 level of delay and 2 level of packet error late achieves 6 level of priority level in total. (*Ryuji Kohno*)
		+ TSN thinking about link control layer but we do not need to focus on that. (*Marco Hernandez*)
	2. TG15.6a Coordinator-to-coordinator communication for Body Area Networks , doc.#15-21-0582-02-06a, *Minsoo Kim*
	3. Summary of Channel and Environmental Modeling Channel Model Document for the Revision, doc.# 15-22-0091-01-06a, *Takumi Kobayashi*
		+ For capsule endoscopy application, Implant to Body surface transmission is more reasonable than implant to external. (*Kamran Sayrafian*)
		+ BMI may have more wider meaning than BCI. (*Kamran Sayrafian*)
		+ We need to define what is BCI and what is BMI in our documents. (*Ryuji Kohno*)
	4. Any other business?
		+ No.
	5. Adjourn

Attendees 22

***Name Affiliation***

* Ryuji Kohno YNU/YRP-IAI
* Marco Hernandez YRP-IAI
* Takumi Kobayashi YNU/YRP-IAI
* Minsoo Kim YRP-IAI
* Boris Danev 3db
* Daoud Serang CML Microcircuits
* Enrico Rantala Zeku
* Gary Stuebing
* Hiroki Saito ARIS
* Huan-Bang Li NICT
* Iwao Hosako NICT
* Jeng-Shiann Jiang Vertexcom
* Kamran Sayrafian NIST
* Keitarou Kondou HRCP
* Masayuki Hirata Osaka University
* Pat Kinney Kinney Consulting
* SK Yong
* Takafumi Suzuki NICT
* Thomas Almholt TI
* Volker Jungnickel Fraunhofer HHI
* Yasuharu Amezawa Mobile Techno
* Yoshio Kashiwagi Nissin Systems