IEEE P802.11  
Wireless LANs

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| IEEE 802.11ba Task Group Meeting Minutes for January 2017 Meeting, Atlanta, GA, US | | | | |
| Date: 01-19-2017 | | | | |
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Abstract

Meeting Minutes for the IEEE 802.11ba TG sessions held in Atlanta, GA, US, January 15-20, 2017.

**Monday, January 16, 2017, 1:30-3:30 pm**

**Meeting Agenda:**

The meeting agenda is shown below, and also published in the agenda document:

<https://mentor.ieee.org/802.11/dcn/16/11-16-1593-02-00ba-tgba-january-2017-agenda.ppt>

* Call meeting to order
* TGba introduction
* Call for submissions
* Review agenda and approval
* IEEE 802 and 802.11 IPR Policy and procedure
* Participation in IEEE 802 Meetings
* Summary from November 2016 meeting
* Motion: November 2016 meeting minutes ([doc: IEEE 802.11-16/1557r0](https://mentor.ieee.org/802.11/dcn/16/11-16-1557-00-0wur-meeting-minutes-november-2016.docx))
* Overview of WUR PAR: scope of the project
* Discussion on TG leadership structure
* Discussion on TG spec development process
* Presentations
* Recess

**Chair Minyoung Park (Intel) calls meeting to order at 1.30 pm. (**About 110 persons in the room.)

Minyoung reminds about recording attendance and goes through the session schedule for the week.

Minyoung goes through the agenda document 11-16/1593r2 as well as the submissions received in response to the call for submission.

Minyoung believes that we need to request at least one more time-slot, and he will ask for this at the mid-week plenary.

**The main topics for this week are:**

* Discuss Task Group leadership structure
* Discuss TG specification development process
* Review technical presentations
* Review TG timeline

Minyoung proposes to divide the 27 received submissions into four different categories: Usage mode, PHY, MAC, and Others, and also make the presentations in that order. No objection.

The received submissions for this meeting are (numbers refer to the order they were uploaded):

**Usage model:**

12) 11-17/0065r0, “Usage Model for Power Saving AP” – Tomoko Adachi (Toshiba)

13) 11-17/0038, “WUR Reconnection Use Case” – Yunbo Han (Huawei)

22) 11-17/0034, “WUR use cases and requirements” - Yong CHENG (Huawei)

18) 11-17/0029, “WUR usage model” – Ross (Huawei)

**PHY:**

3) 11-17/0030, “The performance of timing synchronization and OOK pulse bandwidth” – Eunsung Park (LGE)

5) 11-17/0049, “WUR Signaling Field” - John Son (WILUS)

16) 11-17/0084, “High Level PHY Design” – Shahrnaz Azizi (Intel)

17) 11-17/0026, “Phase Noise Model Study” – Shahrnaz Azizi (Intel)

20) 11-17/0093, “Discussion of a Wake-Up Receiver Front-End Model” – Leif Wilhelmsson (Ericsson)

23) 11-17/0028, “On Waking-up of Multiple WUR Stations” – Jianhan Liu (Mediatek)

24) 11-17/0027, “Re-Discovery Problems in WUR WLAN” – Jianhan Liu (Mediatek)

10) 11-17/0066, “WUR packet design,” Kaiying Lv

4) 11-17/0036r0, “Consideration on WUR Frame Structure” – Dongguk Lim (LGE)

21) 11-17/0094, “Concurrent transmission of data and a wake-up signal in 802.11ax” – Leif Wilhelmsson (Ericsson)

**MAC:**

2) 11-17/0035, “Traffic filter based wakeup service” – Yongho Seok (NEWRACOM)

6) 11-17/0055, “Considerations on post wake-up sequences” – Woojin Ahn (WILUS)

7) 11-17/0054, “WUR MAC issues,” Jeongki Kim (LGE)

8) 11-17/0031, “Channel issue in WUR,” Suhwook Kim (LGE)

9) 11-17/0042, “Power Efficient WUR AP Discovery Follow Up,” Xiaofei WANG (InterDigital)

11) 11-17/0068, “AP Discovery Discussion,” Kaiying Lv

14) 11-17/0070, “Initial Negotiation for WUR“ – Igor Kim (ETRI)

15) 11-17/0071, “High level MAC concept for WUR” – Po-Kai Huang (Intel)

26) 11-17/0043, “WUR power save mode “ – Tiannyu Wu (Mediatek)

27) 11-17/124, “WUR MAC and Wakeup Frame” – Liwen Chu (Marvell)

**Others:**

1) DCN TBD, “Ultra Low Power Strategies for Selective Wake-Up from Receiver Prospect” – Joerg Robert (Friedrich-Alexander-Universität Erlangen-Nürnberg) – prefers Wednesday or Thursday

19) DCN TBD, “Timeline discussion” – Osama AboulMagd (Huawei)

25) 11-17/0039, “Proposed TGba Functional Requirements” Ming Gan (Huawei)

**Motion to approve the Agenda, document number 11-16/1593r2.**

Moved: Yunsong Yang

Second: John Notor

Motion passed by unanimous consent.

**Minyoung reviews the Participants, Patents, and Duty to Inform slide (slide 14), Patent Related Links (slide 15), Call for Potentially Essential Patents (slide 16) and makes a call for potentially essential patents.** No response.

Minyoung reviews Other Guidelines etc. (slides 17-21). No questions.

Minyoung goes through the summary from the November meeting (slide 22), which is shown below.

* Reviewed the comments on the PAR and CSD from 802.11 PAR SC, other WGs, and EC
* Resolved all the comments and revised the PAR and CSD
  + Revised PAR: 802.11-16/1045r9 (scope of the project in the next slide)
  + Revised CSD: 802.11-16/936r4
* The revised PAR and CSD have been approved by the SG and 802.11 WG
* Approved the comment responses (802.11-16/1528r0)
* Approved WUR SG extension
* Reviewed the presentations

**Motion to approve minutes from November meeting**: <https://mentor.ieee.org/802.11/dcn/16/11-16-1557-00-0wur-meeting-minutes-november-2016.docx>

Move: Yongho Seok

Second: Yunsong Yang

Motion passed by unanimous consent.

Minyoung reminds about the scope of the project, shown below:

* **5.2.b. Scope of the project:**
  + This amendment defines a physical (PHY) layer specification and defines modifications to the medium access control (MAC) layer specification that enables operation of a wake-up radio (WUR).
  + The wake-up frames carry only control information.
  + The reception of the wake-up frame by the WUR can trigger a transition of the primary connectivity radio out of sleep.
  + The WUR is a companion radio to the primary connectivity radio and meets the same range requirement as the primary connectivity radio.
  + The WUR devices coexist with legacy IEEE 802.11 devices in the same band.
  + The WUR has an expected active receiver power consumption of less than one milliwatt.

**Question/Comment(Q):** What is the definition of control information?

**Answer(A):** Essentially that the signal does not carry user data. The information should be related to waking up the main receiver.

Minyoung goes through slide 25, TG leadership discussion, and asks if there are any comments. Two comments from the floor in favor of having two vice-chairs. One comment that in case there will be many presentations, there may be a need also for ad-hoc chairs. Minyoung proposes to discuss that further once it has been decided to have ad-hoc groups. Based on the received comments, the proposed structure of the group is

* **Leadership structure**
  + Chair
  + 2 Vice-chairs
  + Secretary
    - Leif Wilhelmsson (Ericsson)
* **Vice-chair election in March**
  + Nomination open until March F2F meeting

**Motion to approve the leadership structure above**

Move: Peter Loc

Second: Jinsoo Choi

Motion passed by unanimous consent.

**Motion for a confirmation vote regarding secretary**

Move: John Notor

Second: Steve Shellhammer

**Result:** Y/N/A: 57/0/2, Motion passes

Minyoung presents slide 28 “Proposed TGba Spec Development Process”. Minyoung suggests that maybe it is possible to not have so many TG documents, but really focus on the SFD, and asks for comments regarding this.

Osama believes this group should have at least functional requirement and usage model documents, but adds that also simulation model and evaluation methodology documents may be useful.

Ross (Huawei) volunteers to be the editor for the functional requirement document.

A few comments from the audience that maybe simulation and evaluation methodology can be combined, but the documents are needed as we need to be able to compare proposals. Especially the simulation model document therefore seems very important.

Minyoung asks if someone can tell how useful these documents really were in other TGs, like 11ax and 11ay. Jianhan Liu (Mediatek) believes it was useful for the calibration of the simulators in 11ax.

Osama believes the functional requirement document is useful for expanding a bit on the PAR document.

Shahrnaz believes everything can be combined in one document.

Osama believes it is better to follow the same structure as in 11ax, but the documents do not have to be very extensive.

Peter Ecclesine points out that maybe we need to also consider that a WUR may look different depending on in what frequency band it is used.

Peter Loc wants to see a feedback loop in the development process to see that what we are developing is actually fulfilling the goals.

Based on the discussion, a straw poll with the following three alternatives is run:

**Straw Poll:**

* **Option 1:**
  + Functional Requirement Document
  + Spec framework document
  + Evaluation + simulation scenario document
  + Usage model document
* **Option 2:**
  + A single document that contains
    - Usage model, functional requirements
    - Spec framework
    - Evaluation + simulation scenario
* **Option 3:** 
  + Usage model, functional requirement, evaluation + simulation scenario document
  + Spec framework document

**Result:** Option 1/2/3: 34/5/19

Based on the outcome of the straw poll, the following motion results:

**Motion:** Move to have the following documents to be developed in TGba as the task group documents:

* Functional Requirement Document
* Spec framework document
* Evaluation + simulation scenario document
* Usage model document

Move: Osama Aboul-Magd

Second: Jianhan Liu

**Result**: Y/N/A: 49/1/17 Motion passes

**Submissions:**

**11-17/0065r0, “Usage Model for Power Saving AP” – Tomoko Adachi (Toshiba):** The AP contains a WUR, in order to allow the AP to be turned off. If the APs could be turned off, the caused interference could be greatly reduced. For instance, when the user-held STAs leave home, the AP turns off its main radio.

Some concerns are expressed from the audience with respect to how to achieve this in practice.

**Q:** The objective is to reduce interference rather than saving power. I wonder if this is what should be focused on here.

**A:** It could also be to reduce power consumption.

**Q:** The interference problem is probably at peak hours, and then the APs are typically on anyway, so the solution is not so useful when it is needed the most. Also, maybe this may cause an issue for the STA?

**Straw Poll:** Do you agree to add a usage model that is described in p.5-6?

**Result:** Y/N/A: 12/24/25

**11-17/0038, “WUR Reconnection Use Case” – Yunbo Han (Huawei):** The presentation discusses means for how to make Wi-Fi a competitive alternative to e.g. BLE by using WUR to reduce the average power consumption.

A few comments from the audience along the lines that there are also other reasons why BLE may be the better choice for wearables. One example is that it not only the average power consumption, but also the ability to run the system on a coin cell battery, which depends on the peak power of the system.

**Minyoung declares the group to be in recess at 3.30 pm.**

**Tuesday, January 17, 2017, 1:30-3:30 pm**

**Meeting Agenda:**

The meeting agenda is shown below, and also published in the agenda document:

<https://mentor.ieee.org/802.11/dcn/16/11-16-1593-03-00ba-tgba-january-2017-agenda.ppt>

* Call meeting to order
* IEEE 802 and 802.11 IPR Policy and procedure
* Presentations
* Recess

**Chair Minyoung Park (Intel) calls meeting to order at 1.32pm. (**About 95 persons in the room.)

Minyoung reminds about the attendance.

Mainyoung states that the plan is to ask for two more time-slots at the mid-plenary.

Minyoung asks if there is question on the agenda. No discussion on the agenda

**11-17/0034, “WUR use cases and requirements” - Yong CHENG (Huawei)** Two use cases, referred to as synchronized and unsynchronized are described. Synchronized does here refer to that if a duty-cycled WUR is used, the AP can send the wake up message when the WUR is on.

Q: For the synchronized mode, what is the purpose of the sync message, just for the WUR to synchronize?

A Yes.

Q; What do you means with the unsynchronized case?

A: In this case both devices would be using a WUR to save power and then it is not possible to send synchronization packets.

Q: In the second case, you could be synchronized also if you would be using higher duty cycles?

A: In principle, but that was not the intension here.

Q: It would be interesting to compare the power consumption for the two cases.

Q: It seems the synchronization message is sent to allow for a duty-cycled approach?

A: In practice yes, if the WUR is on all the time it is not needed.

Q: Is this a specific synchronization message?

A: Yes, but in a sense this is up to the design.

Q: What is the difference between the power save options already available? Why not use these?

A: This is a complement, intended for when the sleep interval is potentially much longer.

Q: I would expect the synchronization packet to be a wake-up packet.

**11-17/0029, “WUR usage model” – Ross (Huawei):** The purpose of this document is to list a number of use cases suitable for WUR. The uses cases are:

1. Smart Home
2. Warehouse
3. Outdoor Cattle Farms
4. Sensor Networks, Synchronized Wake Up
5. Wearable Devices, Unsynchronized Wake Up
6. Wearable Devices, Reconnection

Ross would like to get this document approved as a draft for the use case document

Q: I miss a few use cases for the home scenario, like smoke detector etc.

A: I will include this in the next revision.

Q: Every use case faces the problem of rediscovery. If something happens with the AP, there must be some methodology to take care of this.

Q: On page 8, what is a large number for you

1. Maybe 100?

Q: You did not mention security, which may be a very important aspect. This is something you may want to add to the document.

A: Agreed.

Q: You are assuming a single AP, in e.g. office and enterprise scenario there may be several APs.

A: Agreed.

Minyoung proposes that Ross discusses with people off-line and also look at the other presentations related to use cases. Also, if this is to be used as the use case document you should look for a consensus with the other authors of use case documents.

**11-17/0030, “The performance of timing synchronization and OOK pulse bandwidth” - Eunsung Park (LGE):**

Q: This is the performance for the payload part, I believe more work on synchronization regarding probability of false alarm etc. is needed.

A: Agreed.

Q: Just because you operate on fewer carriers it may not be possible to operate at the same output power, so the comparison may not be for the same output power.

Q: On slide 6, what is the data rate?

A: 250kb/s

Q: Do you actually do the timing recovery in your simulator?

A: Yes.

Q: What kind of impairment are included?

A: No imperfections are included.

Q: Do you assume coherent detection?

A: No, the detection is done based on power measurements in the frequency domain.

Q: You are using three bits and do that well. That seems to be too good. Our simulations show that you need at least 32 bits.

A: We are using 80 samples per symbol (synchronization runs at 20 MHz rather than 250 kHz).

Q: Does the WUR also try to use the phase?

A: No, just the amplitude.

**11-17/0049, “WUR Signaling Field” - John Son (WILUS):**

Q: Slide 5, how do you include this info in the legacy part?

A: Legacy part does not really refer to the legacy preamble. Perhaps additional symbols are added to the legacy preamble and then this is referred to as the legacy part.

Q: I think this may be a bit too specific and almost a corner case.

Q: What approach do you prefer for sending this additional bit?

A: Maybe using some additional non-used sub-carriers.

**11-17/0084, “High Level PHY Design” – Shahrnaz Azizi (Intel):**

Q:You have a data rate of 250kb/s but uses a bandwidth 4 MHz?

A: Yes.

Q:Can you elaborate a bit on why 13 sub-carriers is suggested?

A: The it narrow-band enough for efficient implementation, and then there are also regulatory aspects. There are limitations on psd, so too narrow will limit the maximum output power. Maybe it is attractive if we later on want to multiplex it with other signals.

Q: Is this bandwidth OK, I remember there were concerns related to 11ax operation in the 5 GHz band

A: If there are regulatory issues we must of course adapt and we need to simulate to ensure everything are OK.

Q: If you want to e.g. use Manchester coding, it may be better to generate it in the time domain.

**Straw Poll 1:** Do you support the use of OOK for modulation of the payload portion of the wake-up packet?

**Result:** Y/N/A: 39/0/23

**Minyoung declares the group to be in recess at 3.28 pm.**

**Wednesday, January 18, 2017, 8:00-10:00 pm**

**Meeting Agenda:**

The meeting agenda is shown below, and also published in the agenda document: <https://mentor.ieee.org/802.11/dcn/16/11-16-1593-04-00ba-tgba-january-2017-agenda.ppt>

* + Call meeting to order
  + IEEE 802 and 802.11 IPR Policy and procedure
  + Presentations
  + Recess

**Chair Minyoung Park (Intel) calls meeting to order at 8:00am. (**About 40 people in the room.)

The agenda is reviewed. No discussion on the agenda.

**11-17/0084, “High Level PHY Design” – Shahrnaz Azizi (Intel):** Discussion on the second Straw Poll is continued from the previous session.

Q: I think it is too early to discuss this.

**Straw Poll:** Do you support to generate wake-up waveform by populating a certain number of the OFDM subcarriers?

**Result:** Y/N/A: 14:4/11

**11-17/0026, “Phase Noise Model Study” – Shahrnaz Azizi (Intel):** To address the requirement on low power consumption, it is proposed to use a phase noise model representative for a ring oscillator, rather than what has been used in the development of e.g. 11ax.

It is proposed to use this phase noise model for estimating the power consumption for the WUR. Shahrnaz also believes this is needed to evaluate ACI performance as this will be caused by reciprocal mixing. By combining the requirement on power consumption, a corresponding model for the phase noise can be obtained.

**Q:** In practice there may be additional things to consider, so maybe this is a bit too simplified.

**11-17/0093, “Discussion of a Wake-Up Receiver Front-End Model” – Leif Wilhelmsson (Ericsson):**

On the specific point that it would be nice if different companies could provide their view on what would be a reasonable noise figure (NF) for a WUR, Steve Shellhammer comments that Qualcomm would like to see a NF which is relative to what is assumed for the main receiver, and as a preliminary value a NF 8dB higher than for the main receiver was suggested.

Comment related to that the model for the envelope detector also relates to the need for including phase noise in the receiver model. Clarification of the envelope detector would be appreciated to understand whether the assumption is that the signal is complex valued or real valued.

With respect to the straw poll regarding a unified RX model for the WUR, this was cancelled. Based on the discussion, the idea that we may even need several models was also brought up.

**11-17/0094, “Concurrent transmission of data and a wake-up signal in 802.11ax” – Leif Wilhelmsson (Ericsson):**

**Q:** In case you want to do the power boosting by having the possibility of using a varying number of RUs, this means you must have several wake-up sequences?

**A:** Yes, that would be the implication.

**Q:** For the 11ax data, have you used QPSK? The performance would probably be worse if a larger alphabet would be used as the variations are larger.

**A:** QPSK has been used, and it is agreed that this is the most favorable situation. If there is interestfor this idea of concurrent transmission, we should of course also do the simulations when the data is transmitted using a larger alphabet.

**Minyoung declares the group to be in recess at 10.00 am.**

**Wednesday, January 18, 2016, 1:30-3:30 pm**

**Meeting Agenda:**

The meeting agenda is shown below, and also published in the agenda document: <https://mentor.ieee.org/802.11/dcn/16/11-16-1593-04-00ba-tgba-january-2017-agenda.ppt>

* Call meeting to order
* IEEE 802 and 802.11 IPR Policy and procedure
* Presentations
* Recess

**Chair Minyoung Park (Intel) calls meeting to order at 1.30 pm. (**About 45 people in the room.)

Minyoung reminds about recording attendance.

The agenda is reviewed.

**Motion to approve the agenda.**

Move: John Notor

Second: Yunsong Yang

Motion passed by unanimous consent.

**11-17/0094, “Concurrent transmission of data and a wake-up signal in 802.11ax” – Leif Wilhelmsson (Ericsson):** Discussion on the Straw Poll is continued from the previous session.

**Straw poll:** Do you believe the idea is interesting enough so that we should try to include support for concurrent data and WUS transmission in the 802.11ba work?

**Result:** Y/N/A: 14/0/18

**11-17/0027, “Re-Discovery Problems in WUR WLAN” – Jianhan Liu (Mediatek):**

Q: What kind of STAs do you have in mind?

A: I don’t have a specific type of STA in mind.

Q: Do you think it should be done in this group or in another group defining the main radio?

A: In this group.

Q: I believe this is an issue for the AP so I see this in another way.

A: I don’t agree.

Q: Do you have any kind of solution in mind. To me it seems this can be handled on the system side.

A: I don’t have any exact solution in mind.

Q: What is really the problem you want to solve?

A: Only that the new AP needs to know what the wake-up sequence is.

Q: I believe changing to a new AP is a corner case.

Q: I think the issues can be divided into two. One related to if there actually is new AP, the other one related to duty-cycling.

**Straw Poll:** Do you agree that IEEE 802.11ba shall provide mechanisms to enable re-discovery of WUR stations?

**Result:** Y/N/A: 16/0/24

**11-17/0028, “On Waking-up of Multiple WUR Stations” – Jianhan Liu (Mediatek):** It is proposed to allow the possibility to wake up more than one STA by sending multiple wake-up signals. Either by means of FDMA or by means of cascading the wake-up signals in time.

Q: On slide 4, can you explain the purpose of the legacy preamble?

A: It is for spoofing other STAs, i.e., to protect the wake-up signal.

Q: The preamble part is very small, so looking at the cascading approach the saving is actually very small.

A: Agree. If the wake-up packet is long this is not a very good idea.

Q: On slide 5, how does a STA, know which channel it should listen on?

A: That is negotiated with the AP before the STAs go to sleep and depend on the WUR.

Q: This may limit the range as you need to share the TX power among several STAs

A: Agree. There are situations when you should not use it.

Q: I believe the transmission is not actually cascaded, but rather aggregated.

A: We can discuss the details later.

Q: I agree MU transmission is useful, but I think it is more efficient to do it at the MAC layer by e.g using group addresses.

A: I agree, but I think this can in some cases give more flexibility.

**Straw Poll:** Do you agree that IEEE 802.11ba shall provide Multiple User wake-up schemes?

**Result:** Y/N/A: 39/0/6

**11-17/0066, “WUR packet design,” Kaiying Lv:** The contribution addresses concurrent transmission of the wake-up signal and data. One example is when an 80MHz channel is used and where the wake-up signal is transmitted in one of the 20 MHz channels. Proposed to e.g. use HE-SIGB to announce this.

Q: If we believe 11ax will be successful, should we change to that numerology instead of what has been assumed previously. Or should we support both .11ax and e.g. .11n/ac?

A: This scheme was only intended for .11ax.

**11-17/0036r0, “Consideration on WUR Frame Structure” – Dongguk Lim (LGE):**

Q: I think it is too early to decide at this point in time to decide.

**Straw Poll:** Do you agree that a WUR PPDU follows the L-part (L-STF, L-LTF, L-SIG) as one way of protecting? **Result:** Y/N/A:26/1/8.

**Minyoung declares the group to be in recess at 3.28 pm.**

**Wednesday, January 18, 2017, 4:00-6:00 pm**

**Meeting Agenda:**

The meeting agenda is shown below, and also published in the agenda document: <https://mentor.ieee.org/802.11/dcn/16/11-16-1593-04-00ba-tgba-january-2017-agenda.ppt>

* Call meeting to order
* IEEE 802 and 802.11 IPR Policy and procedure
* Presentations
* Recess

**Chair Minyoung Park (Intel) calls meeting to order at 4.00 pm. (**About 40 people in the room.)

The agenda is reviewed. No comments on the agenda.

**11-17/0035, “Traffic filter based wakeup service” – Yongho Seok (NEWRACOM):** The presentation addresses the potential problem of excessive wake-up frame transmissions. It is therefore proposed to use the Traffic Filter Service (TFS) protocol defined in 802.11v, with parameters negotiated during the wake up service request/response phase.

Q: On slide 10, what do you mean by a malicious packet.

A: A packet e.g. intended to wake up the receiver to drain the battery.

Q: I feel this will impact the use of WUR significantly.

A: It does not really have to, this will be negotiated in the request/response phase.

Q: Do for see this mandatory?  
A; No.

Q: How does the filter work.

A: There are several options.

**Straw Poll:** Do you agree that TGba shall provide a mechanism to avoid excessive wakeup frame transmissions?

**Result:** Y/N/A: 7/5/21

**11-17/0055, “Considerations on post wake-up sequences” – Woojin Ahn (WILUS):** WU report exchange could be beneficial in terms of:

* + Reducing the delay of recovery procedure
  + Boundary between WUR and PCR MAC
  + Detecting false wake-up attack

Q: The wake-up report is similar to PS poll, and we also have the trigger frame in 802.11, it seems we may already have the mechanisms available?

A: Maybe, but maybe one can e.g. additional information.

Q: I believe some of the information sent in the report should instead be sent in the capability report.

Q: What happens if the AP do not receive the WU report?

A: It should retransmit the wake-up signal.

Q: Are these two frames integrity protected?

A: Let’s discuss this off-line.

**Straw Poll:** Do you agree that 802.11ba shall provide a mechanism that WUR AP checks WUR STA’s wake-up status after sending a WUS?

**Result:** Y/N/A: 10/6/18

**Straw Poll:** Do you agree that the WU report exchange procedure is necessary for group wake-up STAs?

**Result:** Y/N/A: 2/10/25

**11-17/0054, “WUR MAC issues,” Jeongki Kim (LGE):**

Q: How does the WUR know the length of the packet, there is no length field?

A: This will be added.

Q: There is no CRC?

A: It should be added.

Q: This is the preferred approach for multiple devices as I see it, i.e., it is done on the MAC level.

Q: I would suggest to put a length field in the WUR preamble.

Q: Remember every bit is 4us, we can’t have very much data in a wake-up packet.

**Straw Poll:** Do you agree that the wake-up packet to wake up all WUR mode STAs need to be considered in 11ba TG?

**Result:** Y/N/A: 24/1/12

**Straw Poll:** Do you agree that multicast wake-up need to be considered in 11ba TG?

**Result:** Y/N/A: 23/3/10.

**11-17/0031, “Channel issue in WUR,” Suhwook Kim (LGE):**

Q: Some of your proposal have major impacts on PHY.

**Minyoung declares the group to be in recess at 6.00 pm.**

**Thursday, January 19, 2017, 10:30-12:30 am**

**Meeting Agenda:**

The meeting agenda is shown below, and also published in the agenda document: <https://mentor.ieee.org/802.11/dcn/16/11-16-1593-06-00ba-tgba-january-2017-agenda.ppt>

* + Call meeting to order
  + IEEE 802 and 802.11 IPR Policy and procedure
  + TG timeline discussion
  + Goal for March 2017 F2F meeting
  + Teleconference call schedule
  + Review the draft use case document
  + Presentations
  + Adjourn

**Chair Minyoung Park (Intel) calls meeting to order at 10.30 am. (**About 90 people in the room.)

The agenda is reviewed. No comments on the agenda.

**Motion to approve the agenda.**

Move: Yongho Seok

Second: Ping Feng

Motion passed by unanimous consent.

Call for essential patent. No response

Minyoung presents the TGba timeline (slide 32).

Q: I believe it is too ambitious to ask for draft 0.1 already in July. I also note there is presently no editor appointed.

A: I believe the 11ba spec will be considerably smaller, so I believe we may have a more aggressive timeline than for instance 11ac and 11ax.

Q: What is your view on what will be done during the four months from D0.1 to D1.0?

A: Basically internal review and comment resolution.

Q: I believe we should consider WFA timeline as well.

A: This is IEEE and I believe we need to make our own time-plan.

Q: I suggest to mode D1.0 from November to January

Q: This is as important as 11ax and the same people are reviewing so I believe it will be too high workload and therefore suggest to move D1.0 at least 6 months.

**11-17/0092, “Timeline discussion” – Osama Aboul-Magd (Huawei):** Osama presents some statistics regarding how long it usually takes from PAR approval to the initial WG LB (D1.0), and points out that this is about 30 months, and in addition the first LB usually fails. Still it is acknowledged that we cannot really wait 30 months with 11ba. Osama proposes the following timeline:

* March 2017 – Start SFD
* November 2017 – D0.1 and start comments collection
* March 2018 – Prepare D1.0 and start WG LB
* September 2018 – D2.0 and recirculation

Based on Osama’s presentation and some discussion following it, Minyoung updates the proposed timeline and runs the following Straw Poll:

**Straw Poll:** Do you agree with the timeline proposed in Slide 32 as the IEEE 802.11ba TG timeline? (The timeline is shown below)

* **2017**
  + **January**: TGba formation meeting
  + **November**: TGba Draft 0.1
* **2018**
  + **March**: TGba Draft 1.0
  + **September**: TGba Draft 2.0
* **2019:**
  + **March**: MDR (mandatory document review)
  + **July**: formation of sponsor ballot pool
  + **September**: Sponsor ballot
* **2020**
  + **July**: RevCom

**Result:** Y/N/A: 58/0/7

**Motion:** Do you agree with the timeline proposed in Slide 32 as the IEEE 802.11ba TG timeline?

Move: Osama AboulMagd

Second: John Notor

Motion passed by unanimous consent.

Minyoung goes through the goals for the March meeting (see below) and asks if there is any question.

**Goal for March 2017:**

* TG Vice-Chair election
* Review technical presentations
* Work on TGba task group documents
  + Use case document (editor: RossYu)
  + Functional requirement document (editor: Ming Gan)
  + Evaluation methodology and simulation scenario document (editor: Shahrnaz Azizi)
  + Spec framework document (editor: TBD)
* Review TG timeline

Q: If we should have these document in place for the March meeting, we need to appoint persons rather soon.

Based on the above question, editors for use case document, functional requirement document, and evaluation methodology and simulation scenario document are identified as shown indicated above.

Minyoung proposes a teleconference call schedule with three calls and asks if there is any comment. (One reason for three calls is that there are a number of contributions that were not presented at this f2f.) After some discussion the following teleconference call schedule is proposed:

* 3 teleconference calls
* Feb. 06 (M), 10 AM ET (1.5 hours)
* Feb. 13 (M), 5 PM ET (1.5 hours)
* Feb. 27 (M), 11 PM ET (1.5 hours)

**Motion:** Move to have the teleconference call schedule listed in Slide 36 of this document (see above)

Move: Yunsong Yang

Second: John Notor

Motion passed by unanimous consent.

**11-17/0029r3, “WUR Usage Model Document” – Ross Yu (Huawei):** Ross goes through the usage model document, which now essentially has been merged with some of the other contributions related to usage model.

Q: Usage mode seems to be like RFID, is the assumption that Wi-Fi should be used also for such use cases?

A: Yes.

Q: I feel some concern to wake up so many devices

A: Many devices can be woken up by e.g. using a group wake-up address.

Q: Use cases 3 and 7 are really addressing new markets where we don’t have Wi-Fi. If we want to have this aggressive time schedule, maybe we need to think about prioritization.

Q: Would be good to clarify that power limited devices is targeted in usage model 1.

A: Agreed. The text will be updated accordingly.

Q: For usage model 3, it seems targeted distance should be included

A: The idea is basically to collect the data by using a mobile phone, as indicated on page 12 in the presentation, so range is not believed to be an issue.

**Straw poll:** Do you agree to approve this document (11-17/0029r4) as the draft TG Usage Models document?

**Results:** Y/N/A: 48/0/10.

**Motion:** Move to approve this document (11-17/0029r4) as the draft TG Usage Models document?

Move: Ross Yu

Second: Xiaofei Wang

Results: Y/N/A: 48/1/8, motion passes

**11-17/0042, “Power Efficient WUR AP Discovery Follow Up,” Xiaofei Wang (InterDigital):**

Q: It seems the STA, which now has to send the wake-up signal, may consume more power?

A: It probably depends, but if you do passive scan you instead need to wake up many times.

Q: For some applications, like gas and electricity, you may need to send information much more often, e.g. due to that the cost depends on the time of the day.

Q: Is there any good way to discover suitable APs?

A: At this point we don’t propose any solution.

Q: It would be interesting to see some analysis with respect to how much power can be saved.

Q: Which one of the schemes do you prefer, or do you propose both?

A: It really depends on the situation.

**Meeting is adjourned at 12.30 am.**