**IEEE P802.15**

**Wireless Personal Area Networks**

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| --- | --- |
| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **<IEEE802.15 WG minutes>** |
| Date Submitted | [15 Nov 2019] |
| Source | [Clint Powell][<PWC LLC>][Phoenix, AZ] | Voice: [+1.480.586.8457]Fax: [-]E-mail: [cpowell@ieee.org] |
| Re: | [802.15 Plenary Meeting in Waikoloa, Hawaii] |
| Abstract | [IEEE 802.15 Working Group Minutes] |
| Purpose | [Official minutes of the Working Group Session] |
| Notice | This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |
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**123rd IEEE 802.15 WSN MEETING**

**HILTON WAIKOLOA VILLAGE HOTEL AND CONFERENCE CENTER**

**WAIKOLOA, HAWAII, USA**

**November 11-14, 2019**

**Monday, 11 Nov 2019**

**10:30 AM** The acting-chair, Rick Alfvin (Linespeed), called the meeting to order (15-18-0468-04)

* Rick announced that the 802.15 WG Chair, Dr. Bob (Thanks for all the Fish) Heile. and 1st Vice Chair/Secretary, Pat (Prognosticator of Meeting Minutes) Kinney were both unable to attend this meeting due to family emergencies.
* Rick communicated that Mike McGinnis, a major proponent for harvested energy devices for 802.15, a great colleague and even better friend to many in 802. as well as a major contributor to 802.15, recently passed away in his sleep. Rick asked for a moment of silence in remembrance of Mike.

The chair showed a face-to-face presentation on this venue, i.e. “802\_1119\_Things to Know”.

* Luau Social Wed. eve. - $30/person.
* Free dolphin show Tues. am 7:35am in the saltwater lagoon adjacent to the lunch area.

Announcements:

* Registration for the January Interim meeting at Hotel Irvine, in Irvine, CA will be opening this Wednesday. Once open please register ASAP.

Acting-Chair asked for new attendees to raise their hands; there were seven.

Acting-Chair displayed and read the standard IEEE Anti-Trust statement.

Acting-Chair asked the participants who wished to declare a Letter 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. There were no attendant responses to this call.

* No questions were asked.

Acting-Chair informed the group of, and displayed the IEEE-SA patent policy presentation slides 0-5 *(*[*http://standards.ieee.org/board/pat/pat-slideset.ppt*](http://standards.ieee.org/board/pat/pat-slideset.ppt)*).*

Acting-Chair informed the group of, and displayed the IEEE-SA copyright policy
*(document* [*15-19-0504-00-0000*](https://mentor.ieee.org/802.15/dcn/19/15-19-0504-00-0000-patent-copyright-policies.pptx)*)*

Acting-Chair informed the group of, and displayed the IEEE-SA ethics and conduct policy
*(document* [15-19-0504-00-0000](https://mentor.ieee.org/802.15/dcn/19/15-19-0504-00-0000-patent-copyright-policies.pptx)*)*

James Gilb moved to *approve the agenda (document* [*15-19-0468-05-0000*](https://mentor.ieee.org/802.15/dcn/19/15-19-0468-05-0000-koa-2019-graphic-agenda.xlsx)*)*

with Tim Harrington seconding the motion. Following no objection, the agenda was approved.

James Gilb moved *to approve the previous meeting minutes (document* [*15-19-0408-00-0000*](https://mentor.ieee.org/802.15/dcn/19/15-19-0408-00-0000-working-group-minutes-for-sept-2019.docx)*)*

*15-19-0408-00-0000)* and Tim Harrington seconded the motion. Following neither discussion nor objection the minutes were approved. There were no matters resulting from the previous minutes.

Acting-Chair informed the group of current 802.15 voting status:

* 93 voters
* 7 nearly
* 20 aspirant

Ben Rolfe (Blind Creek Associates) presented the treasurer’s report *(*[*ec-19-0151-00-WCSG*](https://mentor.ieee.org/802-ec/dcn/19/ec-19-0151-00-WCSG-wcsc-march-2019-status-report.pptx)*).*

* Hanoi (300 attendees) summary: ~ -$1750
* Reserves: ~$400k (on target)
* Irvine: est. loss ~ -$22k

Future Sessions

* January 12-17, 2020 Hotel Irvine, Irvine CA *Wireless Interim Session.\**
* March 15-20, Hilton Atlanta, Atlanta, GA, *802 Plenary Session.*
* May 10-15, 2020 Warsaw Marriott *Wireless Interim Session.\**
* July 12-17, 2020, Sheraton Montreal, Quebec Canada, *802 Plenary Session.*
* September 13-18, 2020, Grand Hyatt Buckhead, Atlanta, GA *Wireless Interim Session.\**
* November 8-13, Bangkok Marriott Marquis Queen’s Park, *802* *Plenary Session.*

**Status Reports**

802.18 by Jay Holcomb (Itron)

* + WRC19 is in the middle of regular 3-4 yr session
	+ Asia update on Thurs.

802.15

Task Group 4md – Revision by G Stuebing (Cisco Systems)

* 6 sessions this week
* Draft is out for recirculation until Fri.
* Will look at how TG can stay on track for SB submission

Task Group 4w – LPWA by J Robert (University of Erlangen-Nuremberg)

* Draft is finished, waiting for publication of 4md before sending draft to RevCom

Task Group 4y – SECN by D Sturek (Itron)

* 4 sessions this week
* Working to get 1st WG Letter Ballot out

Task Group 4z – ELR by T Harrington (UWB Alliance)

* Recirculation (D4) just closed (76 technical, 92 editorial)
* 12 sessions this week
* Working on comment resolutions and getting D5 out for WG ballot

Task Group 9ma – by Tero Kivinen (self)

* + - 3 sessions this week
		- Will start on developing draft
		- Collect and assemble changes to be done, start draft

Task Group 13 –Multi Gigabit/sec OWC by V Jungnickel (Fraunhofer Heinrich Hertz Institute)

* + - 5 sessions this week
		- Finalize modifications to draft, start WG ballot bye end of meeting
		- Update Project Plan/Timeline

Task Group 22 -15.22.3 Spectrum Characterization and Occupancy Sensing (SCOC) by Apurva Mody

* No sessions this week

IG Dep by R Kohno (YNU/CWC-Nippon)

* 3 sessions this week
* Dr. Kohno presented *(document* [*15-19-0497-02*](https://mentor.ieee.org/802.15/dcn/19/15-19-0497-02-0dep-ig-dep-opening-information-for-november-2019.pptx)*)*
* 1 presentation during WNG

IG Profiles by D Sturek (Itron)

* 1 session this week
* Looking to finalize spreadsheet to be sent out to various consortiums

TAG TeraHz by T Kürner (TU Braunschweig)

* No sessions this week

Task Group 12 –Upper Layer Interface (ULI) by P Kinney (Kinney Consulting)

* No sessions this week

Standing Committees (SCmaintenance, SCwng) by P Kinney (Kinney Consulting)

* No SCmaintenance sessions this week
	+ - WNG will have 1 presentation this week on Brain Machine Interface with WBAN, given by Prof. Masayuki Hirata, MD, PhD & Meng, Dept of Neurological Diagnosis and Restoration, Osaka University Graduate School of Medicine

802.19 Coexistence Group by B Rolfe (BCA/MERL/UWB Alliance)

* 3 TG3 sessions this week
* 802.19 will again discuss a coexistence recommendation

802.24 TAG by B Rolfe (BCA/MERL/UWB Alliance)

* 3 sessions this week
* Working on a PAR for 802.16, intending for work to be done within 802.15 once approved, as TG 802.15.16

**11:10 AM** The Acting-Chair recessed the meeting

**Wednesday, 13 Nov 2019**

**10:34** Acting-Chair, Rick Alfvin (Linespeed) called the meeting to order.

Announcements:

* Acting-Chair made announcements concerning social, logistics, and affiliation requirements.
* Acting-Chair made announcements that the Registration for the January Interim meeting at Hotel Irvine, in Irvine, CA is now open. Please register ASAP.

**10:36** 802.18 TAG liaison by J Holcomb (Itron)

* Discussions about recent FCC activity around 6 GHz band
* ETSI Guide for Harmonized Standards was Rejected
* Looking to get (IEEE 802) more involved in WRC

802.15

**10:40** TG4md by G Stuebing (Cisco)

* Discussing direction forward
* Have had 1 submission with comments on Letter Ballot closing on Fri. 11/13
* Looking at options to still achieve going to sponsor ballot before January

**10:42** TG4w by J Robert (Friedrich-Alexander-Universität Erlangen)

* Discussing test vectors
* No sessions intended for next meeting

**10:44** TG4y by D Sturek (Itron)

* Will run an informal TG review between now and Jan. Mtg.
* Will start letter ballot after the Jan. Mtg.
* Working on proposed changes to operations manual for an 802.15 Standing Committee on Security

**10:46** IG Profiles by D Sturek (Itron)

* Went through contribution from Tero Kivinen
* Preparing for reach out to other standards bodies using 802.15 on what’s being used

**10:48** TG4z by T Harrington (Pro ID)

Move that *802.15 WG start a WG Recirculation Letter Ballot requesting approval of CA document 15-18-0523-06-004z and document P802.15.4z\_D05, and to forward draft and CA document to the Standards Association Ballot.*

Moved by: Tim Harrington (Pro ID)

Seconded by: Ben Rolfe (BCA/MERL/UWB Alliance)

Upon neither discussion nor objection the vote was taken and passed with unanimous consent, motion carries.

Move that *802.15 WG approve the formation of a Comment Resolution Group (CRG) for the WG balloting of the P802.15.4z\_D05 with the following membership: Tim Harrington (Chair), Ayman Naguib, Mingyu Lee, Aditya Padaki, Billy Verso, Frank Leong, Ben Rolfe, David Barras, Boris Danev, Brima Ibrahim, Paul Kettle, Zheda Li, Clint Chaplin, Jochen Hammerschmidt, Tushar Shah. The 802.15.4z CRG is authorized to approve comment resolutions, edit the draft according to the comment resolutions between sessions, and to approve the start of recirculation ballots of the revised draft on behalf of the 802.15 WG. Comment resolution on recirculation ballots between sessions will be conducted via reflector email and via teleconferences announced to the reflector as per the LMSC 802 WG P&P.*

Moved by: Tim Harrington (Pro ID)

Seconded by: Ben Rolfe (BCA/MERL/UWB Alliance)

Question: Should there be wording TG motion was the same as amended wording above, TG4z TG Vice-Chair responded yes.

Question: Is wording in TG motion was the same as amended wording above, TG4z TG Vice-Chair responded yes.

Question: Is CRG balanced - one entity has 4, but TG felt it was ok.

One additional name was added to the CRG list.

Upon no objection the vote was taken and passed with unanimous consent, motion carries.

**11:04** TG9ma closing report by T Kivinen (self) *(*[*15-19-0508-01*](https://mentor.ieee.org/802.15/dcn/19/15-19-0508-01-09ma-tg9ma-kona-closing.pptx)*)*

* No contributions received this Mtg.

**11:05** TG13 by V Jungnickel (Fraunhofer Heinrich Hertz Institute)

* Working on finishing CAD

**11:07** IG Dependability by R Kohno (YNU/CWC-Nippon)

* Working on PAR and CSD

**11:10** TG22-15.22.3 by Apurva Mody

* No sessions this week

Move that *802.15 WG approve the formation of a Comment Resolution Group (CRG) for the SA balloting of the P802.15.22.3 D05 with the following membership: Apurva N. Mody (Chair), Oliver Holland, Roger Hislop, Michael Cotton, Doug Boulware, Gianfranco Miele, Ranga Reddy and Dr. James P. K. “Trainwreck” Gilb. The 802.15.22.3 CRG is authorized to approve comment resolutions, edit the draft according to the comment resolutions, and to approve the start of recirculation ballots of the revised draft on behalf of the 802.15 WG. Comment resolution on recirculation ballots between sessions will be conducted via reflector email and via teleconferences announced to the reflector as per the LMSC 802 WG P&P.*

Moved by: Ben Rolfe

Seconded by: Clint Powell

Question: Is CRG balanced - one entity has 2.

One additional name was added to the CRG list.

Upon no objection the vote was taken and passed with unanimous consent, motion carries.

**11:12** IG VAT closing report by Yeong Min Jang (YNU/CWC-Nippon) *(*[*15-19-0562-01*](https://mentor.ieee.org/802.15/dcn/19/15-19-0562-01-0vat-ig-vat-closing-report-nov-2019-meeting.pptx)*)*

* 1 contribution heard this week

**11:15** TAG THz by T Kürner (TU Braunschweig)

* Not sessions this week

**11:15** TG 15.12 ULI by P Kinney (Kinney Consulting)

* Not sessions this week

**11:15** SC reports by P Kinney (Kinney Consulting)

* No SC sessions this week except for WNG
* SC WNG: one presentation to be heard, immediately following mid-week plenary

**11:15** 802.19 Coexistence Group by B Rolfe (BCA/MERL/UWB Alliance)

* WG worked on guidelines for coexistence - to be balloted
* TG3 will go over contribution to a potential draft

**11:19** 802.24 TAG by T Godfrey (EPRI)

* Working on PAR

**11:22** Acting-Chair recessed the meeting until Thursday evening.

**Thursday, 14 Nov 2019**

**16:00** Acting-Chair, Rick Alfvin (Linespeed) called the meeting to order.

**16:02** 802.11 update by S Shearer (Octobox)

* Effort working on sensing
* Coexistence is a hot topic
* 11be, discussing multiple data rates and higher bandwidth, had 9 meetings this week
* 11ax looking at 6 GHz, with 18 meetings this week
* 11az, next gen position, with several meetings this week, ongoing test events in Wi-Fi Alliance
* 11bb, light comm met this week
* 11ba, ULP Radio Initiative met this week
* 11ec, enhanced broadcast service, i.e. streaming video to 100 clients
* Vehicle Anywhere Technology met this week
* 11ay, 60 GHz enhancements, finished business in 1 meeting, for backhaul

**16:05** Acting-Chair conducted the following straw polls

* Straw Poll:Would you like to return to this venue for a future session?
	+ Y: 24
	+ N: 4
* Straw Poll: Did you attend the social?
	+ Y: 20
	+ N: 12
* Straw Poll: For those that attended the social, did you enjoy the social?
	+ Y: 19
	+ N: 0

**16:12** P802.16t project by Tim Godfrey (EPRI)

Since the 802.16 WG has been hibernated, changes to the standard, in this case an amendment, have been proposed to be done in the 802.15 WG.

Need for IEEE 802.16t: Mission critical entities have a strong preference for private, licensed networks for their data communications needs. Licensed channels from 5 kHz to 1 MHz may be available from the FCC and other regulators, or may be purchased in secondary markets at a lower cost than commercial channels. Examples of operating frequencies include 160 MHz, 450 MHz, 700 MHz, and 900 MHz. Furthermore, VHF/UHF channels have superior propagation characteristics requiring less infrastructure and are capable of meeting capacity needs of private networks. The amendment facilitates the development of innovative, cost-effective, and interoperable multivendor products for private licensed wireless access systems for mission critical networks. Applications include smart grids supporting generation, transmission, and distribution; field area networks; smart fields and smart pipes for oil and gas; intelligent transportation for rail systems; and federal, state and local uses for homeland security, environmental and seismic monitoring and military communications.

The purpose of the following motions are to provide assurance to the 802 EC that the 802.15 WG will provide the necessary support (e.g. a voter pool) to review the draft upon its generation by former 802.16 members.

Move that *802.15 WG approve the PAR and CSD comment responses in document 802.24-19-0035r0, and the resulting changes to the P802.16t PAR and CSD (as updated in 802.24-19-0029r6 and 802.24-19-0030r1 respectively).*

Moved by: Tim Godfrey (EPRI)

Seconded by: Clint Powell (PWC)

Question was asked when the PAR and CSD was posted. Response was a couple months ago.

Upon no objection the vote was taken with the results of 17/3/4, motion carries.

Move that *802.15 WG approve the PAR and CSD contained in 802.24-19-0029r6 and 802.24-19-0030r1, respectively, and that the EC be requested to forward the PAR to NesCom. The 802.15 WG Chair and technical editor are authorized to make additional modifications to the PAR and CSD as needed to reflect EC discussion at its closing meeting.*

Moved by: Tim Godfrey (EPRI)

Seconded by: Ben Rolfe (BCA/MERL/UWB Alliance)

Question was asked when the PAR and CSD was posted. Response was on Wed.

Upon no objection the vote was taken with the results of 18/3/4, motion carries.

Move that *802.15 WG, pending approval of the P802.16t PAR in document 802.24-19/0029r6 (or later version), agrees to take on the project.*

Moved by: Tim Godfrey (EPRI)

Seconded by: Dr. James P. K. “Trainwreck” Gilb

Since the PAR and CSD was just approved, what is the purpose of this. Response was to formally accept the project.

Upon no objection the vote was taken with the results of 16/5/3, motion carries.

Move that *802.15 WG seeks approval from the 802 EC to form a study group in 802.15 to develop the PAR and CSD documents for Licensed Narrowband Amendment to 802.16 and additionally authorize the 802.15 WG Chair to make any necessary changes to these docs required to support the submission.*

Moved by: Tim Godfrey (EPRI)

Seconded by: Clint Powell (PWC)

Question was asked why a study group vs interest group and will there be enough people to participate. Response was that 15-30 have been participating in 802.24 in preparation for this, and those and possibly more are anticipated.

Upon no objection the vote was taken with the results of 17/4/2, motion carries.

Note: The above motion is in case comments are received from NesCom, the Study Group is then able to deal with them.

**16:25** TG4md closing report by Gary Stuebing (Cisco Systems) *(15-19-0571-01)*

* TG voted on new CRG
* No comments received on ballot currently set to close on Sat. at 1pm

Motion: *802.15 has reviewed and approves and requests conditional approval from the EC to submit P802.15.4-REVd-D04 (or current revision) to Standards Association ballot.*

Moved by: Gary Stuebing (Cisco)

Seconded by: Kunal Shah (Itron)

Upon neither discussion nor objection the vote was taken with the results of 21/0/1, motion carries.

Move that *802.15 WG approve the formation of a Comment Resolution Group (CRG) for the WG and/or SA balloting of the P802.15.4-REVd-D04 with the following membership: Gary Stuebing (Chair), Don Sturek, Kunal Shah, Ruben Salazar, Tero Kivinen, Phil Beecher, Shoichi Kitazawa and Clint Powell. The 802.15.4md CRG is authorized to approve comment resolutions and to approve the start of recirculation ballots of the revised draft on behalf of the 802.15 WG. Comment resolution on recirculation ballots between sessions will be conducted via reflector email and via teleconferences announced to the reflector as per the LMSC 802 WG P&P*

Moved by: Gary Stuebing (Cisco)

Seconded by: Ben Rolfe (BCA/MERL/UWB Alliance)

Question was asked if there are more than 2 people from the same affiliation. The response was no.

Upon no objection the vote was taken and passed with unanimous consent, motion carries.

**16:35** TG4w LPWA closing report by Jörg Robert (Friedrich-Alexander-Universität Erlangen) *(15-19-0576-00)*

* Putting together test vectors.
* Will not be meeting at Jan. Mtg.

**16:42** TG4y closing report by D Sturek (Itron) *(15-19-0558-01)*

* Reviewed section 9 and edits
* Document started with amendment text
* Will have an informal TG review prior to Jan. Mtg.
* Planning to start WG ballot after Jan. Mtg.
* Will request a new Security Standing Committee be formed to monitor security aspects going forward
	+ Question asked if SC would be for all of .15 or just 15.4. Response is that it should be for all of .15, especially those using 15.4 constructs, which most if not all other .15 work streams have been, of those that have implemented security.

**16:50** IG Profiles closing report by D Sturek (Itron) *(15-19-0xxx-0x)*

* NTR

**16:50** TG4z closing report by C Chaplin (Samsung) *(15-19-0xxx-0x)*

* WG Letter Ballot recirculation started
* Vice-Chair communicated that after a trip to the ER last evening, the Chair (Tim Harrington) is doing well.

Motion: *802.15 has reviewed and approves the CSD ec-18-0085-00-ACSD-802-15-4z.docx, and the CA document 15-18-0523-06, and requests conditional approval from the EC to submit P802.15.4z-D5 (or current revision) to Standards Association ballot.*

Moved by: Clint Chaplin (Samsung)

Seconded by: Ben Rolfe (BCA/MERL/UWB Alliance)

Upon neither discussion nor objection the vote was taken with the results of 22/1/4, motion carries.

TG4z result: Y / N / A = 13 / 0 / 0

**16:55** TG9ma by T Kivinen (self)

* Closing report given during mid-week plenary.

**16:55** TG13 closing report by V Jungnickel (Fraunhofer Heinrich Hertz Institute) *(15-19-0575-0x)*

* Original (thick) document had to be rebuilt as a new document, resulting in a new doc with only 115 pages – a major effort by all those involved.

Move that *802.15 WG start a WG Letter Ballot requesting approval of CA document 15-19/0572r0 and document P802-15-13\_D8 (as edited in accordance with the instructions in document 15-19/0534r2) and to forward document P802-15-13\_D8, as edited in accordance with the instructions in document 15-19/0534r2, and CA document 15-19/0572r0 to Standards Association ballot pending the completion and inclusion of the edits in the draft.*

Moved by: Volker Jungnickel (Fraunhofer Heinrich Hertz Institute)

Seconded by: Clint Powell (PWC)

Upon neither discussion nor objection the vote was taken with the results of 20/0/5, motion carries.

TG13 result: Y / N / A = 4 / 0 / 0

Move that *802.15 WG approve the formation of a Comment Resolution Group (CRG) for the WG balloting of the P802.15.13\_D8 with the following membership: Volker Jungnickel, Nikola Serafimovski, Tuncer Baykas, Jörg Robert. The 802.15.13 CRG is authorized to approve comment resolutions, edit the draft according to the comment resolutions, and to approve the start of recirculation ballots of the revised draft on behalf of the 802.15 WG. Comment resolution on recirculation ballots between sessions will be conducted via reflector email and via teleconferences announced to the reflector as per the LMSC 802 WG P&P.*

Moved by: Volker Jungnickel (Fraunhofer Heinrich Hertz Institute)

Seconded by: Dr. James P. K. “Trainwreck” Gilb

Question on whether there is more than person with the same affiliation. Response was no.

Upon no objection the vote was taken and passed with unanimous consent, motion carries.

**17:05** TG22-15.22.3 by Oliver Holland (Advanced Wireless Technology Group)

* In comment resolution
* Looking to start recirculation in Dec.

**17:12** IG Dependability closing report by H Li (NICT) *(15-19-0567-00)*

* Review previous documents, including technical req’s. and 802.15.6
* Had some discussions on PAR and CSD

**17:16** IG VAT by Yeong Min Jang (YNU/CWC-Nippon)

* Closing report given during mid-week plenary.

**17:16** TAG THz closing report by T Kürner (TU Braunschweig)

* No sessions this week

**17:16** TG 15.12 ULI closing report by P Kinney (Kinney Consulting)

* No sessions this week

**17:16** SC closing reports by P Kinney (Kinney Consulting)

* No SC sessions this week except for WNG
* SC WNG: one presentation was heard during mid-week plenary

**17:17** 802.18 Radio Regulatory TAG by J Holcomb (Itron)

* TeraHertz submission being worked on for ITU

**17:20** 802.19 Coexistence Group by B Rolfe (BCA/MERL/UWB Alliance) *(19-19-0084-00)*

* OM and Guidelines changes have been split into 2 ballots, to be started soon
* TG3 held sessions this meeting
	+ Framework draft will go out for informal review before Jan.
	+ WG ballot will go out in Jan.

**17:25** 802.24 TAG by T Godfrey (EPRI)

* Worked on 16 PAR and CSD
* Tutorial on power over ethernet – single paired
* Reviewed low latency white paper
* Reviewed 802.11 white paper contribution

**New Business**

* Next meeting in Jan.

**AoB**

**17:30** Motion *to adjourn* was made by Ben Rolfe (BCA/MERL/UWB Alliance). Upon hearing no objection, the motion carries; the session is adjourned.

**Annex A** Attendance = 57

|  |  |  |
| --- | --- | --- |
| **Last Name** | **First Name** | **Affiliation** |

|  |  |  |
| --- | --- | --- |
| Akhavan | Koorosh | Qualcomm Incorporated |
| Alfvin | Richard | Linespeed Events LLC |
| Berens | Friedbert | FBConsulting Sarl |
| Bims | Harry | Bims Laboratories, Inc. |
| Bober | Lennert | Fraunhofer Heinrich Hertz Institute |
| Bouchet | Olivier |  |
| Chaplin | Clint | Samsung Research America |
| Choi | Sangsung | Woosong University |
| Cotton | Michael G | NTIA |
| De Ruijter | Hendricus | Silicon Laboratories |
| Dewberry | Brandon | Apple, Inc. |
| Feng | Xiang | Keysight Technologies |
| Gilb | James | Gilb Consulting, Inc. |
| Godfrey | Tim | Electric Power Research Institute, Inc. (EPRI) |
| Golshan | Robert | Apple, Inc. |
| Guo | Jianlin | Mitsubishi Electric Research Labs (MERL) |
| Hammerschmidt | Joachim | Apple, Inc. |
| Hara | Shinsuke | Osaka City University (OCU) |
| Harrington | Timothy | Pro-ID |
| Hett | Christopher | Landis Gyr Group Worldwide |
| Hirata | Masayuki | Osaka University Graduate School of Medicine, Dept of Neurological Diagnosis and Restoration |
| Holcomb | Jay | Itron Inc. |
| Holland | Oliver | Advanced Wireless Technology Group, Ltd. |
| Ibrahim | Brima | NXP Semiconductors |
| JOO | SEONG-SOON | Electronics and Telecommunications Research Institute (ETRI) |
| Jungnickel | Volker | Fraunhofer Heinrich Hertz Institute |
| Kameda | Seiji | Osaka University Graduate School of Medicine |
| Karthik | S. G. | SAMSUNG ELECTRONICS |
| Kitazawa | Shoichi | Muroran IT |
| Kivinen | Tero | Self Employed |
| Knobloch | Daniel | BMW Group |
| Kohno | Ryuji | YNU/CWC UofOulu |
| Krieger | Ann | US Department of Defense |
| LEE | Mingyu | Samsung Electronics Co., Ltd. |
| LEE | MINWOO | SNUT |
| Leong | Frank | NXP Semiconductors |
| Li | Huan-Bang | National Institute of Information and Communications Technology (NICT) |
| Li | Zheda | Samsung Research America |
| Lorbach | Thomas | NXP Semiconductors |
| Matsuoka | Toshimasa | SPChange |
| Naguib | Ayman | Apple, Inc. |
| Nelson | Kathleen | Ondas Networks |
| Orlik | Philip | Mitsubishi Electric Corporation |
| Polland | Joe | CommScope, Inc. |
| Powell | Clinton | Powell Wireless Consulting, LLC |
| Robert | Joerg | University of Erlangen-Nuremberg |
| Rolfe | Benjamin | Blind Creek Associates |
| Sakata | Ren | TOSHIBA Corporation |
| Salazar Cardozo | Ruben E | Landis+Gyr AG |
| Shah | Tushar | Apple, Inc. |
| Simpson | Guy | Full Spectrum |
| Stuebing | Gary | Cisco Systems, Inc. |
| Sturek | Don | Itron Inc. |
| Suzuki | Takafumi | NICT |
| Tedrow | Craig | General Electric |
| Verso | Billy | DecaWave |
| Yang | Shang-Te | Apple, Inc. |