Minutes IEEE P802.11  
Wireless LANs

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| IEEE 802.11 TGbh Meeting Minutes, February 7, 2023  Randomized and Changing MAC addresses (RCM) | | | | |
| Date: 2023-02-07 | | | | |
| Author(s): | | | | |
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Abstract

This document contains the minutes of the IEEE 802.11bh telecon meeting of February 7, 2023.

Note: Highlighted text are action items.

Q- proceeds a question asked at the meeting

A- proceeds an answer

C- proceeds a comment

**Meeting February 7, 2023 9:30 a.m. to 11:30 a.m. ET**

**Chair: Mark Hamilton (Ruckus/CommScope)**

**Vice Chair: Peter Yee (NSA-CSD/AKAYLA)**

**Vice Chair: Stephen Orr (Cisco)**

**Secretary: Peter Yee**

**Editor: Carol Ansley (Cox)**

**The teleconference was called to order by the Chair at 9:33 a.m. EST.**

Agenda slide deck [11-23/0029r00](https://mentor.ieee.org/802.11/dcn/23/11-23-0029-00-00bh-agenda-tgbh-2023-jan-10.pptx)

1. **Policies and procedures were presented by the chair. (Slides 4 to 14)**

There were no Patent declarations.

Copyright policy slides were presented (Slides 10 and 11)

1. **Agenda:**

* **Attendance, noises/recording, meeting protocol reminders**
* **Policies, duty to inform, participation rules**
* **Organization topics (see Backup slides)**
  + **Timeline reminder (slide 24)**
* **Issues Tracking:** [**11-21/0332r37**](https://mentor.ieee.org/802.11/dcn/21/11-21-0332-37-00bh-issues-tracking.docx)
* **Results of Comment Collection on D0.2:** [**11-22/0973r13**](https://mentor.ieee.org/802.11/dcn/22/11-22-0973-13-00bh-cc41-comments-against-d0-2.xlsx)
* **Motions record:** [**11-22/0651r9**](https://mentor.ieee.org/802.11/dcn/22/11-22-0651-09-00bh-tgbh-motions-list.pptx)
* **Discussion on way forward:**
  + **Support for “pre-association use cases”, but no consensus on any solution …**
  + **Do we agree on the set of use cases (review from 11-21/0332)?**
  + **Other help to find consensus?**
* **Contributions (if any ready/if there’s time)**
* **WBA liaison response**

Any comments? [None]

Any objections to agenda? [None]

1. **Timeline**

The timeline currently indicates an initial WG letter ballot on a Draft 1.0 of the IEEE 802.11bh specification coming out of the March 2023 plenary meeting. So far, this is not looking likely given the lack of consensus on what else goes into the draft and whether the draft addresses the PAR.

1. **Way forward**

C- Half the people voted for an encrypted scheme (IE); half voted for unencrypted MAC addresses. I don’t see a clear way forward.

C- With the vote last week for doing pre-association use cases being 12 for and 9 against, it would take 27 to overcome the ‘no’ voters. That’s pretty steep. I wonder if we are addressing our PAR. People’s votes seem to change over time. Maybe we should have recorded votes.

C- I checked, recorded votes in straw polls could be allowed if there’s a motion to do so.

C- The use cases should help us to move forward. The scope of TGbh is to provide a simple fix for problems that industry noted with RCM. The post-association use case, we are generally all right with. The pre-association use cases are a different set of problems. But we’re having an issue with having a previously associated STA do something to allow itself to be identified in a subsequent pre-association. It doesn’t have to be a completely bulletproof security/privacy solution. TGbi should be dealing with that. We’re just supposed to fix things that broke from RCM. The fix should be at the same level of utility and complexity as RCM. This seems to be a discussion of implementation of what we are enabling. There many ways we could share information from a STA to the AP for identification. How those are implemented is not designated in detail by our spec. We’ve talked what’s practical, what’s not in terms of implementation. I don’t think those discussions are all that appropriate for this group. How that information is shared seems to be beyond us. Hopefully, we can agree that we are enabling a mechanism that is not specified by our spec for use by devices that will benefit from it.

C- The problem is that if we do that, we create problems for TGbi to solve where currently none exist. Yes, there’s a use case that needs to be looked at and fixed, but we shouldn’t make things worse.

C- Since the PAR was mentioned, let’s take a look at it. It has the words “without affecting user privacy,” which makes me think that the solutions are not supposed to not affect the level of privacy that RCM grants. The question is whether we are solving the RCM problems and not making things worse. Perhaps people have a different view of where the line is between solving and worsening.

C- The words before “without affecting user privacy” are preceded by “to preserve existing services”. It might be worthwhile to see if we can find agreement on solving a small set of use cases. I guess that’s how we got to our current pre-association dilemma. The “preserve existing services” is the important part.

C- That’s the trick, how to balance between preserving and not affecting.

C- I concentrated on the last sentence in 5.2.b in the PAR. The issues tracking document maybe does need looking back at the use cases to see if they meet the PAR.

C- I tried to highlight the in-scope pre-association use cases in the PAR as they appear in the issues tracking document. That amounts to six or seven items. Do people believe those use cases cover the PAR correctly? [The use cases are 4.1, 4.6, 4.8, 4.10, 4.15, and 4.26.]

C- We could do this two ways. We could point out the gaps the present draft has. We could ask if people are happy going forward with that and whether they feel we’ve met the PAR. Straw polls don’t really mean anything, but I’m not sure you can ask people if our text meets the PAR. It does or it doesn’t. You have to prove that you are meeting your PAR or not. A good question for the ‘no’ voters is if they feel if the PAR is met. I don’t know how meeting a PAR goes? Can you say you have when you haven’t?

C- My understanding of the process is that part of the motion to take something to letter ballot is affirmation that the draft meets the PAR. I think it’s up to the participants to read the PAR and make that determination for themselves. I think it will end up being a judgment call. It comes down to the letter ballot authorization motion.

C- To turn this around, my understanding of the PAR and it being agreed by the WG (TG) that the draft meets the PAR is something we have to vote on. Pre-association use cases seem to be in scope. We could remove those from the PAR and then move forward. Not meeting the PAR risks generating comments during voting or when the draft reaches RevCom. We have to be PAR compliant before we start a letter ballot.

C- Going back to the text at the end of 5.2.b, we have to make a compelling case for client-side devices to implement. What’s compelling to a client? Customer service and network diagnostics would be good, so having a fixed MAC address would help the IT desk to figure things out. That’s compelling for a client. But then we talk about celebrity tracking and trashcan tracking that have nothing to do with a compelling story for a client. I want to see a solution to this. Network vendors understand that some of these are legitimate problems, but a client vendor is hard pressed to transform any of this use cases into a feature request list for engineering to work on. Very little of this goes beyond the “I don’t care” criterion. We need problems that are compelling. We haven’t done that. Celebrity tracking isn’t compelling. Grocery store frequent shopper and airport security queue timing aren’t really compelling. As a client vendor, I ask myself which of these are problems that need to be solved and I’m finding the empty set.

Q- That’s a good point. The thing I return to, it’s not the client vendor’s problem. A higher-level app is the one that needs these services that IEEE 802.11bh will specify so that it can identify STAs and make an access determination. The STA manufacturer just needs to provide a hook for the app maker to be able to provide that service. Isn’t that how this is split between STA and app makers? Am I wrong?

C- If we look at the IEEE 802.11be draft, there the principle is that the AP knows more about the environment and can give a lot of assistance to the STAs. If we follow that spirit and we think of the use cases, we note that the network can provide different services to different clients. That’s why we hope the client steering use cases is in viewed in that spirit and is attractive to STA vendors.

Q- Is that the bottom line? We need to find an example use case that’s perhaps noted in the PAR, is amenable to network-side solving, and is compelling to a STA vendor? Do we need to flesh out the use cases more? Do we need to pick out one or two compelling use cases to flesh out?

C- We seem to come back to client steering. I think it’s a valuable service and I’m in favor of having a solution for it. That said, I’m not sure how that gets sold to the STA vendor. If STAs didn’t randomize as frequently and the same MAC address showed up on two different bands in short order, the network could stop responding on one band in order for the STA to take a hint and choose the network’s preferred band.

C- I think we may have captured something like that in the issues tracking document or at least we discussed it. Steering could be to the right network or specific AP, not just band.

C- I think I understand AP and band steering. We want to unstick sticky clients. Send them where they need to be. I don’t know what network steering is. A network is an SSID. If I’m broadcasting multiple SSIDs, which one the client chooses is up to the client. I don’t know to steer a client until it’s authenticated.

C- I think this was the home network that also offers a public hotspot, with residents of the home being steered to the home network SSID rather than the public hotspot SSID.

C- In the troubleshooting case, when someone calls to complain to the help desk, the people on the help line need to get information about the STA that’s trying to join. They do that by having the user turn off RCM in order to use a fixed address to facilitate debugging. The user loses privacy in that case, but that’s for a good purpose. I thought one of the focuses of this group was to allow the troubleshooting functionality without compromising privacy. If we’re not doing that, then we already have a mechanism (fixed addresses), so let’s remove the use case from the PAR.

C- Looking at section 4.15 (Customer Support and Troubleshooting) in the issues tracking document, we had discussed broadening it for enterprise use cases along with residential use cases. We haven’t done that. There are some thoughts buried in the document about ways to solve these use cases. Perhaps fleshing them out would help.

C- When we talked about troubleshooting use cases, mostly it happened post association. Once the STA is associated, Layer 3 identifiers can be used. Why did propose a Device ID solution based on Layer 2? Another question, is that we can reduce the PAR, so why not do that? If we are focused on Layer 2 identifiers, that implies that pre-association is needed. Most of our discussion should be pre-association.

C- That goes back to the question of which use cases we want to address and whether the group can reach agreement.

Q- If Layer 3 mechanisms exist, what’s the benefit of creating a Layer 2 identifier to solve the same problem?

A- I think that if you limit yourself to post association and you have network performance kinds of issues, then the question is what Layer 2 vs. Layer 3 identification buys you. Pre-association, you can’t do a Layer 3 identifier.

A- If you don’t have a Layer 2 connection, you can’t have a Layer 3 identifier. We’re to allow troubleshooting Layer 2 connection problems. A Layer 3 identifier wouldn’t help that.

C- I agree with that statement. Additionally, it’s conceivable there are multiple Layer 3 associations on the network that a Layer 2 identifier might get you access to without having to reidentify yourself in all of the Layer 3 cases. Layer 3 addresses used to be based on MAC addresses in some cases. A Layer 2 secure identifier might be advantageous, depending on how things are implemented.

Q- For a pre-association use case, there’s no connection (yet). The problem is that no trust has been established between the STA and the AP at that point. Do we want to let TGbi finish their work in privacy for pre-association and then work within those confines?

A- From the TIG and SG, we thought that there were problems that needed a faster solution than TGbi was expected to bring. That’s why there’s a TGbh. TGbi could solve the bigger, slower problems. There was no conception of bringing TGbi’s solution back to TGbh. I think that was somewhat captured in the TGbh PAR.

C- I think we have established that there’s no quick fix. If we have reached a deadlock in TGbh and we aren’t making progress, then something needs to change. Change will have to come externally, which in my view is TGbi.

C- That could be another view of the “let’s go back and modify the PAR” discussion. We could hand things to TGbi.

C- We had a TIG, then a SG. There were lots and lots of discussions to form two task groups. To go back now and say “that was wrong” is water under the bridge. We’re talking two years. That flies in the face of everything we did. I can’t support that at all. If a bloc of people doesn’t want to do something, they can stop it. For optional schemes, I fascinated by the amount of blocking and stopping. TGbi seems to lack contributions. I don’t think they are addressing our use cases, because of the PARs. In privacy, everything is open and on the line. TGbh is supposed to have a direct and focused PAR. You can’t just go back after 4 years of discussions and say, “everything is wrong.”

C- I did editing on both PARs. I recall that on three occasions, our discussion centered around whether we needed one or two PARs. The decision was for two, but that has always been something that has gone around in the SG process and now it’s happening in the project process.

C- I don’t think we’re going to ask TGbi for a solution, but we should try to work within their framework. Otherwise TGbi might have to “fix” our solution. Our charters are somewhat opposing in that sense. I know that TGbi is moving more slowly than we would like, but it would give us some freedom in which to operate. Without trust established between the STA and the AP, it’s difficult to provide an identifier in the pre-association phase to an unauthenticated network.

C- We might look at how much risk there is the different scenario and see if that gives any direction.

C- At least we have two directions for pre-association: encrypted and unencrypted. The problem is to create a security context as Device ID has done. If we work in that direction, we’ll have the same security level as the baseline.

C- What happens in TGbi is TGbi’s scope and business. Yes, we may be better off allowing them to provide our solution. They may have a more robust, higher privacy technique to ensure STA privacy. What we are dealing with here is a very limited, focused scope. The question is whether we address the last line of 5.2.b in the PAR or remove it. Without doing one of those, we invite ballot comments. So far, we can’t decide how to move forward. We’ve been stuck now for 9 months on how and if we address that. Let’s make a decision and then move forward.

C- From what I’ve seen of TGbi and this group, looking at this PAR, the last sentence of 5.2.b is the problematic part and could conflict with TGbi. The group needs to understand how a solution developed here is distinct from what TGbi is doing.

C- If we refer to that one sentence, this could be solved by Device ID as found in the draft. You can provide troubleshooting, and then when a device returns you can do Device ID. Are we talking about pre-association troubleshooting? That’s not a trusted environment.

C- That’s not how I read the PAR. Troubleshooting was pre-association. Post association, RCM doesn’t have anything to do with that sentence. There are other techniques to use once associated.

C- Then we need to clarify that (in the PAR). And we need to understand how those mechanisms work in a world without RCM. If we are looking for a MAC address replacement, it’s going to be difficult. We need to see the exact mechanisms used for troubleshooting in a pre-RCM world so we can devise a solution, while achieving the privacy goals.

C- That’s what the issues tracking document was trying to do, but we probably didn’t put enough explanation into that.

C- I really think we should get into the specifics.

C- It’s getting a little insulting. That the people who wrote the PAR didn’t know what they were doing. And that we were trying to meet that PAR for two years for nothing. You can’t just say now that you don’t understand the PAR and it needs to be amended. We’ve had a dozen schemes proposed and worked on. The whole idea that TGbi is going to solve everything, I’ve not seen that there. It’s a bold statement to want to chuck everything out with a claim of not understanding the PAR. That makes the work in this group seem like a total waste of time. That’s a shame. You can’t make bold statements like “throw it all away and wait for TGbi.”

C- From a TGbi perspective, we do have requirements for STAs returning to an AP to protect the identity of those STAs in (Re)Associate Request/Response. We are looking at a mechanism for a STA to change its OTA MAC address when reassociating to another AP in the network. We aren’t looking at MAC address changes for STAs that leave and return. Even though we call these use cases pre-association, it’s really STAs that have associated at least once before coming back. You can’t troubleshoot a STA that’s never been there before. I would prefer for TGbh to finish its work and then TGbi will decide how much of any mechanism that TGbh creates fits into the work of TGbi.

C- I found the comments on “insulting” were themselves insulting. I put a lot of effort into helping the group address comments during PAR creation. The issue is that the last sentence in 5.2.b has different interpretations in the group. In the end, the task group has to agree with what goes into the amendment. Somehow the group has to come to grips with interpreting that sentence. Not just personal interpretations.

C- I said the opposite of that.

C- When a task group is going back to its PAR like this, that’s problematic. And if the group doesn’t have consensus over the sentence in question, the group needs to address it.

C- I’m not trying to belittle the work done on the PAR or in this group. I’ve given this group a fair amount of time. No insult was meant to be projected. I’m just trying to find a way to move forward. If that requires that we take a second look at that PAR, so be it. We’re all human. We make mistakes. Let’s get the job done and rectify the problem.

C- TGbi deals with identifier protection in Association and Reassociation. It doesn’t deal with ANQP and pre-association. If we transfer something from TGbh to TGbi, that’s still missing.

C- I think the TGbi scope is to enhance privacy beyond RCM. In my mind, TGbh is quite distinct from that – fix things that RCM broke. The pre-association case of customer support, diagnostics, troubleshooting, and device detection on arrival were all broken by RCM. The way the spec is written now, you use the same MAC address as you used the last time you associated. Any privacy aspects should be dealt with in TGbi. When not associated, some STAs change their MAC addresses on every packet. Turning off RCM in these use cases is something that some providers use, despite the privacy loss. I would like to see a solution that allows those use cases without losing the privacy of RCM. We haven’t reached agreement on the techniques. So maybe we drop that sentence and move forward with the draft as it stands. That decision should be made at or before the March meeting.

C- I also worked on the draft PARs for both TGbh and TGbi. We had a devil of time of splitting the scope and objectives, but I think we did pretty well. Given the timeline of TGbh, it’s time to bite the bullet. Let’s open the PAR and make modifications. I know that will aggravate some people, but the chair needs to have a series of motions during the March meeting to clarify things. A motion for an initial letter ballot based on the current draft should be in order too. This group is at an impasse and we need to make hard decisions to move forward.

C- It helps to discuss these things at face-to-face meeting, but we have different people in the room than we have on the calls. Thus, we don’t always have common consensus in the two ways of meeting. I’m thinking of having motions prior to the March meeting. We have 3 more calls before then. People should look at the PAR language. I’m not sure how much sense it makes to literally modify the PAR as opposed to just agreeing on how we interpret the PAR. Perhaps we can have motions during a teleconference to guide that. But this is where motions get tricky, the wordsmithing of the motions. These shouldn’t be motions on specific proposals but on what the words in the PAR mean. I don’t want them to be another set of words that we later dispute the meaning of. We might start motions by 21 February. Other thoughts?

C- To reiterate what you said, you don’t have to modify the PAR to figure out how to move forward.

C- As long as everyone understands that we are working on an agreement of interpretation, particularly that problematic sentence.

C- If we went along with that scheme, I would suggest that the first motion is whether new schemes are allowed into the draft. Then we can decide on whether we amend the PAR or agree not to meet the PAR. Or we have a motion to disband.

Q- We could see if the group moves forward with the draft as is. Is that appropriate?

A- That doesn’t say that the draft as is meets the PAR. That’s putting multiple things together in the motion. Are we tacitly saying we agree with the PAR when we do that?

C- Maybe we attack what we meant by this PAR first. I don’t think we need to spend a lot of time modifying the PAR. We do need to come to some agreement of what the group meant when the PAR was voted in. Presumably, we all had something in mind.

C- I suggest we discuss the topic on email after some reflection. We can discuss a set of motions over email.

C- I’ll try to kickstart that discussion. [Action on the TG chair]

Q- Do we have to specify those motions to the WG chair first?

A- No.

C- And the sooner the better.

C- February 21st is the earliest.

C- The WG chair needs to know the substance if not the wording of the motion prior to the teleconference.

C- The best way to kickstart a discussion is to put up some pre-motion type text.

C- I’ll try to do that.

C- And I’ll try to respond to that.

**Meeting adjoined at 11:27 a.m. EST.**

**Attendance**

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| Breakout | Timestamp | Name | Affiliation |
| TGbh | 02/07 | Ansley, Carol | Cox |
| TGbh | 02/07 | Baron, Stéphane | Canon |
| TGbh | 02/07 | Hamilton, Mark | Ruckus/CommScope |
| TGbh | 02/07 | Harkins, Dan | HPE |
| TGbh | 02/07 | Kneckt, Jarkko | Apple |
| TGbh | 02/07 | Levy, Joseph | InterDigital |
| TGbh | 02/07 | McCann, Stephen | Huawei |
| TGbh | 02/07 | Montemurro, Mike | Huawei |
| TGbh | 02/07 | Mutgan, Okan | Nokia |
| TGbh | 02/07 | Petrick, Al | InterDigital |
| TGbh | 02/07 | Sam, Harvey | Broadcom Corporation |
| TGbh | 02/07 | Sevin, Julien | Canon |
| TGbh | 02/07 | Smith, Graham | SRT Wireless |
| TGbh | 02/07 | Thakore, Darshak | CableLabs |
| TGbh | 02/07 | Thakur, Sidharth | Apple |
| TGbh | 02/07 | Yang, Jay | Nokia |
| TGbh | 02/07 | Yee, Peter | NSA-CSD |