IEEE P802.11
Wireless LANs

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| IEEE 802.11bf - November 2020 Plenary Meeting Minutes |
| Date: 2020-11-09 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Leif Wilhelmsson | Ericsson AB | Mobilvägen 1, 22632 Lund, Sweden | +46-706-216956 | leif.r.wilhelmsson@ericsson.com |
| Claudio da Silva  | Intel |  |  |  |

Abstract

Rev 0: This document contains the meeting minutes of IEEE 802.11bf teleconferences held during the November 2020 IEEE 802 Plenary.

**Teleconference on November 3rd, 2020**

Minutes taken by Claudio da Silva.

1. The IEEE 802.11 TGbf teleconference was called to order at 9:00am ET by the Chair (Tony Xiao Han, Huawei).
	1. Attendance log can be found in Appendix 1.
2. The agenda for the meeting can be found in IEEE 802.11-20/1624r1.
3. Guidelines on “Meeting Protocol, Attendance, Voting & Document Status” (slide 4) were reviewed. No items noted.
4. Patent policy guidelines (slides 6-9) were reviewed. No items noted.

The chair made a Call for Potentially Essential Patents. No potentially essential patents reported, and no questions asked.

1. Guidelines on the IEEE Codes of Ethics & Conduct, "individual process," and "fair & equitable consideration" (slides 10-12) were reviewed. Required notices (slide 13) were also reviewed. No items noted.
2. The proposed agenda (slide 14) was reviewed and approved without objection.
3. Motion “Move to approve SENS SG and TGbf minutes of meetings and teleconferences from September 2020 meeting to today:

September interim: https://mentor.ieee.org/802.11/dcn/20/11-20-1465-00-SENS-wlan-sensing-sg-september-2020-interim-meeting-minutes.docx

Teleconferences September-October: https://mentor.ieee.org/802.11/dcn/20/11-20-1729-00-00bf-ieee-802-11bf-teleconference-meeting-minutes-september-and-october-2020.docx”

Move: Claudio da Silva (Intel)

Second: Sang Kim (LG)

Discussion: No discussion.

Result: Approved with unanimous consent.

1. Chair initiated a discussion on TGbf’s timeline by presenting the contribution “802.11bf timeline discussion,” doc. IEEE 11-20/1746r0.
	1. Floor was opened for discussion after the presentation. Various aspects of the presentation/proposal were discussed.
	2. The following SP was conducted: “Do you agree with the timeline presented on slide 5 of 20/1746r0 as the initial time estimate for the development of P802.11bf amendment?”

Results were: Yes 90, No 1, Abstain 29.

1. Chair conducted a last call for TGbf’s officer nominations. As shown in slide 17, up to that time, the following nominations had been received:
	1. Vice-chair position: Sang Kim and Assaf Kasher
	2. Technical editor: Claudio da Silva
	3. Secretary: Oscar Au, Leif Wilhelmsson, and Michel Allegue

No other nominations were received/made during the meeting/teleconference.

1. Chair discussed TGbf’s leadership structure (slides 18 and 19) and, in particular, the issue of the number of Vice Chairs.
	1. Floor was opened for discussion. Various aspects of the proposed leadership were discussed.
	2. The following SP was conducted: “How many Vice Chairs do you prefer for TGbf?”

Results: One (32), two (99), no answer (78)

1. Chair stated that confirmation motions and elections for secretary will be made on the November 6th teleconference.
2. Chair presented a proposal for future teleconference times.
	1. After changes, the days and times found in slide 22 of IEEE 802.11-20/1624r2 were agreed upon.
3. Presentation of “Learning-based spectrum occupancy prediction exploiting multi-dimensional correlations,” doc. IEEE 11-20/1709r3, by Mehmet Ali Aygul (VESTEL, IMU).
	1. Presentation was followed by Q&A. Technical discussion of multiple aspects of the contribution were discussed.
4. Meeting recessed at 11:00am ET.

**Teleconference on November 6th, 2020**

Minutes taken by Claudio da Silva.

1. The IEEE 802.11 SENS SG teleconference was called to order at 9:08am ET by the Chair (Tony Xiao Han, Huawei).
	1. Attendance log can be found in Appendix 2.

2. The agenda for the meeting can be found in IEEE 802.11-20/1624r3.

3. Guidelines on “Meeting Protocol, Attendance, Voting & Document Status” (slide 4) were reviewed. No items noted.

4. Patent policy guidelines (slides 6-9) were reviewed. No items noted.

The chair made a Call for Potentially Essential Patents. No potentially essential patents reported, and no questions asked.

5. Guidelines on the IEEE Codes of Ethics & Conduct, "individual process," and "fair & equitable consideration" (slides 10-12) were reviewed. Required notices (slide 13) were also reviewed. No items noted.

6. The proposed agenda (slide 23) was reviewed and approved without objection.

1. The chair presented the timeline shown in slide 24, which was discussed, and straw-polled, during the November 3rd teleconference/session.
	1. The motion found in slide 25 of 20/1624r3 was presented to the group. Motion was moved by Oscar Au (Origin Wireless) and seconded by Assaf Kasher (Qualcomm).
	2. Floor was opened for discussion. One participant spoke in favor of the motion.
	3. Motion was approved with unanimous consent.
2. The chair presented the TGbf leadership structure shown in slide 26.
	1. Naftali Chayat of Vayyar Imaging nominated himself for the position of Vice Chair.
	2. Chair stated that, as specified in the call for nominations (<https://www.ieee802.org/11/email/stds-802-11/msg04933.html>), nominations were due on November 3rd and, as result, he was unable to accept/consider the nomination.
3. The chair presented slide 27 that shows the 3 nominations received for the TGbf secretary position.
	1. Chair asked each of the three candidates to introduce themselves to the group.
	2. After stating that the vote was for 802.11 voting members only, the vote found in slide 27 of 20/1624r3 was conducted.
		1. Oscar Au received 26 votes
		2. Leif Wilhelmsson received 62 votes
		3. Michel Allegue received 4 votes
	3. After the teleconference, the received votes were audited to remove any potential votes mistakenly casted (e.g., vote by a non-802.11 voting member), and the final count was:
		1. Oscar Au received 16 votes
		2. Leif Wilhelmsson received 56 votes
		3. Michel Allegue received 2 votes
4. The motion “Move to confirm Sang Kim as TGbf Vice-Chair”, moved by Oscar Au and seconded by Jinsoo Choi was approved by unanimous consent.
5. The motion “Move to confirm Assaf Kasher as TGbf Vice-Chair”, moved by Oscar Au and seconded by Jinsoo Choi was approved by unanimous consent.
6. The motion “Move to confirm Claudio Da Silva as TGbf Technical Editor”, moved by Edward Au and seconded by Oscar Au was approved by unanimous consent.
7. The motion “Move to confirm Leif Wilhelmsson as TGbf Secretary”, moved by Oscar Au and seconded by Sang Kim was approved by unanimous consent.
8. Presentation of “Feasibility Study of Human Pose and Occupancy Classification using mmWave WiFi Beam Attributes” by Pu (Perry) Wang (MERL), Doc. IEEE 11-20/1741r0.
9. Presentation was followed by technical discussion.
10. Presentation of “Regulatory aspects of sensing” by Naftali Chayat (Vayyar), Doc. IEEE 11-20/1757r0.
11. Presentation was followed by technical discussion.
12. Meeting recessed at 11:03am ET.

**Monday, November 9, 2020, 9:00-11:00 am (ET)**

Minutes taken by Leif Wilhelmsson.

**Meeting Agenda:**

The meeting agenda is shown below, and published in the agenda document: <https://mentor.ieee.org/802.11/dcn/20/11-20-1624-04-00bf-tgbf-meeting-agenda-2020-11-plenary.pptx>

1. Call the meeting to order
2. Patent policy and logistics
3. Teleconference Times
4. Presentation of submissions
5. Any other business
6. The chair, Tony Xiao Han, calls the meeting to order at 9:00am (around 60 persons are on the call after a few minutes of the meeting).
7. The chair goes through “Meeting Protocol, Attendance, Voting &Documentation Status” (slide 4), “Participants have a duty to inform the IEEE” (slide 6), and “Ways to inform IEEE” (slide 7).

The chair makes a Call for Potentially Essential Patents. No potentially essential patents reported, and no questions asked.

The chair goes through “Other Guideline for IEEE WG meeting” (slide 8), “Patent-related information” (slide 9), “Participant behavior in IEEE-SA activities is guided by the IEEE Codes of Ethics & Conduct” (slide 10), “Participants in the IEEE-SA “individual process” shall act independently of others, including employers”(slide 11), and “IEEE-SA standards activities shall allow the fair & equitable consideration of all viewpoints” (slide 12), and “Required notices” (slide 13).

The chair goes through the agenda (slide 32) and asks if there is any discussion on the agenda. No response from the group.

The chair asks if there is any objection to approve the agenda with unanimous consent. No objection from the group so the agenda is approved.

1. The chair goes through the Teleconference Times. The ones after this meeting are shown below.
* November 24 (Tuesday), 9am - 10:30am ET
* December 8 (Tuesday), 9am - 10:30am ET
* December 15 (Tuesday), 9am - 10:30am ET
* January 5 (Tuesday), 9am - 10:30am ET
1. Presentation of submissions

**11-20/1812r0 “IEEE 802.11bf Selection Procedure”, Claudio da Silva (Intel)**

Claudio presents the process that will be used for developing the standard specification, including the documents that are needed and the procedure. Claudio stresses that this is basically how things have been done in the past for e.g. 802.11ax and there is not really anything controversial about this suggestion.

Referring to the flow chart on page 3, Claudio comments that according to the timeline D0.1 should be ready in January 2022 and D1.0 in July 2022.

**Questions/Comment (Q):** If there would be a selection of one proposal over another, should that selection be documented somewhere, e.g. in the FRD?

**Answer (A):** In the past it has been almost complete amendments that have been compared. In 11be, the contributions are very narrow in the scope. Therefore, we have function blocks in the FRD. Basically, we have moved away from comparison of these relatively limited contributions. If the TG wants, it would be possible to develop such a document.

**Q:** What is the major the difference between the SFD and specification?

**A:** The SFD is essentially an outline for the specification. The SFD is very generic with no details.

**Q:** When do we start to think of being backward compatible?

**A:** From day one.

**Q:** The Evaluation Methodology document was used in 11ac for comparing performance for different proposals. Even if there is no such document in 11be, the Evaluation Methodology document developed in 11ax is reused. In 11bf, things are different, and I believe we should consider this. The document describing the channel model is important. It is not clear to me that we can reuse the same channel model when the purpose is to study sensing rather than communications. I believe we need input from experts in this matter.

**A:** There is a contribution for user model on the agenda. Basically, it is up to the group to create a document for channel models if there are enough contributions and input for such a document.

**Q:** I have a question regarding point 5 on page 2. Is it only for D1.0?

**A:** This entire document if only up to D1.0. But it is correct, after D1.0 we will not explicitly consider this.

**Q:** Regarding point 3, it is not clear to me what is meant by a functional block.

**A:** I see your point, and we can change the term if there is a better suggestion. This term has been used in the past. In the PAR, we talk about elements that must be addressed. I view a functional block as something that relate to such an element.

**Q:** When do you transition from SFD to specification?

**A:** This is typically not defined, but what we describe here is how it has been done in the development of the other amendments. When the transition is to happen, we will discuss within the group. I don’t have a firm idea at this point.

**Q:** Will the vote for the FRD happen for every block every time?

**A:** Just for D1.0

**Q:** Between D1.0 and D2.0, will there be a new SFD and FDD?

**A:** No. The SFD is basically just a steppingstone for starting the specification document.

**Q:** Can you share the corresponding documents for earlier amendments?

**A:** You can find them on Mentor.

Claudio proposes to run a straw poll to get a feeling for the support for the presented document.

**Straw Poll:** Do you support the adoption of 11-20/1812r0 as the selection procedure document for TGbf?

**Y/N/A: 35/0/7**

Claudio request to run a corresponding motion in the next teleconference and asks Tony to prepare for this. Tone agrees to this.

**11-20/1758r0 “Support of high-resolution imaging sensors”, Naftali Chayat (Vayyar)**

Naftali presents what he believes is necessary for supporting high-resolution sensors, with respect to number of antennas and support for airtime allocation for monostatic sensing.

One message is that 8 antennas as supported in 11ay is not sufficient.

**Q:** I basically agree with your view. Do you consider lower frequency or mmWave?

**A:** We started with lower frequencies, but we have found mmWave more useful as it allows for better (angle) resolution. Basically, a product of just a few centimeters is feasible when the wavelength is about 5 mm, rather than 5 cm.

**Q:** I wonder if these devices belong in this specification. I don’t think 24 antennas devices really are Wi-Fi devices. There was a reason why 11ay stopped at 8 antennas.

**A:** One reason to operate within Wi-Fi is to ensure coexistence and coordination with ordinary Wi-Fi.

When it comes to a large number of antennas, we don’t suggest that it should be mandated just that the specification should allow for it. I believe there are benefits to support it.

**Q:** Do you expect the waveforms to be compatible with the bandwidth of 11ay?

**A:** It makes sense to be compatible, but we can also consider using another band.

**Q:** I have two comments. First, when you are doing sensing using the communication device, I don’t think there is much we have to do. There is already support in 11ay for how to do this. Second, about the MAC, it is up to the scheduler how to support sensing and thus this is beyond the scope of 802.11. It is therefore not clear to me what of this should be addressed in 11bf.

**A:** If there is a mechanism already in 11ay, this would be good, and I would just need a reference.

**Q:** I believe doing time-sharing is a burden for the communication part. Especially for VR/AR applications where there may be strict delay constraints. I would like to avoid adding another coexistence mechanism for support sensing.

**A:** The intent is that the sensing radar and data transmission are coordinated, essentially the sensor would be a slave giving priority to the data. So, this is very different than having sensing and data compete in an uncoordinated matter.

**11-20/1742r0 “A Study on the Impact of Radar Range Resolution in Different Use Cases”, Anthony Pesin (InterDigital)**

Anthony presents measurements for human activity detection using both sub- 6GHz and mmWave products. The conclusion is that sub-6GHz works very well.

**Q:** You are mainly interested in range resolution. One advantage with mmWave is that the angle resolution is much higher, so I believe the comparison does not give the full picture.

**A:** You are correct, we wanted to concentrate on range resolution. It is also so that we have not found much results about this, so we wanted to study it.

We are out of time, and the chair says some time will be allocated for Q&A in the next teleconference.

1. Any other business.

The chair asks if there is any other business. No response from the group.

**The meeting is adjourned at 11.04 am (ET).**

**Appendix 1: Attendance log for the November 3rd, 2020 session**

The list below was recorded from IMAT and may be incomplete.

|  |  |
| --- | --- |
| Aboulmagd, Osama | Huawei Technologies Co., Ltd |
| Adachi, Tomoko | TOSHIBA Corporation |
| Akhmetov, Dmitry | Intel Corporation |
| Aldana, Carlos | Facebook |
| Allegue Martinez, Michel | Aerial Technologies Inc |
| Ambede, Abhishek | Ericsson AB |
| Andersdotter, Amelia | None - Self-funded |
| Anwyl, Gary | MediaTek Inc. |
| Asai, Yusuke | NTT |
| Asterjadhi, Alfred | Qualcomm Incorporated |
| Au, Kwok Shum | Huawei Technologies Co., Ltd |
| Au, Oscar | Origin Wireless |
| Auluck, Vijay | Self |
| Avital, Ziv | MaxLinear |
| Awater, Geert | Qualcomm Incorporated |
| Aygul, Mehmet | Istanbul Medipol University; Vestel |
| B, Hari Ram | NXP Semiconductors |
| Baek, SunHee | LG ELECTRONICS |
| Bajko, Gabor | MediaTek Inc. |
| Barr, David | Intel Corporation |
| Batra, Anuj | Apple, Inc. |
| Baykas, Tuncer | Istanbul Medipol University, Hyperion Technologies |
| Beg, Chris | Cognitive Systems Corp. |
| Ben Arie, Yaron | Toga networks (a huawei company) |
| ben yahia, olfa | vestel |
| Berger, Christian | NXP Semiconductors |
| Berkema, Alan | HP Inc. |
| Bhandaru, Nehru | Broadcom Corporation |
| Bluschke, Andreas | Signify |
| Bredewoud, Albert | Broadcom Corporation |
| Cariou, Laurent | Intel Corporation |
| Carney, William | Sony Corporation |
| Cavalcanti, Dave | Intel Corporation |
| Cepni, Gurkan | Apple, Inc. |
| CHAN, YEE | Facebook |
| Chayat, Naftali | Vayyar Imaging |
| Chen, Evelyn | Ericsson AB |
| Chen, Na | MaxLinear Corp |
| Chen, Xiaogang | Intel Corporation |
| Cheng, Gang | Nokia |
| Cheng, Paul | MediaTek Inc. |
| Cheng, Xilin | NXP Semiconductors |
| CHERIAN, GEORGE | Qualcomm Incorporated |
| Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| Cho, Hangyu | LG ELECTRONICS |
| Choi, Jinsoo | LG ELECTRONICS |
| Ciochina, Dana | Sony Corporation |
| Cohn, Daniel | Intel Corporation |
| Cordeiro, Carlos | Intel Corporation |
| Costa, D.Nelson | Peraso Technologies Incorporated |
| Das, Dibakar | Intel |
| Das, Subir | Perspecta Labs Inc |
| Dash, Debashis | Apple |
| da Silva, Claudio | Intel Corporation |
| Dauphinee, Leonard | MaxLinear Corp |
| Di Taranto, Rocco | Ericsson AB |
| Dong, Xiandong | Xiaomi Inc. |
| Du, Rui | Huawei Technologies Co., Ltd |
| Eitan, Alecsander | Qualcomm Incorporated |
| Fang, Yonggang | Self |
| feng, Shuling | MediaTek Inc. |
| Feng, Xiang | Keysight Technologies |
| Fridman, Roi | Vayyar Imaging Ltd |
| Furuichi, Sho | Sony Corporation |
| Garg, Lalit | Broadcom Corporation |
| Ghaderipoor, Alireza | MediaTek Inc. |
| Ghosh, Chittabrata | Intel Corporation |
| Godbole, sachin | Broadcom Corporation |
| Gong, Bo | Huawei Technologies Co., Ltd |
| Grandhe, Niranjan | NXP Semiconductors |
| Grigat, Michael | Deutsche Telekom AG |
| Guntupalli, Lakshmikanth | Ericsson AB |
| Guo, Yuchen | Huawei Technologies Co., Ltd |
| Haider, Muhammad Kumail | Facebook |
| Hall, Robert | CONSULTANT |
| HAN, Xiao | Huawei Technologies Co., Ltd |
| Han, Zhiqiang | ZTE Corporation |
| Handte, Thomas | Sony Corporation |
| Hansen, Christopher | Covariant Corporation |
| Hart, Brian | Cisco Systems, Inc. |
| Haskou, Abdullah | InterDigital, Inc. |
| Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| Hirata, Ryuichi | Sony Corporation |
| Hiroki, Shigeru | Canon |
| Hoffman, Damian | Vayyar Imaging |
| Hsieh, Hung-Tao | MediaTek Inc. |
| Hsu, Chien-Fang | MediaTek Inc. |
| Hu, Chunyu | Facebook |
| Hu, Mengshi | HUAWEI |
| Huang, Lei | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| IDO, Tetsuo | Canon |
| Inohiza, Hirohiko | Canon |
| Jang, Insun | LG ELECTRONICS |
| Jeon, Eunsung | SAMSUNG ELECTRONICS |
| Ji, Chenhe | Huawei Technologies Co., Ltd |
| Jia, Jia | Huawei Technologies Co., Ltd |
| Kadampot, Ishaque Ashar | Qualcomm Incorporated |
| Kamel, Mahmoud | InterDigital, Inc. |
| Kasher, Assaf | Qualcomm Incorporated |
| Kedem, Oren | Huawei Technologies Co., Ltd |
| Khorov, Evgeny | IITP RAS |
| Khude, Nilesh | NXP Semiconductors |
| Kim, Jeongki | LG ELECTRONICS |
| Kim, Myeong-Jin | SAMSUNG |
| kim, namyeong | LG ELECTRONICS |
| Kim, Sang Gook | LG ELECTRONICS |
| Kim, Sanghyun | WILUS Inc. |
| Kim, Youhan | Qualcomm Incorporated |
| Klein, Arik | Huawei Technologies Co., Ltd |
| Klimakov, Andrey | Huawei Technologies Co., Ltd |
| Kneckt, Jarkko | Apple, Inc. |
| Ko, Geonjung | WILUS Institute |
| Kureev, Aleksey | IITP RAS |
| Kwak, Jin-Sam | WILUS Inc. |
| Kwon, Young Hoon | NXP Semiconductors |
| Lalam, Massinissa | SAGEMCOM SAS |
| Lan, Zhou | Broadcom Corporation |
| Lee, Jae Seung | ETRI |
| Lee, Nancy | Signify |
| Lee, Wookbong | SAMSUNG |
| Levitsky, Ilya | IITP RAS |
| Li, Bo | Northwestern Polytechnical University |
| Li, Jianhui | Huawei Technologies Co.,  Ltd |
| Li, Qinghua | Intel Corporation |
| Li, Yunbo | Huawei Technologies Co., Ltd |
| Lim, Dong Guk | LG ELECTRONICS |
| Lin, Wei | Huawei Technologies Co., Ltd |
| Lindskog, Erik | SAMSUNG |
| Lissack, Zeev | Vayyar |
| LIU, CHENCHEN | Huawei Technologies Co., Ltd |
| Liu, Jeff | Broadcom Corporation |
| Liu, Jianhan | MediaTek Inc. |
| Liu, Yong | Apple, Inc. |
| Lopez, Miguel | Ericsson AB |
| Lu, Liuming | ZTE Corporation |
| Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| Ma, Li | MediaTek Inc. |
| Martinez Vazquez, Marcos | MaxLinear Corp |
| Mashimo, Hiroshi | Canon |
| MELZER, Ezer | Toga Networks, a Huawei company |
| Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| Merlin, Simone | Qualcomm Incorporated |
| Mirfakhraei, Khashayar | Cisco Systems, Inc. |
| Nagai, Yukimasa | Mitsubishi Electric Corporation |
| NAGATA, KENGO | Nippon Telegraph and Telephone Corporation (NTT) |
| Nakano, Takayuki | Panasonic Corporation |
| NANDAGOPALAN, SAI SHANKAR | Cypress Semiconductor Corporation |
| Nassiri Toussi, Karim | Broadcom Corporation |
| Omar, Hassan | Huawei Technologies Co., Ltd |
| Orlik, Philip | Mitsubishi Electric Research Labs (MERL) |
| Orlovsky, Michael | Vayyar Imaging LTD. |
| Ouchi, Masatomo | Canon |
| Ozbakis, Basak | VESTEL Electronics Corp. |
| Palm, Stephen | Broadcom Corporation |
| Pan, Chun | Huawei Technologies Co., Ltd |
| Pare, Thomas | MediaTek Inc. |
| Park, Eunsung | LG ELECTRONICS |
| Perahia, Eldad | Hewlett Packard Enterprise |
| PESIN, ANTHONY | InterDigital, Inc. |
| Petranovich, James | ViaSat, Inc. |
| Pettersson, Charlie | Ericsson AB |
| Pirhonen, Riku | NXP Semiconductors |
| Popov, Mark | Vayyar |
| porat, ron | Broadcom Corporation |
| Prabhakaran, Dinakar | Broadcom Corporation |
| Puducheri, Srinath | Broadcom Corporation |
| Pulikkoonattu, Rethnakaran | Broadcom Corporation |
| Pushkarna, Rajat | Panasonic Asia Pacific Pte Ltd. |
| Rafique, Saira | Istanbul Medipol University, Vestel |
| Raissinia, Alireza | Qualcomm Incorporated |
| Rantala, Enrico-Henrik | Nokia |
| Redlich, Oded | Huawei Technologies Co., Ltd |
| Regev, Dror | Toga Networks (a Huawei company) |
| REICH, MOR | HUAWEI |
| Riegel, Maximilian | Nokia |
| RISON, Mark | Samsung Cambridge Solution Centre |
| Robert, Joerg | University of Erlangen-Nuremberg |
| Rolfe, Benjamin | Blind Creek Associates |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Rosenhouse, Tsachi | Vayyar Imaging |
| Sahin, Onur | InterDigital, Inc. |
| Sarris, Ioannis | u-blox |
| Schmidhammer, Martin | German Aerospace Center (DLR) |
| Scott, Andy | NCTA |
| Sedin, Jonas | Ericsson AB |
| Seok, Yongho | MediaTek Inc. |
| Sherlock, Ian | Texas Instruments Incorporated |
| Shilo, Shimi | Huawei Technologies Co., Ltd |
| Smith, Graham | SR Technologies |
| Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| Son, Ju-Hyung | WILUS Inc. |
| Sosack, Robert | Molex Incorporated |
| Stanley, Dorothy | Hewlett Packard Enterprise |
| Stavridis, Athanasios | Ericsson AB |
| Stott, Noel | Keysight Technologies |
| Strauch, Paul | Qualcomm Incorporated |
| SU, HONGJIA | Huawei Technologies Co., Ltd |
| SUH, JUNG HOON | Huawei Technologies Co., Ltd |
| Sumi, Takenori | Mitsubishi Electric Corporation |
| Sun, Yingxiang | Huawei Technologies Co. Ltd |
| Sundman, Dennis | Ericsson AB |
| Tan, Danny | Huawei Technologies Co., Ltd |
| Tanaka, Yusuke | Sony Corporation |
| Tolpin, Alexander | Intel Corporation |
| Tomoyuki, Takada | Canon |
| Torab Jahromi, Payam | Facebook |
| Trainin, Solomon | Qualcomm Incorporated |
| Tsai, Tsung-Han | MediaTek Inc. |
| Tsodik, Genadiy | Huawei Technologies Co., Ltd |
| Turkmen, Halise | Vestel |
| Umehara, Makoto | Canon Research Centre France |
| Urabe, Yoshio | Panasonic Corporation |
| Ustunbas, Seda | ITU,Vestel |
| Van Nee, Richard | Qualcomm Incorporated |
| van Wageningen, Andries | Signify |
| Van Zelst, Allert | Qualcomm Incorporated |
| Varshney, Prabodh | Nokia |
| Verenzuela, Daniel | Sony Corporation |
| Wang, Chao Chun | MediaTek Inc. |
| Wang, Hao | Self |
| Wang, Lei | Huawei R&D USA |
| Wang, Pu | Mitsubishi Electric Research Labs (MERL) |
| Wang, Qi | Huawei Technologies Co., Ltd |
| Wang, Qi | Apple, Inc. |
| Wang, Yi-Hsiu | Zeku |
| Want, Roy | Google |
| Wendt, Matthias | Signify |
| Xin, Yan | Huawei Technologies Co., Ltd |
| Xu, Yanchao | Zeku |
| Xue, Ruifeng | Cisco Systems, Inc. |
| Yan, Zhongjiang | Northwestern Polytechnical University |
| Yang, Bo | Huawei Technologies Co., Ltd |
| Yang, Jay | Nokia |
| Yang, Mao | Northwestern Polytechnical University |
| YANG, RUI | InterDigital, Inc. |
| Yang, Steve TS | MediaTek Inc. |
| Yang, Xun | Huawei Technologies Co., Ltd |
| Yang, Yunsong | Futurewei Technologies |
| Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| Yee, James | MediaTek Inc. |
| Yoshikawa, Yuki | Canon |
| Yu, Jian | Huawei Technologies Co., Ltd |
| Zeng, Ruochen | NXP Semiconductors |
| Zeng, Yan | Huawei Technologies Co., Ltd |
| ZHANG, JIAYIN | Huawei Technologies Co., Ltd |
| Zhang, Meihong | Huawei Technologies Co., Ltd |
| Zuo, Xin | Tencent |

**Appendix 2: Attendance log for the November 6th, 2020 session**

The list below was recorded from IMAT and may be incomplete.

|  |  |
| --- | --- |
| AbidRabbu, Shaima' | IMU, VESTEL |
| Aboulmagd, Osama | Huawei Technologies Co. Ltd |
| Adachi, Tomoko | TOSHIBA Corporation |
| Agrawal, Sandeep | C-DOT/Centre for Development of Telematics |
| Akhmetov, Dmitry | Intel Corporation |
| Aldana, Carlos | Facebook |
| Allegue Martinez, Michel | Aerial Technologies Inc. |
| Ambede, Abhishek | Ericsson AB |
| ANANDAKUMAR, KRISHNASAMY | Maxlinear |
| Ansley, Carol | IEEE member / Self Employed |
| Anwyl, Gary | MediaTek Inc. |
| Arregui, Antonio | Maxlinear |
| Asterjadhi, Alfred | Qualcomm Incorporated |
| Au, Kwok Shum | Huawei Technologies Co.,  Ltd |
| Au, Oscar | Origin Wireless |
| Avital, Ziv | MaxLinear |
| Aygul, Mehmet | VESTEL; IMU |
| B, Hari Ram | NXP Semiconductors |
| Baek, SunHee | LG ELECTRONICS |
| Bankov, Dmitry | IITP RAS |
| Batra, Anuj | Apple, Inc. |
| Baykas, Tuncer | Hyperion Technologies |
| BECHADERGUE, Bastien | OLEDCOMM |
| Beg, Chris | Cognitive Systems Corp. |
| ben yahia, olfa | Vestel |
| Berger, Christian | NXP Semiconductors |
| Bims, Harry | Bims Laboratories, Inc. |
| Bredewoud, Albert | Broadcom Corporation |
| Carney, William | Sony Corporation |
| Cavalcanti, Dave | Intel Corporation |
| Cepni, Gurkan | Apple, Inc. |
| Chayat, Naftali | Vayyar Imaging |
| Chen, Cheng | Intel Corporation |
| Chen, Evelyn | Ericsson AB |
| Chen, Na | MaxLinear Corp |
| Cheng, Gang | Nokia |
| Cheng, Xilin | NXP Semiconductors |
| Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| Cho, Hangyu | LG ELECTRONICS |
| Choi, Jinsoo | LG ELECTRONICS |
| CHUN, JINYOUNG | LG ELECTRONICS |
| Ciochina, Dana | Sony Corporation |
| Cordeiro, Carlos | Intel Corporation |
| Costa, D.Nelson | Peraso Technologies Incorporated |
| Das, Subir | Perspecta Labs Inc |
| da Silva, Claudio | Intel Corporation |
| Dauphinee, Leonard | Maxlinear |
| Ding, Yanyi | Panasonic Corporation |
| Di Taranto, Rocco | Ericsson AB |
| Dong, Xiandong | Xiaomi Inc. |
| Du, Rui | Huawei Technologies Co. Ltd |
| Fang, Yonggang | Self |
| feng, Shuling | MediaTek Inc. |
| Feng, Xiang | Keysight Technologies |
| Ferruz, David | MaxLinear Corp |
| Ghaderipoor, Alireza | MediaTek Inc. |
| Godbole, sachin | Broadcom Corporation |
| Gong, Bo | Huawei Technologies Co. Ltd |
| Grandhe, Niranjan | NXP Semiconductors |
| Grigat, Michael | Deutsche Telekom AG |
| Guntupalli, Lakshmikanth | Ericsson AB |
| HAN, Xiao | Huawei Technologies Co., Ltd |
| Han, Zhiqiang | ZTE Corporation |
| Handte, Thomas | Sony Corporation |
| Haskou, Abdullah | InterDigital, Inc. |
| Hiertz, Guido | Ericsson GmbH |
| Hiroki, Shigeru | Canon |
| Hong, Hanseul | WILUS Inc. |
| Hsieh, Hung-Tao | MediaTek Inc. |
| Hsu, Chien-Fang | MediaTek Inc. |
| Hu, Chunyu | Facebook |
| Huang, Lei | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| Huang, Po-Kai | Intel Corporation |
| IDO, Tetsuo | Canon |
| Inohiza, Hirohiko | Canon |
| Inoue, Yasuhiko | Nippon Telegraph and Telephone Corporation (NTT) |
| Iranzo, Salvador | MaxLinear Corp |
| Izquierdo, Eduardo | Maxlinear Corp |
| Jang, Insun | LG ELECTRONICS |
| Jeon, Eunsung | SAMSUNG ELECTRONICS |
| Kadampot, Ishaque Ashar | Qualcomm Incorporated |
| kamath, Manoj | Broadcom Corporation |
| Kamel, Mahmoud | InterDigital, Inc. |
| Kang, Sugbong | Apple, Inc. |
| Kasher, Assaf | Qualcomm Incorporated |
| Kim, Jeongki | LG ELECTRONICS |
| Kim, Myeong-Jin | SAMSUNG |
| kim, namyeong | LG ELECTRONICS |
| Kim, Sang Gook | LG ELECTRONICS |
| Klimakov, Andrey | Huawei Technologies Co., Ltd |
| Kneckt, Jarkko | Apple, Inc. |
| Ko, Geonjung | WILUS Inc. |
| Kozarev, Aleksandra | MaxLinear Corp |
| kristem, vinod | Intel Corporation |
| Kwon, Young Hoon | NXP Semiconductors |
| Lalam, Massinissa | Sagemcom |
| Lee, Jae Seung | Electronics and Telecommunications Research Institute (ETRI) |
| Lee, Wookbong | SAMSUNG |
| Levitsky, Ilya | IITP RAS |
| Lim, Dong Guk | LG ELECTRONICS |
| Lin, Wei | Huawei Technologies Co. Ltd |
| Lindskog, Erik | SAMSUNG |
| LIU, CHENCHEN | Huawei Technologies Co. Ltd |
| Loginov, Vyacheslav | IITP RAS |
| Lopez, Miguel | Ericsson AB |
| Louzir, Ali | InterDigital, Inc. |
| Lu, kaiying | MediaTek Inc. |
| Lu, Liuming | ZTE Corporation |
| Luo, Chaoming | Beijing OPPO telecommunications corp., ltd. |
| Ma, Li | MediaTek Inc. |
| Mashimo, Hiroshi | Canon |
| Max, Sebastian | Ericsson AB |
| Memisoglu, Ebubekir | Istanbul Medipol University; Vestel |
| Merlin, Simone | Qualcomm Incorporated |
| Monajemi, Pooya | Cisco Systems, Inc. |
| Montreuil, Leo | Broadcom Corporation |
| NAGATA, KENGO | Nippon Telegraph and Telephone Corporation (NTT) |
| Nakano, Takayuki | Panasonic Corporation |
| Namboodiri, Vamadevan | SAMSUNG ELECTRONICS |
| Nassiri Toussi, Karim | Broadcom Corporation |
| Omar, Hassan | Huawei Technologies Co., Ltd |
| Ouchi, Masatomo | Canon |
| Ozbakis, Basak | Vestel Electronics Corp. |
| OZDEN ZENGIN, OZLEM | VESTEL |
| Pare, Thomas | MediaTek Inc. |
| Park, Eunsung | LG ELECTRONICS |
| Park, Minyoung | Intel Corporation |
| Perahia, Eldad | Hewlett Packard Enterprise |
| Pettersson, Charlie | Ericsson AB |
| Popov, Mark | Vayyar |
| Pushkarna, Rajat | Panasonic Asia Pacific Pte Ltd. |
| Qi, Emily | Intel Corporation |
| Rafique, Saira | Istanbul Medipol University; Vestel |
| Raissinia, Alireza | Qualcomm Incorporated |
| Rantala, Enrico-Henrik | Nokia |
| RISON, Mark | Samsung Cambridge Solution Centre |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Sahin, Onur | InterDigital, Inc. |
| Sambasivan, Sam | AT&T |
| Sarris, Ioannis | u-blox |
| Schiessl, Sebastian | u-blox |
| Schmidhammer, Martin | German Aerospace Center (DLR) |
| Sedin, Jonas | Ericsson AB |
| Serafimovski, Nikola | pureLiFi |
| Shellhammer, Stephen | Qualcomm Incorporated |
| Sinn, Ulrich | Siemens AG |
| Solaija, Muhammad Sohaib | Istanbul Medipol University; Vestel |
| Son, Ju-Hyung | WILUS Inc. |
| Startsev, Ivan | IITP RAS |
| Stott, Noel | Keysight Technologies |
| SUH, JUNG HOON | Huawei Technologies Co. Ltd |
| Sun, Yingxiang | Huawei Technologies Co. Ltd |
| Sundaram, Rajesh | Broadcom Corporation |
| SURACI, FRANK | U.S. Department of Homeland Security |
| Tan, Danny | Huawei Technologies Co.,  Ltd |
| Tolpin, Alexander | Intel Corporation |
| Tomoyuki, Takada | Canon |
| Torrijo, Alejandro | MaxLinear Corp |
| Trainin, Solomon | Qualcomm Incorporated |
| Tsai, Tsung-Han | MediaTek Inc. |
| Turkmen, Halise | IMU; Vestel |
| Umehara, Makoto | Canon |
| Ustunbas, Seda | ITU,Vestel |
| Van Zelst, Allert | Qualcomm Incorporated |
| Varshney, Prabodh | Nokia |
| Verenzuela, Daniel | Sony Corporation |
| Vicent Colonques, Santiago | Maxlinear |
| Wang, Chao Chun | MediaTek Inc. |
| Wang, Lei | Futurewei Technologies |
| Wang, Pu | Mitsubishi Electric Research Labs (MERL) |
| Wentink, Menzo | Qualcomm |
| Wilhelmsson, Leif | Ericsson AB |
| Xin, Yan | Huawei Technologies Co., Ltd |
| Xu, Yanchao | Zeku |
| Xue, Ruifeng | Cisco Systems, Inc. |
| Yan, Aiguo | Guangdong OPPO Mobile Telecommunications Corp.,Ltd |
| Yang, Mao | Northwestern Polytechnical University |
| YANG, RUI | InterDigital, Inc. |
| Yang, Steve TS | MediaTek Inc. |
| Yang, Xun | Huawei Technologies Co., Ltd |
| Yang, Yunsong | Futurewei Technologies |
| Yano, Kazuto | Advanced Telecommunications Research Institute International (ATR) |
| Yee, James | MediaTek Inc. |
| Yoshikawa, Yuki | canon |
| ZEGRAR, Salah Eddine | Istanbul Medipol University; Vestel |
| Zeng, Ruochen | NXP Semiconductors |
| Zeng, Yan | Huawei Technologies Co., Ltd |
| ZHANG, JIAYIN | Huawei Technologies Co. Ltd |
| Zhang, Meihong | Huawei Technologies Co., Ltd. |

**Appendix 3: Attendance log for the November 9th, 2020 session**

The list below was recorded from IMAT and may be incomplete.

|  |  |
| --- | --- |
| Agrawal, Sandeep | C-DOT/Centre for Development of Telematics |
| Aldana, Carlos | Facebook |
| Ambede, Abhishek | Ericsson AB |
| Au, Oscar | Origin Wireless |
| Aygul, Mehmet | VESTEL; IMU |
| Beg, Chris | Cognitive Systems Corp. |
| ben yahia, olfa | Vestel |
| Berner, Stephan | pureLiFi |
| Bober, Lennert | Fraunhofer Heinrich Hertz Institute |
| Chayat, Naftali | Vayyar Imaging |
| Cheng, Gang | Nokia |
| Cheng, Xilin | NXP Semiconductors |
| Costa, D.Nelson | Peraso Technologies Incorporated |
| da Silva, Claudio | Intel Corporation |
| Di Taranto, Rocco | Ericsson AB |
| Du, Rui | Huawei Technologies Co. Ltd |
| Eitan, Alecsander | Qualcomm Incorporated |
| Fridman, Roi | Vayyar Imaging |
| Goto, Fumihide | DENSO |
| Grigat, Michael | Deutsche Telekom AG |
| HAN, Xiao | Huawei Technologies Co., Ltd |
| Haskou, Abdullah | InterDigital, Inc. |
| Hoffman, Damian | Vayyar Imaging |
| Jang, Insun | LG ELECTRONICS |
| jiang, yiming | Nokia |
| Kadampot, Ishaque Ashar | Qualcomm Incorporated |
| Kain, Carl | USDOT; Noblis |
| Kasher, Assaf | Qualcomm Incorporated |
| Kenney, John | Toyota Motor North America |
| Kim, Sang Gook | LG ELECTRONICS |
| Kozarev, Aleksandra | MaxLinear Corp |
| Lim, Dong Guk | LG ELECTRONICS |
| Lindskog, Erik | SAMSUNG |
| Lopez, Miguel | Ericsson AB |
| Mazor, Nadav | Vayyar Ltd |
| Orlovsky, Michael | Vayyar Imaging LTD |
| PESIN, ANTHONY | InterDigital, Inc. |
| Pirhonen, Riku | NXP Semiconductors |
| Popov, Mark | Vayyar |
| Pushkarna, Rajat | Panasonic Asia Pacific Pte Ltd. |
| Rafique, Saira | Istanbul Medipol University; Vestel |
| Rantala, Enrico-Henrik | Nokia |
| RISON, Mark | Samsung Cambridge Solution Centre |
| Sadeghi, Bahareh | Intel |
| Sahin, Onur | InterDigital, Inc. |
| Sakamoto, Takenori | Panasonic Corporation |
| Sarris, Ioannis | u-blox |
| Schiessl, Sebastian | u-blox |
| Schmidhammer, Martin | German Aerospace Center (DLR) |
| Segev, Jonathan | Intel Corporation |
| Sherlock, Ian | Texas Instruments Incorporated |
| Smely, Di Dieter | Kapsch TrafficCom AG |
| Stepanov, Max | Intel Corporation |
| Sun, Yingxiang | Huawei Technologies Co. Ltd |
| Takai, Mineo | Space-Time Engineering |
| Tan, Danny | Huawei Technologies Co.,  Ltd |
| Trainin, Solomon | Qualcomm Incorporated |
| Tsai, Tsung-Han | MediaTek Inc. |
| Turkmen, Halise | IMU; Vestel |
| Unterhuber, Paul | German Aerospace Center (DLR) |
| Wang, Pu | Mitsubishi Electric Research Labs (MERL) |
| Wilhelmsson, Leif | Ericsson AB |
| Wizenberg, Reut | Vayyar Imaging |
| Yang, Jay | Nokia |
| YANG, RUI | InterDigital, Inc. |
| Yang, Xun | Huawei Technologies Co., Ltd |
| Zhang, Meihong | Huawei Technologies Co., Ltd. |