IEEE P802.11
Wireless LANs

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| IEEE 802.11ba Task GroupMeeting Minutes for September 2017 Meeting,Waikoloa, HI, USA |
| Date: 09-15-2017 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Leif Wilhelmsson | Ericsson AB | Mobilvägen 1, 22632 Lund, Sweden | +46-706-216956 | leif.r.wilhelmsson@ericsson.com |

Abstract

Meeting Minutes for the IEEE 802.11ba TG sessions held in Waikoloa, HI, USA, September 10-15, 2017.

**Monday, September 11, 2017, 1:30-3:30 pm**

**Meeting Agenda:**

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

<https://mentor.ieee.org/802.11/dcn/17/11-17-1223-02-00ba-september-2017-tgba-agenda.pptx>

* + 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 July 2017 meeting
	+ Motion: July 2017 meeting minutes ([doc:](https://mentor.ieee.org/802.11/dcn/17/11-17-1197-00-00ba-meeting-minutes-july-2017.docx) [IEEE](https://mentor.ieee.org/802.11/dcn/17/11-17-1197-01-00ba-meeting-minutes-july-2017.docx) [802.11-17/1197r](https://mentor.ieee.org/802.11/dcn/17/11-17-1197-00-00ba-meeting-minutes-july-2017.docx)1)
	+ TGba Spec Framework Document review and approval
	+ Presentations, Recess

**Chair Minyoung Park (Intel) calls meeting to order at 1.30 am. (**About 90 persons in the room.)

Minyoung goes through page 6 and reminds about taking attendance.

Minyoung goes through page 7. 802.11ba has 8 time-slots scheduled for this week.

Minyoung goes through the main topics for this week (page 8), which are:

* **Review technical presentations**
	+ Strictly limit the presentation to the basic operation of WUR
* **Review the progress and have discussion on initial TGba draft (D0.1) planned for Nov. 2017**
* **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: Po-Kai Huang)
* **Review TG timeline**

Minyoung goes through page 9, Call for submission. In total 35 submissions have been received. Priority has been given to the presentations addressing the essential features.

The received submissions are:

**PHY presentations**:

1. **WUR Preamble (packet acquisition):**
	1. 11-17-1442-00-00ba-WUR-preamble-performance-study-with-phase-noise-and-aci, Shahrnaz Azizi (Intel Corp) –  25min (including questions)
	2. 11-17/1355   WUR Preamble Evaluation (Steve Shellhammer, Bin Tian and Lohan Verma) - 25min
	3. 11-17/1354   WUR Preamble Bit Duration (Steve Shellhammer, Bin Tian and Lochan Verma) - 25min
	4. 11-17/1343r0, “WUR Preamble SYNC design and performance”, Rui Cao and Hongyuan Zhang, 20mins
	5. 11-17/1352r0, Considerations on WUR sync preamble , Jinyoung Chun (LG electronics),, 25min
	6. “11-17-1340-00-00ba-WUR packet format”, Jianhan Liu (Mediatek), 20 minutes.
	7. 11-17/1326r0-follow up on Signaling method for data rates , dongguk Lim (LG Electronics), 25min
	8. 11-17/1345r0, phy-frame-format-discussions, Hongyuan Zhang (Marvell), 30min
2. **WUR signal waveform:**
	1. 11-17/1390 Blank GI choices under Timing Errors (Junghoon Suh, Jia Jia, Osama Aboul-Magd, and Ross Yu) - 30min
	2. “Consideration on PAPR of Wake-up packet”, Yujin Noh, “11-17-1344-00-00ba”, 20min
	3. 11-17-1347-00-00ba-symbol-structure, Eunsung Park (LG Electronics), 25min
	4. 11-17/1426 WUP CCA problem , Jinsoo Ahn (Yonsei Univ.)
3. **WUR data rate/channel coding**
	1. 11-17-1348-00-00ba-higher-data-rates, Eunsung Park (LG Electronics), 20min
	2. 11-17-1394-00-00ba, “Discussion of possible BCCs for WUR”, author: Dennis Sundman (Ericsson), 20 min

**MAC presentations**:

1. **WUR packet format**
2. 11-17/1004r1 Considerations on WUR frame format (Alfred Asterjadhi, Qualcomm), 30 mins
3. 11-17/1115, 11ba Wakeup Frame Format, Liwen Chu
4. 11-17/977, Address structure in unicast wake-up frame, Jeongki Kim (LG Electronics), 20min.
5. 11-17/1368, BSS parameters update notification, Ming Gan (Huawei), 20min
6. 11-17/0967r1 Consideration of WUR packet design, Kaiying Lv (ZTE), 20min
7. 11-17/1384r0, WUR Synchronization, Yongho Seok(MediaTek), 30 minutes
8. **WUR basic operation**
	1. 11-17/1333r0 WUR Operating Channel, Po-Kai Huang
	2. 11-17-1349, Discussion on WUR mode, Woojin Ahn (WILUS), 20 min.
	3. 11-17-1051, Uplink transmission behavior of WUR STA, Woojin Ahn (WILUS), 20 min.
	4. 11-17-1302r0, WUR mode operation procedures, Lei Huang (Panasonic), 25min
	5. 11-17-1303r0, Communicating wake-up operating parameters, Lei Huang (Panasonic), 20min
	6. 11-17/1356, PS operation for Duty cycle STAs follow-up, Jeongki Kim (LG Electronics), 25min.
	7. 11-17-1316r0, WUR-mode-signaling, Suhwook Kim (20-30min)
	8. 11-17/1369, Power save mode transition, Ming Gan (Huawei), 20~25min
	9. 11-17/1359, Considerations for WUR Response, Taewon Song (LG Electronics), 20min
9. **Security**
	1. 11-17/0660, WUR Security Proposal (SP only), Yunbo Han/Yunsong Yang

**Further Optimizations presentations**:

1. **WUR non-basic operation**
	1. 11-17/1334r0 Vendor Specific WUR Frame Follow up, Po-Kai
	2. 11-17/1427r0, Issues on Wake-up V2P radio, Hanseul Hong (Yonsei Univ.), 20min
2. **Multi-user support**
	1. 11-17/1353, Multi-user wake-up frame, Jeongki Kim (LG Electronics), 20min.
	2. 11-17-1395r0, “Simple multiplexing of Wake-Up Signals”, author: Leif Wilhelmsson (Ericsson), time: 20 min
	3. 11-17/1419 Waveform Coding Schemes for Frequency Domain Multiplexing, Rui Yang (InterDigital) (Wed AM1 or Thur PM2)

**Usage Models Presentations**:

1. 11-17-1386-00-ba-examining 802.11ba usage models for mainstream devices., Guoqing Li, 25min
2. 11-17/1388 On AP Power Saving Usage Model, Xiaofei Wang (InterDigital)

After some discussions, the above grouping of the presentations is agreed.

Minyoung goes through the agenda for the week (slide 17) and asks if there is any question on the agenda. No question asked.

**Motion** to approve the agenda

Move: Yunsong Yang

Second: Alfred Asterjadhi

Motion passed by unanimous consent.

Minyoung reads through the slides about *Participants, Patents, and Duty to Inform* (slide 19), *Patent Related Links* (slide 20), makes a *Call for Potentially Essential Patents* (slide 21). No potentially essential patents reported and no questions asked.

Minyoung shows *Other Guidelines for IEEE WG Meetings (slide 22), Participation in IEEE 802 Meetings (slide 23),* and where to find more relevant information (slides 24-26). People not familiar are encouraged to read these slides.

Minyoung goes through the summary from the July 2017 meeting (slide 27).

**Motion** to approve TGba minutes of July 2017 meeting [[doc: IEEE 802.11-17/1197r1](https://mentor.ieee.org/802.11/dcn/17/11-17-1197-01-00ba-meeting-minutes-july-2017.docx)]

Move: John Notor

Second: Yunsong Yang

Motion passed by unanimous consent.

**Review of document 11-17/0575r3 “Specification Framework for TGba”, (Po-Kai Huang):**

Po-Kai explains that the document has been updated in agreement with what was decided during the July f2f meeting. Po-Kai has also added a table for the different abbreviations used throughout the document.

Po-Kai asks if there are any questions. There are no question or comments on the document.

**Motion:** Move to approve the document 11-17/0575r3 as the revised TGba Specification Framework Document.

Move: Po-Kai Huang

Second: Jianhan Liu

Motion passed by unanimous consent.

**Presentations:**

**11-17/1442r1 “WUR preamble performance study with phase noise and ACI”, Shahrnaz Azizi (Intel Corp):** A preamble design consisting of two 15-bit PN sequences was evaluated and shown to work well, also taking into account phase noise and ACI.

**Question/Comment (Q):** We have a similar presentation with similar results. I wonder if 10% for missed detection is good enough?

**Answer (A):** I believe so, we have talked about a packet error rate of 10%.

Q: I have a question with respect to the use of two thresholds. Is it so that there is an increased error probability?

A: Not in practice, you need to select the thresholds properly.

Q: Do you see issues with AGC, since you compare the correlation peak with a threshold?

A: We normalized the output of the correlator, so the absolute value is not of any concern. We don’t see a problem with AGC.

Q: How is the SNR defined?

A: After the 4 MHz filter.

Q: You are using a first order filter, but we talk about using a second order in the simulation evaluation document. What is the reason for the first order filter?

A: We have seen some negative impact of using a second order filter.

Q: Why do you put a zero in front of the PN sequence?

A: We wanted to have 16 bits.

**11-17/1355r1: “WUR Preamble Evaluation” Steve Shellhammer (Qualcomm):** False alarm rate can be relatively high as the wake-up packet also contains a CRC and thus to actually wake up the main radio the CRC must check in addition to having a false alarm. Rather similar performances are obtained for a 32 bits MLS or two combined 16 bits MLSs. Noteworthy that the performance probably is not sufficiently good in case a BCC is used, i.e., the operating point for the data part of the packet is at a lower SNR.

Q: Just a comment that alternative zero-one pattern has never been proposed for synchronization, but only for AGC training.

Q: You have a different SNR value than in a previous presentation.

A: Due to different definition of SNR. We define it over 20 MHz, so there is a 7 dB difference.

Q: You have not consider ACI?

A: Correct

Q: You say you have normalized the output of the correlator, but it is not entire clear how that is done.

A: I basically use a window which is slightly wider than the 128 us used for correlation and calculate the average energy in this.

Q: I believe one can actually use a shorter length of the synchronization,

Q: I believe the false alarm ratio should be much lower for such a long sequence.

A: It depends on the threshold. It is designed to be 1% so that we can have a high probability of detect.

**11-17/1354r0 “WUR Preamble Bit Duration”, (Steve Shellhammer):** The presentation studies the impact of the bit duration used in the preamble. Specifically, durations of 1,2, and 4 us are considered.

Q: How do you make the 1 and 2 us duration preamble bit?

A: I basically just multiply the OFDM signal with a sequence having this duration.

Q: For the different durations on page 3, how do you design the waveforms?

A: You can think of it as masking the OFDM signal. This is essentially the same question as the previous one.

Q: If you have shorter duration, would not the TX spectrum be worse?

A: Only slightly I expect.

**Minyoung declares the meeting to be in recess at 3.31 pm.**

**Tuesday, September 12, 2017, 8:00-10:00 am**

**Meeting Agenda:**

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

<https://mentor.ieee.org/802.11/dcn/17/11-17-1223-03-00ba-september-2017-tgba-agenda.pptx>

* Call meeting to order
* IEEE 802 and 802.11 IPR Policy and procedure
* Usage model submissions
* Presentations, Recess

**Chair Minyoung Park (Intel) calls meeting to order at 8.05 am. (**About 60 persons in the room.)

Minyoung reminds about taking attendance.

Minyoung makes a call for essential patents. No potentially essential patents reported and no questions asked.

Minyoung goes through the agenda and asks if there are any comments. No comments or questions.

**Presentations:**

**11/17-1386r7 “Examining 802.11ba usage models for mainstream devices”, Guoqing Li (Apple):** The contribution is about adding two use cases which are believed to allow for that significantly more power can be saved for main devices, e.g. mobile phones, that are equipped with a WUR.

Q: Before adding features one should also consider the additional complexity added.

Q: I envision there can also be active scanning

A: This is only for passive scanning

Q: With only passive scanning, do you envision more WUR beacons?

A: No, what is available should be used.

Q: On page 10, do we need to specify how often the WUR beacon needs to be transmitted?

A: No, I envision this can be implementation dependent.

Q: I think the two use cases should be merged into one.

A: We thought about this, but decided we wanted to have them as two.

Q: It is not clear whether the Wake-up signal will be sent in-band or out-of-band. How would that impact this use case?

A: I believe we need to work on the details, but if the channel used by the main radio is known this can be communicated using the WUR.

Q: How do you think about when APs don’t have WUR capability.

A: It will be more useful as the market adopts, but there is no harm if only some APs have this capability.

**Strawpoll:** Do you agree to include page 9 into 802.11ba usage model document?

**Y/N/A: 35/1/11**

**Strawpoll:** Do you agree to define a type of WUR frame that can be decoded by unassociated STAs?

The Strawpoll is postponed.

**11-17/1388r2 “On AP Power Saving Usage Model”, Xiaofei Wang (InterDigital):**

A usage model of a mobile AP power saving is proposed as a modified usage model 3b (Cattle farm). The intention is to address some of the concerns raised in relation to having a WUR in the AP. Simulation results are provided to show the power savings possible to achieve by using a WUR in a mobile AP.

Q: There is no urgency on the same time scale as we usually think of. I think all of this essentially can be done at a high level as it does not really matter if things take, say, one hour. Basically I think it is hard to see this as a compelling application for a WUR in an AP.

A: I have looked up the requirement when it comes to agriculture, and I don’t agree that the time scale is like you describe, but more on the order of 10s.

Q: I speak against this as I believe you need to introduce some new protocol to support this. In addition, I don’t think the power consumption in this case is not such a big issue.

Q: On slide 22, I agree with a previous commenter that this is not a main use case, and I also believe it will require additional work which I am very concerned with.

A: I understand your concern, but I believe this use case really address what was stated in the PAR.

Q: On slide 12, why are the numbers so similar for the main radio and the WUR?

A: I just reused some numbers from an earlier presentation

Q; I oppose this feature. I believe we need to consider the cost of adding this, where cost can be measured in delay of the specification, the additional number of specification pages etc. I don’t see that this use case can justify the cost that is added to 11ba.

A: I have tried to address the concerns expressed earlier, and also provided some results. I see there now are new concerned

**Straw Poll 1:** Do you agree to insert the usage model described on slide 21-22 into the 802.11ba Usage Model document as Usage Model 3b?

**Y/N/A:** 11/20/19

**11-17/1343r0 “WUR Preamble SYNC design and performance”, Rui Cao (Marvell):** The contribution proposed to use two different syncwords corresponding to the different data rates. The two different syncwords are selected as to have low cross correlation in addition to have good autocorrelation.

Q: How do you select the sync timing?

A: We have not fine-tuned the threshold with respect to probability of false alarm and probability of miss, but basically we look at the output of the correlator and search for the peak which we compare to a threshold.

Q: You have to run two correlators simultaneously, is that correct?

A: Yes.

Q: On slide 8, what does the numbers 2 and 4 mean?
A: That is the duration of the corresponding symbols in the sync word, i.e., 2 or 4 us.

Q: I like the presentation and would actually like to propose that we define something like this to the simulation scenario document, e.g. using 2 ms noise before the wake-up packet and use this for evaluating false alarm. Also, I suggest to use to define the syncwords in terms of suggestion to make it more clear when comparing different sync words.

**11-17/1352r0 “Considerations on WUR sync preamble”, Jinyoung Chun (LG electronics):** The presentation shows simulation results related to synchronization.

Since the strawpolls relate to similar things also are covered in other contributions, it is decided to postpone them.

**Minyoung declares the meeting to be in recess at 9.56 am.**

**Tuesday, September 12, 2017, 1:30-3:30 pm**

**Meeting Agenda:**

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

<https://mentor.ieee.org/802.11/dcn/17/11-17-1223-03-00ba-september-2017-tgba-agenda.pptx>

* Call meeting to order
* IEEE 802 and 802.11 IPR Policy and procedure
* Usage model submissions
* Presentations, Recess

**Chair Minyoung Park (Intel) calls meeting to order at 1.30 pm. (**About 65 persons in the room.)

Minyoung reminds about taking attendance.

Minyoung makes a call for essential patents. No potentially essential patents reported and no questions asked.

Minyoung goes through the agenda and asks if there are any comments. No comments from the participants.

**Presentations:**

**11-17/1004r1 “Considerations on WUR frame format”, (Alfred Asterjadhi, Qualcomm):** Suggests to support constant-length and variable-length WUR frames, where length in the latter case is indicated in the MAC header. The WUR PPDU consists of PHY Preamble, MAC Header, Frame Body and FCS.

Q: On slide 6, how do you determine the address to the STA?

A: It depends on the number of bits. If there are sufficient number of bits, it could be the AID, if there are only 8 bits, it has to be something else.

Q: The Frame Body, can that carry data or application data?

A: It could be control data, see e.g. slide 4.

Q: Can unassociated STAs decode them?

A: The frame format allows for this to be the case.

Q: It seems the MIC calculation may be rather complex, is that the case?

A: It should be based on a low complex cipher.

Q: On slide 7, I prefer option 1 because of its shorter length.

A: This was more as an example, and I don’t have any straw poll related to this.

Q: On slide 8, if the packet is not encrypted what is the content of FCS, just a CRC? What is the length?

A: It will be a CRC. The length is expected to be 2 or 3 bytes, but needs to be decided based on simulations.

Q: What if two APs use the same identifier?

A: Then the WUR would be erroneously woken up. If found to be a practical problem we need to address this.

Q: Can there be different encryptions in a packet.

A: No, all the receivers must use the same key.

**The straw polls are deferred.**

**11-17/1115r2, “Wakeup Frame Format”, Liwen Chu (Marvell):** The presentation is about the frame format of a wake-up packet, and in particular about how to identify the transmitter and receiver.

Q: You want to have different lengths for different types, but when I talk to our PHY people it seems it preferable to have a fixed length.

A: I believe this can be considered.

Q: The terms LP Sync is the same as WUR beacon?

A: Yes.

Q: I don’t think we need more than one type.

Q: Is CBSSID just the color?

A: Essentially yes.

Q: LPSTAID, is that another identifier than AID?

A: Yes, basically if you don’t have 11 bits available.

Q: You say optional, do you mean variable?

A: Effectively yes. The length can be zero, so then you can also view it as optional.

Q: You think 8 bits FCS are needed to protect, say, 20 bits?

A: Yes, but I have not done any calculation.

**The straw polls are deferred.**

**11-17/0977r1 “Address structure in unicast wake-up frame,” Jeongki Kim (LG Electronics):** Different options to be used as RX identifier are discussed. AID, WID (New ID for WUR), variable WUR ID. As a TX identifier 8 or 10 bits BSS identifier is proposed.

Q: I don’t think we should have a variable length WUR ID. I don’t think it is worth the extra complexity.

**The straw polls are deferred.**

**11-17/1368r0 “BSS parameters update notification,” Ming Gan (Huawei):** The presentation is concerned with how to update BSS parameters, and how to inform the WUR that some of the parameters have been updated.

**The straw poll is deferred.**

**11-17/0967r0 “Consideration of WUR packet design,” Kaiying Lv (ZTE):** It is argued in this contribution that a SIG field might be useful for power saving. The presentation also discusses encryption of the WUR packet.

Q: How much is the overhead for the encryption?.

A: We envision that the data is scrambled, so there is no overhead in terms of transmitted bits.

Q: I am concerned with having two CRCs. I don’t think this is actually needed.

Q: I believe you actually mean authentication rather than encryption.

Q: Unclear exactly what you have in mind when it comes to encryption.

Q: I agree with an earlier commenter that only one CRC is needed.

A: One idea was to use it to identify whether the packet is unicast or broadcast.

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

**Tuesday, September 12, 2017, 4:00-6:00 pm**

**Meeting Agenda:**

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

<https://mentor.ieee.org/802.11/dcn/17/11-17-1223-04-00ba-september-2017-tgba-agenda.pptx>

* Call meeting to order
* IEEE 802 and 802.11 IPR Policy and procedure
* Usage model submissions
* Presentations, Recess

**Chair Minyoung Park (Intel) calls meeting to order at 4.00 pm. (**About 65 persons in the room.)

Minyoung reminds about taking attendance.

Minyoung makes a call for essential patents. No potentially essential patents reported and no questions asked.

Minyoung goes through the agenda and asks if there are any comments.

**Presentations:**

**11-17/1390r0 “Blank GI choices under Timing Errors”, (Junghoon Suh):** The presentation is a continuation of earlier presentations on the topic of waveform coding, and in particular using a blank GI as a means to reduce the impact of ISI.

Q:Can you explain intuitively why you obtain as much as 3 dB gain?

A: Higher amplitude.

Q: Looking at WFC III and WFC I it looks like WFC III should be more sensitive to timing error, but your results show that things are the opposite.

**11-17/1347r0 “Symbol Structure”, Eunsung Park (LG Electronics):** The presentation looks in to potential gains that can be obtained by blanking out part of the symbol. The idea is similar to presentation 1390, above

Q: I believe it makes sense that repeating the symbols adjacent to one another is beneficial when there is ISI. Do you have a feeling for how much the difference is.

A: Somewhere between 0.5 and 1 dB

Q: You may have as much as 16us when there is no signal for the 62.5 kb/s case. Could this have the undesirable effect that the channel is found to be idle by other devices?

A: We have not considered this.

**The straw polls are deferred**

**11-17/1426r1 “WUP CCA problem”, Jinsoo Ahn (Yonsei Univ.)** The presentation is concerned with the situation that if the L-preamble is not detected, other 802.11 STAs will use ED to sense the WUP, and the channel may then more likely be declared as idle.

**11-17/1348r0 “Higher data rates,” Eunsung Park (LG Electronics):**The presentation investigates the feasibility of using 500kb/s and 1 Mb/s data rate for the WUP.

Q: Did you also consider preamble when calculating the overhead?

A: No, we did not.

Q: I believe you will transit these packet so seldom that it does not really make a difference.

Q: I believe the majority of transmitted WUPs is WUR beacons, and these I believe will anyway be sent with lower data rates anyway. Therefore I don’t really see a big gain.

Q: I believe there are use cases for higher data rates.

Q: I believe we should consider these high data rates as optional.

**The straw poll is deferred**

**Minyoung declares the meeting to be in recess at 5.54 pm.**

**Wednesday, September 13, 2017, 8:00-10:00 am**

**Meeting Agenda:**

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

<https://mentor.ieee.org/802.11/dcn/17/11-17-1223-05-00ba-september-2017-tgba-agenda.pptx>

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

**Chair Minyoung Park (Intel) calls meeting to order at 8.00 am. (**About 40 persons in the room.)

Minyoung reminds about taking attendance.

Minyoung makes a call for essential patents. No potentially essential patents reported and no questions asked.

Minyoung goes through the agenda and asks if there are any questions. No questions asked.

**Presentations:**

**11-17/1384r0, “WUR Synchronization”, Yongho Seok (MediaTek):** The submission is concerned with synchronization using the partial timestamp field in the beacon.

**Q:** You recommend that the WUR beacon is sent every second, but earlier we have discussed 10s in order to reduce channel occupancy. Maybe we can discuss this a bit more.

**The straw poll is deferred.**

**11-17/1004r2, “Considerations on WUR frame format”. Alfred Asterjadhi (Qualcomm):**

This is a continuation of the presentation, now running the straw polls.

**Straw Poll 1:**

* **Do you agree with the following MAC frame:**
	+ The length of the MAC header is fixed



* + Whether the Address field contains more than one identifier is open for discussion

**Y/N/A:** 18/2/10

**Straw Poll 2:**

Do you agree to have a Type subfield that identifies the WUR frame type?

* + The Type subfield is contained in the Frame Control field of the MAC header
	+ One Type subfield value assigned to WUR Beacon and one to Wake Up frame

**Y/N/A:** 9/0/14

**Straw Poll 3a:**

Do you agree to have in the Address field an identifier that:

* + Is the identifier of the transmitter when the frame is WUR Beacon

**Y/N/A:** 18/1/7

**Straw Poll 3b:**

Do you agree to have in the Address field an identifier that:

* + Is the identifier of the receiver when the frame is unicast Wake Up
		- Presence of an additional addressing identifier is open for discussion

**Y/N/A:** 10/8/8

**Straw Poll 4:**

* Do you agree to have a Type Dependent (TD) Control field in the MAC header that contains type dependent control information?
	+ The TD Control field of a WUR Beacon contains the partial TSF

**Y/N/A:** 10/0/10

**Straw Poll 5a:**

* Do you agree to have an optionally present Frame Body field in the MPDU?
	+ The length of the Frame Body field is signaled in the Frame Control field
	+ It is optional for a STA to support reception of a frame with nonzero length Frame Body

**Y/N/A:** 5/6/14

**Straw Poll 5b:**

* Do you agree to have an optionally present Frame Body field in the MPDU?
	+ It is optional for a STA to support reception of a frame with nonzero length Frame Body

**Y/N/A:** 5/0/20

**Straw Poll 5c:**

* Do you agree to define a Frame Check Sequence (FCS) that carries the CRC of the frame?
	+ Length and computation of FCS is TBD

**Y/N/A:** 21/0/5

**Straw Poll 6:** -Deferred

**11-17/1115r3, “Wakeup Frame Format”, Liwen Chu (Marvell):**

This is a continuation of the presentation, now running the straw polls.

**Straw poll 1:**

Do you support that the unicast wakeup frame includes the following identifiers

* + Transmitter identifier
	+ Receiver identifier

Y/N/A: 22/4/9

**Straw poll 2:** -Deferred

**11-17/0977r2 “Address structure in unicast wake-up frame,” Jeongki Kim (LG Electronics):**

This is a continuation of the presentation, now running the straw polls.

**Straw Poll 1:**

Do you agree the following?

* + R.4.2.B. The WUR Action frame sent by an AP through the PCR includes a WUR receiver identifier (WID)
		- WID uniquely identifies a WUR STA within a BSS
		- WID is included in a unicast wake-up packet as the receiver identifier to wake up the WUR STA
		- The size of WID is TBD and how it is computed is TBD

 **Y/N/A:** 25/0/6

**Straw Poll 2:**

Which option do you prefer as TX identifier included in the unicast WUR packet?

* + Option 1: BSS Color (The size is TBD)
	+ Option 2: Partial BSSID (Partial BSSID is N least significant bit(LSB)s of BSSID)
	+ Option 3: abstain

**Op1/Op2/Op3:** 10/4/15

**Straw Poll 3: - Deferred**

**11-17/1368r1 “BSS parameters update notification”, Ming Gan (Huawei):**

This is a continuation of the presentation, now running the straw poll.

**Straw Poll:**

Do you agree that AP indicates a BSS parameter update by incrementing a counter in the wake up packet?

**Y/N/A:** 10/2/15

**Minyoung declares the meeting to be in recess at 10.03 am.**

**Thursday, September 14, 2017, 8:00-10:00 am**

**Meeting Agenda:**

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

<https://mentor.ieee.org/802.11/dcn/17/11-17-1223-06-00ba-september-2017-tgba-agenda.pptx>

* Call meeting to order
* IEEE 802 and 802.11 IPR Policy and procedure
* TGba usage model document review/approval
* Presentations, Recess

**Chair Minyoung Park (Intel) calls meeting to order at 8.00 am. (**About 80 persons in the room.)

Minyoung reminds about taking attendance.

Minyoung makes a call for essential patents. No potentially essential patents reported and no questions asked.

Minyoung goes through the agenda and asks if there are any questions. No questions asked.

**Presentations:**

**11-17/0029r10,** “**WUR Usage Model Document” (Ross Jian Yu):**

Some changes that have been made to this version include that Wake-Up AP is removed, the wording in the usage model for V2P Radio is updated, and Usage Model 9, Smart Scanning, is added.

**Motion:** Move to approve this document (11-17/0029r10) as the draft TGba Usage Models document

Move: Ross Jian Yu

Second: John Notor

**Y/N/A**: 29/7/4, Motion passes

**11-17/1340r0 ”WUR packet format”, Jianhan Liu (Mediatek):** The presentation proposes that the rate is indicated by the signature sequence.

Q: I believe we need to have the big picture before deciding on how the rate should be indicated.

A: I believe we have enough insight to make a decision in this matter.

Q: You want to kill the usage of higher data rates than 250 kb/s?

A: Yes.

Q: I don’t really see the additional complexity by indicating the rate elsewhere.

Q: Does this mean that if we in the future would like to add another data rate, we need a new signature?

A: No, that is not necessary.

Q: We are concerned with how this may impact future generations where we may want to support other rates.

A: I believe we must have something simple to make 11ba take off. I don’t think we can afford to build in a lot of flexibility at this point in time.

**11-17/1326r0, “Follow up on signaling method for data rates”, Dongguk Lim (LG Electronics):**

The presentation is a follow-up from the last meeting.

Q: I believe the strawpoll is going against what you proposed in the presentation. Is the Strawpoll correct?

A: It is correct

Q: I believe you are using the term signature sequence in a different way than some other presentations. Perhaps we should agree on terminology before running the straw polls.

**Straw Polls deferred.**

**11-17/1345r2, “11ba PHY frame format proposal,” Hongyuan Zhang (Marvell):** The presentation proposes two data rates, where the lowest data rate only is used for the most basic frame types. WUR beacon is an example for when the low data rates should be used.

Q: Type indication is like a SIG field, where you need a CRC?

A: I don’t believe there is any need for a separate CRC.

Q: We have seen presentation showing that higher data rates may beneficial, so I am a bit concerned with only having two data rates.

A: We had similar thinking originally, but we now believe we should do things as simple as possible.

Q: With two sync fields, it seems the receiver must consume more power.

A: The power consumption of the correlator is very low, so we don’t really see that this makes a big difference taking also other things into account.

Q: I agree that two rates are sufficient and also that the power consumption is not an issue.

Q: Maybe we can run some simulations showing whether there is a benefit of adding additional higher data rates.

Q: I think this presentation really has a good balance between simplicity and performance.

Q: I want the group to also think about p2p and other use cases, not only when there is an AP. In this case maybe higher data rates may make sense. In general I am a bit concerned having too many restrictions.

Q: I also believe higher data rates may be beneficial.

Q: I would prefer to only have one data rate.

**Straw Polls deferred.**

**11-17/1506r1 “Preamble Straw Polls”, (Steve Shellhammer, Qualcomm):**

**Straw Poll 1:**

* We can either have one sync design for all WUR packets, or a sync1 design for 62.5 kb/s and a sync2 design for 250 kb/s.
	+ Sync is used for Packet Detection and Timing Synchronization

Which do you prefer

* Option #1 – One sync design for all WUR packets
* Option #2 – Two sync designs: one design for 62.5 kb/s packets and one design for 250 kb/s packets

**Option1/Option2/Too early to decide:**28/21/16

**Straw Poll 2:**

Which do you prefer

* Option #1 –Same duration of sync field for all rates
* Option #2 – Shorter duration sync field for 250 kb/s and longer duration sync field for the 62.5 kb/s design

**Option1/Option2/Too early to decide:**19/21/18

**Minyoung declares the meeting to be in recess at 10.03 am.**

**Thursday, September 14, 2017, 10:30-12:30 am**

**Meeting Agenda:**

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

<https://mentor.ieee.org/802.11/dcn/17/11-17-1223-07-00ba-september-2017-tgba-agenda.pptx>

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

**Chair Minyoung Park (Intel) calls meeting to order at 10.30 am. (**About 65 persons in the room.)

Minyoung reminds about taking attendance.

Minyoung makes a call for essential patents. No potentially essential patents reported and no questions asked.

Minyoung goes through the agenda and asks if there are any questions. No questions asked.

**Presentations:**

**11-17/1345r3 “11ba PHY Frame Format Proposal”, Hongyuan Zhang (Marvell):**

This is a continuation of the presentation, now running the straw poll.

**Straw Poll 1:** Do you agree that 11ba has two data rates: 62.5Kbps and 250Kbps?

No other rate(s) are defined

**Y/N/A:** 39/8/7

**11-17/1004r4, ”Considerations on WUR frame format”, Alfred Asterjadhi (Qualcomm):**

**Motion 1:** Move to add to the TGba SFD:

* The WUR frame has the following format:
	+ The length of the MAC header is fixed



* + Whether the Address field contains more than one identifier is open for discussion

Move: Alfred Asterjadhi

Second: Bin Tian

Motion passed by unanimous consent.

**Motion 2:** Move to add to the TGba SFD:

* A Type subfield identifies the WUR frame type
	+ The Type subfield is contained in the Frame Control field of the MAC header
	+ One Type subfield value assigned to WUR Beacon and one to Wake Up frame

Move: Alfred Asterjadhi

Second: Po-Kai Huang

Motion passed by unanimous consent.

**Motion 3:** Move to add to the TGba SFD:

* The Address field contains an identifier of the transmitter when the frame is WUR Beacon

Move: Alfred Asterjadhi

Second: Po-Kai Huang

Motion passed by unanimous consent.

**Motion 4:** Move to add to the TGba SFD:

* The Type Dependent (TD) Control field in the MAC header contains type dependent control information
	+ The TD Control field of a WUR Beacon contains the partial TSF

Move Alfred Asterjadhi

Second Po-Kai Huang

Motion passed by unanimous consent.

**Motion 5:** Move to add to the TGba SFD:

* The WUR frame has an optionally present Frame Body field
	+ It is optional for a STA to support reception of a frame with nonzero length Frame Body

Move Alfred Asterjadhi

Second Po-Kai Huang

Motion passed by unanimous consent.

**Motion 6:** Move to add to the TGba SFD:

* The WUR frame has a Frame Check Sequence (FCS) that carries the CRC of the frame
	+ Length and computation of FCS is TBD

Move Alfred Asterjadhi

Second Yongho Seok

Motion passed by unanimous consent.

**11-17/0977r4, “Address structure in unicast wake-up frame” (Jeongki Kim)**

**Motion:**

* **Move to add the following into 11ba SFD**
	+ R.4.2.B. The WUR Action frame sent by an AP through the PCR includes a WUR receiver identifier (WID)
		- WID uniquely identifies a WUR STA within a BSS
		- WID is included in a unicast wake-up packet as the receiver identifier to wake up the WUR STA
		- The size of WID is TBD and how it is computed is TBD

Move: Jeongki Kim

Second: Kiseon Ryu

Motion passed by unanimous consent.

**11-17/1115r4, ”Wakeup Frame Format” Liwen Chu (Marvell)**

**Motion:**

* Move to add the following text to 11ba SFD:
	+ the unicast wakeup frame contains an identifier that identifies both the Transmitter and the Receiver

Move: Liwen Chu

Second George Vlantis

Motion passed by unanimous consent.

**11-17/1368r2 “BSS parameters update notification” Ming Gan (Huawei)**

**Motion:**

* Move to add to the TGba SFD:
	+ AP indicates a BSS parameter update by incrementing a counter in the Wake Up frame

Move Ming Gan

Second Yunsong Yang

Motion passed by unanimous consent.

**11-17/1345r5 “11ba PHY Frame Format Proposal” Hongyuan Zhang (Marvell)**

**Motion:**

* Move to add to the TGba SFD:
	+ 11ba has only two data rates: 62.5Kbps and 250Kbps.

Move: Hongyouan Zhang

Second Jianhan Liu

Motion passed by unanimous consent.

**11-17/1347r3 “Symbol structure” Eunsung Park (LG Electronics)**

**Straw Poll 1:**

* Do you agree to add the following to the 11ba SFD?
	+ Symbol structure of the data rate of 250Kbps for each information is as follows



**Y/N/A:** 22/0/10

**Motion:**

* Do you agree to add the following to the 11ba SFD?
	+ Symbol structure of the data rate of 250Kbps for each information is as follows



Move: Eunsung Park

Second: Jinsoo Choi

Motion passed by unanimous consent.

**Straw Poll 2:**

* Do you agree to take the following waveform coding as an optional feature of WUR frame format?
	+ 2usec ON-signal for the data rate of 250Kbps is composed of a TBD usec null portion and a 2-TBD usec signal part
	+ The TBD usec is non-zero
	+ Indication of capability to handle the proposed waveform is TBD
	+ The proposed waveform is for the payload and is not applied to the WUR preamble SYNC symbols and TBD indication bit(s)

**Y/N/A:** 17/23/7

**11-17/1394r0, “Discussion of possible BCCs for WUR”, Dennis Sundman (Ericsson):** Based on that there in earlier meeting have been some concern regarding reusing the memory 6 BCC currently used in 802.11, alternative BCCs are discussed to address this concern.

**Straw Poll:**

Do you support to have a BCC for 62.5kb/s mode of the WUR?

**Y/N/A:** 14/21/15

**11-17/0660r1, “WUR Security Proposal” (SP only), Yunbo Han/Yunsong Yang**

**Straw Poll:**

* Do you support that a STA may include a reason of its wake-up due to a unicast wake-up packet in a frame that the STA sends to the AP using its PCR, in order to assist the AP in determining whether the STA’s WURx receives a spoofed unicast wake-up packet?

**Straw Poll** deferred to pm1 session.

**Minyoung declares the meeting to be in recess at 12.30 pm.**

**Thursday, September 14, 2017, 1:30-3:30 pm**

**Meeting Agenda:**

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

<https://mentor.ieee.org/802.11/dcn/17/11-17-1223-08-00ba-september-2017-tgba-agenda.pptx>

* + Call meeting to order
	+ IEEE 802 and 802.11 IPR Policy and procedure
	+ TG timeline discussion
	+ Goal for November 2017 F2F meeting
	+ Teleconference call schedule
	+ TGba simulation scenarios and evaluation methodology document review/approval
	+ Presentations
	+ Adjourn

**Chair Minyoung Park (Intel) calls meeting to order at 1.30 pm. (**About 25 persons in the room.)

Minyoung reminds about taking attendance.

Minyoung makes a call for essential patents. No potentially essential patents reported and no questions asked.

Minyoung goes through the agenda and asks if there are any questions. No questions asked.

**TG timeline discussion:**

Minyoung believes MAC is in better shape than PHY. Minyoung encourage cooperation and trying to have some joint bigger contributions for the next meeting and emphasize the urgency to harmonize different proposals.

The timeline is updated such that TGba Draft 0.1 is moved from November 2017 to January 2018 and Draft 1.0 is moved from March 2018 to May 2018.

**Motion:** Move to accept the updated TGba Timeline in document 11-17/1223r8 “September 2017 TGba Agenda”

Move: Peter Loc

Second: John Notor

Motion passed by unanimous consent.

Minyoung goes through the goals for November 2017 (slide 32). No questions asked.

**Teleconferences:**

October 9 (Monday) 10.00 ET

 October 23 (Monday) 17:00 ET

 October 30 (Monday) 23:00 ET

There are no questions, and the teleconference scheduled is agreed.

11-17/0188r10 “IEEE 802.11 TGba Simulation Scenarios and Evaluation Methodology Document”, Shahrnaz Azizi (Intel)

Shahrnaz goes through the Simulation Scenario and Evaluation Methodology Document: Some minor editorial corrections. Clarification with respect to LPF used as a channel selective filter. It has also been suggested to add something that can be used to evaluate the benefit of using supporting higher data rates.

**Motion:**

Move to approve document 11-17/0188r10 as the TGba “Simulation Scenario and Evaluation Methodology Document”

Move: Shahrnaz Azizi

Second: Po-Kai Huang

Motion passed by unanimous consent

**Presentations:**

Continuation of the straw poll that was not finalized during the am2 session.

**11-17/0660r2, “WUR Security Proposal” (SP only), Yunbo Han/Yunsong Yang**

**Straw Poll:**

* Do you support that a STA may include a reason of its wake-up due to a unicast wake-up packet in an 802.11 management frame that the STA sends to the AP using its PCR, in order to assist the AP in determining whether the STA’s WURx receives a spoofed unicast wake-up packet?

**Y/N/A:** 4/6/10

**11-17/1333r2 “WUR Operating Channel”, Po-Kai Huang (Intel):** For various reasons the channel used by the WUR and the PCR may be different. The suggestion is that the AP should decide WUR operating channel.

Q: You say the WUR channel can be indicated in the beacon?

A: Yes

**Straw Poll:**

Do you support that AP decides the WUR operating channel in the band(s) supported by the associated non-AP STA operating in WUR Mode?

**Y/N/A**: 13/1/5

**Motion:**

* Move the following to the 11ba SFD:
* AP decides the WUR operating channel in the band(s) supported by the associated non-AP STA operating in WUR Mode

Move: Po-Kai Huang

Second: Lei Huang

**Y/N/A:** 13/0/4, Motion Passes

**11-17/1349r4, “Discussion on WUR mode”, Woojin Ahn (WILUS):** The presentation discusses the WUR mode, and in particular that a STA in WUR mode should not have to listen to the beacon.

**Straw Poll:**

* **Do you agree to add the following to 11ba SFD:**
	+ *If a non-AP STA is in WUR mode, then*
		- *the non-AP STA may not listen for Beacon frames if the non-AP STA is in PS mode*

**Y/N/A:** 12/0/3

**Motion:**

* **Do you agree to add the following to 11ba SFD:**
	+ *If a non-AP STA is in WUR mode, then*
		- *the non-AP STA may not listen for Beacon frames if the non-AP STA is in PS mode*

Move: Woojin Ahn

Second: Lei Huang

Motion passed by unanimous consent

**11-17-1051r1, “Uplink transmission behavior of WUR STA”, Woojin Ahn (WILUS)**: General UL transmission behavior for a STA is discussed. In particular, it is proposed to introduce a guard time from that the STA enters WUR mode in order to ensure that the WUR is ready for reception of a WUP.

Q: I am not sure we need to specify anything for the AP.

Q: Do you have any time for the guard time?

A: I have seen numbers in the order of 1ms

Q: I am trying to understand if this really is a problem.

**Minyoung declares that the meeting is adjourned at 3.30 pm.**