IEEE P802.11  
Wireless LANs

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| ARC SC Meeting Minutes September 2018 | | | | |
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Abstract

This document contains the minutes of the IEEE 802.11 ARC SC meeting sessions held on 11-13 September in Waikoloa, Hawaii, USA.

Note: Highlighted text are action items.

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# Tuesday, 11 September 2018, at 16:00 HST

**Administration:**

**Chair/Secretary: Mark Hamilton, Ruckus/ARRIS**

**Meeting call to order in Kona1 meeting room by Chair 16:00 HST**

Agenda slide deck: [11-18/1382r2](https://mentor.ieee.org/802.11/dcn/18/11-18-1382-02-0arc-arc-sc-agenda-sept-2018.pptx) proposed agenda copied here for reference:

**Tuesday, September 11, PM2**

* **Administrative: Minutes**
* **IEEE 1588 mapping to IEEE 802.11/802.1ASrev use of FTM update -** [**11-17/1086r4**](https://mentor.ieee.org/802.11/dcn/17/11-17-1086-04-0arc-ieee-802-1as-d5-0-review-comments.pptx)
* **802 (and 802.1) activities: 802c, 802.1CQ**
* **IETF/802 coordination**
* **Continued review of TGax approach to subclause 10.2 and Figure 10-1**
* **Introduction to WBA liaison, on MAC Address Randomization:** [**11-18/1579r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1579-00-0000-2018-09-liaison-from-wba-re-mac-randomization-impacts.docx)
* **“What is an ESS?”:** [**11-18/1051r3**](https://mentor.ieee.org/802.11/dcn/18/11-18-1051-03-0arc-what-is-an-ess.pptx)
* **Consider IETF DetNet/time-sensitive networking input (potential relationship to RTA TIG?)**
* **AP/DS/Portal architecture and 802 and GLK concepts -** [**11-17/0136r2**](https://mentor.ieee.org/802.11/dcn/17/11-17-0136-02-0arc-bridging-architecture-considerations.docx)**,** [**11-16/1512r0**](https://mentor.ieee.org/802.11/dcn/16/11-16-1512-00-0arc-glk-802-1q-bridge.pptx)**,** [**11-16/0720r0**](https://mentor.ieee.org/802.11/dcn/16/11-16-0720-00-0arc-stacked-architecture-discussion.pptx)**,** [**11-15/0454r0**](https://mentor.ieee.org/802.11/dcn/15/11-15-0454-00-0arc-some-more-ds-architecture-concepts.pptx)**,** [**11-14/1213r1**](https://mentor.ieee.org/802.11/dcn/14/11-14-1213-01-0arc-ap-arch-concepts-and-distribution-system-access.pptx) **(slides 9-11)**
* **MLME-RESET, versus MLME-JOIN and MLME-START**

**Wednesday, September 12, AM1**

* + **TGba (WUR) continued discussion:** [**11-17/1025r0**](https://mentor.ieee.org/802.11/dcn/17/11-17-1025-00-0arc-11ba-arch-discussion.pptx)**,** [**11-18/0884r1**](https://mentor.ieee.org/802.11/dcn/18/11-18-0884-01-0arc-802-11ba-architecture-discussion.pptx)**,** [**11-18/1016r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1016-00-0arc-wur-state-diagram-proposal-hamilton.vsdx)**,** [**11-18/1017r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1017-00-0arc-wur-multi-ap-reference-model.vsd)**,** [**11-18/1020r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1020-00-0arc-discussion-on-wur-802-11ba-states.pptx)**,** [**11-18/1494r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1494-00-00ba-overview-of-802-11-ba-power-management-in-d0-4.pptx)
  + **Does TGba discussion lead into other “split” PHYs (LC, 28 GHz (Phazr))?**
  + **Response to WBA liaison, on MAC Address Randomization:** [**11-18/1579r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1579-00-0000-2018-09-liaison-from-wba-re-mac-randomization-impacts.docx)
  + **Continue the other items (previous slide), as needed**

**Thursday, September 13, AM2**

* + **Future sessions / SC activities**
  + **Continue the other items (previous slide), as needed**

**Administration:**

The Chair reviewed the Administrative information in slides 5-10 in Agenda document

**Call for Patents:**

The Chair reviewed the Patent policy and called for potentially essential patents – there was no response to the call.

**Approval of the Agenda:**

The Chair reviewed the agenda and called for comments or amendments to the agenda – there was no response to the call

The proposed agenda was approved by unanimous consent.

**ARC Minutes:**

* **July face-to-face minutes:** [11-18/1326r0](https://mentor.ieee.org/802.11/dcn/18/11-18-1326-00-0arc-arc-sc-meeting-minutes-july-2018.docx)
* [11-18/1355r0](https://mentor.ieee.org/802.11/dcn/18/11-18-1355-00-00ba-meeting-minutes-july-2018.docx) (TGba minutes, capturing Thursday PM2 joint meeting)

Minutes approved by unanimous consent.

**IEEE 1588 mapping to IEEE 802.11/802.1ASrev use of FTM update -** [**11-17/1086r4**](https://mentor.ieee.org/802.11/dcn/17/11-17-1086-04-0arc-ieee-802-1as-d5-0-review-comments.pptx)

Chair was informed prior to the meeting by Ganesh Venkatesan (Intel) that there was nothing new to report, as things appear to proceeding well – 802.1AS is in WG ballot process; IEEE 1588 is nearly ready for Sponsor Ballot.

**802 (and 802.1) activities: 802c, 802.1CQ**

*Chair:* 802.1Q revision was approved by REVCOM. So, this is done.

Called for additional inputs and comments, none were forth coming.

*Chair:* 802.1CQ, was PAR approved a while ago, seems to be slow getting started.

Roger Marks reported they are having discussions about a discovery process to for an address server, that would control/give out local addresses on a network. This may lead to a .11 feature to discover the address server, also. There will be conference call in 2-3 weeks, and Roger and/or Stephen McCann will report back.

Chair – called for addition inputs – none were forthcoming.

**IETF/802 coordination**

Peter Yee – IETF Liaison – will have update later in the week.

**TGax approach to subclause 10.2 and Figure 10-1:** [11-18/0362r1](https://mentor.ieee.org/802.11/dcn/18/11-18-0362-01-00ax-cr-for-cids-in-10-2-6.docx)

* + Review of concepts as captured in D3.0.
  + Noted no D3.0 LB comments were received on these topics.

Chair call for comments – none were forthcoming.

**Introduction of WBA liaison on MAC Address randomization**

Liaison is here: [11-18/1579r0](https://mentor.ieee.org/802.11/dcn/18/11-18-1579-00-0000-2018-09-liaison-from-wba-re-mac-randomization-impacts.docx). Chair noted the embedded PDF doesn’t open, but the text is cut-and-pasted correctly.

Call for everyone to please review this (just received) liaison, for discussion later in the week.

**What is an ESS?**

Chair reviewed status of discussion in [11-18/1051r3](https://mentor.ieee.org/802.11/dcn/18/11-18-1051-03-0arc-what-is-an-ess.pptx).

Focused on “Examples A-F”.

* Agreed to not call these “<x>ESS” examples, as that implies they are all special cases of “ESS”. But, they are really (at least some of them) different concepts, that are some sort of “service set” but are not an “ESS”. So, we’ll say “<x>SS” for now.
* Aligned the “Same subnet” bullets to be the same on all Examples where that is true.
* Highlighted (in Bold) the most important attributes – the attributes that most determine that this concept is this type of SS, and distinguishing it from other types. The other attributes are either secondary, or might be the result of (not the cause of) being this type of SS.
* Agreed that type “D” SSs are not a .11 concept, since there is more than one DS, this is two (or more) .11 networks, with .1Q bridging between them.
* Agreed that type “F” is just a coincidence, and not a useful concept in the Standard.
* Agreed that type “G” is not an “SS”, but a (potentially) useful concept in regulatory discussions, although not architectural.
* Is type “C” is different from type “B”, and if so how, exactly? This needs more discussion.
* Out of time for this meeting.

Recessed 18:02 CET

# Wednesday, 12 September 2018, at 8:00 HST

**Call to order 8:09 CET.**

**Agenda document:** [**11-18/1382r4**](https://mentor.ieee.org/802.11/dcn/18/11-18-1382-04-0arc-arc-sc-agenda-sept-2018.pptx)

**Administration:**

The Chair reviewed the Administrative information in slides 5-10 in Agenda document,

**Call for Patents:**

The Chair reviewed the Patent policy and called for potentially essential patents – there was no response to the call.

**Agenda Items:**

* + **TGba (WUR) continued discussion:** [**11-17/1025r0**](https://mentor.ieee.org/802.11/dcn/17/11-17-1025-00-0arc-11ba-arch-discussion.pptx)**,** [**11-18/0884r1**](https://mentor.ieee.org/802.11/dcn/18/11-18-0884-01-0arc-802-11ba-architecture-discussion.pptx)**,** [**11-18/1016r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1016-00-0arc-wur-state-diagram-proposal-hamilton.vsdx)**,** [**11-18/1017r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1017-00-0arc-wur-multi-ap-reference-model.vsd)**,** [**11-18/1020r5**](https://mentor.ieee.org/802.11/dcn/18/11-18-1020-05-0arc-discussion-on-wur-802-11ba-states.pptx)**,** [**11-18/1494r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1494-00-00ba-overview-of-802-11-ba-power-management-in-d0-4.pptx) **,** [**11-18/1641r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1641-00-0arc-discussion-on-wur-802-11ba-nomenclature.pptx)
  + **Does TGba discussion lead into other “split” PHYs (LC, 28 GHz (Phazr))?**
  + **Response to WBA liaison, on MAC Address Randomization:** [**11-18/1579r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1579-00-0000-2018-09-liaison-from-wba-re-mac-randomization-impacts.docx)
  + **Continue the other items (previous slide), as needed**

**Approval of the Agenda:** approved with no objection

**Review of** [**11-18/1494r3**](https://mentor.ieee.org/802.11/dcn/18/11-18-1494-03-00ba-overview-of-802-11-ba-power-management-in-d0-4.pptx) (just posted):

* This is an overview of power management in WUR
* Existing PCR power states (Awake and Doze) are unchanged. Existing power management modes (Active and PS) are unchanged.
  + Capture the subtlety of the modes versus states, for neophytes
  + Also that we are describing the “shared understanding” between the two ends of the link. The actual state of the non-AP STA, might for example, actually be Awake or off-channel or ???, but the AP assumes/understands it is on-channel and in Doze.
* Slide 5, add WUR:
  + Companion radio, with its own power state. Independent of PCR power state
  + Use PCR radio to negotiate the WUR state
  + Q: If the two state machines are really independent, can the WUR be “operating” when the PCR is in other than Doze state? The point is for the WUR to be in rx when the PCR is in Doze. There is a statement that if the PCR is in Awake state (or Active mode?), then the WUR may be in Doze (perhaps this should be implementation-specific state?)
* Slide 6,
  + “avoiding checking DTIM” -> “not required to check DTIM”
  + Add a “No WUR” discussion here. Note that No WUR and WUR Suspend are behaviorally the same. Only differ in that WUR Suspend has the negotiation done and ready (in “hot ready” status). But, third point here would match the state diagrams on slide 5 and 7.
* Slide 7
  + Continues the point that the WUR power state behavior is only defined when the PCR is in Doze state.

ARC Chair and members thanked the WUR experts for this presentation, and discussion in trying to better understand the archicture.

**Review of WUR architecture discussion in** [**11-18/1020r5**](https://mentor.ieee.org/802.11/dcn/18/11-18-1020-05-0arc-discussion-on-wur-802-11ba-states.pptx)**:**

As we’re running out of time today, and given the discussion above, Chair recommends the ARC members review this update from Joe off-line, and we’ll discuss further later. Let’s focus now on material that needs WUR expert review/input, while we have them in the room.

**Review of** [**11-18/1641r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1641-00-0arc-discussion-on-wur-802-11ba-nomenclature.pptx) **– Proposed nomenclature for WUR concepts:**

Do we need a term for a STA with WUR capability (“PCR”)? Proposal says we do not, this is just a “STA with WUR capability” like many other “STA with <xxx> capability.”

Whether the non-AP STA in the WUR architecture is one STA or two is still not settled. The WUR experts (TGba participants) in the room don’t seem to care – leave it to ARC to decide.

There is agreement that the AP that can also signal WUR frames, is still just one STA and one AP. The WUR frames are more like a new modulation mode for the AP.

This leads to discussion if the AP-side capability is/can be split: into a transmitter and a negotiator. Agreed that not all APs that can negotiate must be able to transmit WUR frames. So, probably, yes, there is a split in these functions. Not entirely agreed yet, though. Needs further discussion.

**No time for discussion of WBA liaison.** Will discuss tomorrow.

In recess – 10:00 HST.

# Thursday, 13 September 2018, at 10:30 HST

**Call to order 10:30 HST**

**Agenda document:** [**11-18/1382r5**](https://mentor.ieee.org/802.11/dcn/18/11-18-1382-05-0arc-arc-sc-agenda-sept-2018.pptx)

**Agenda:**

* + **Future sessions / SC activities**
  + **IETF/802 coordination**
  + **Does TGba discussion lead into other “split” PHYs (LC, 28 GHz (Phazr))?**
  + **Response to WBA liaison, on MAC Address Randomization:** [**11-18/1579r0**](https://mentor.ieee.org/802.11/dcn/18/11-18-1579-00-0000-2018-09-liaison-from-wba-re-mac-randomization-impacts.docx)
  + **Continue the other items (previous slide), as needed**

**Administration:**

The Chair reviewed the Administrative information in slides 5-10 in Agenda document,

**Call for Patents:**

The Chair reviewed the Patent policy and called for potentially essential patents – there was no response to the call.

**Approval of the Agenda:**

The Chair noted that the WBA liaison topic is moved to this meeting slot. Updated to r6, will post later.

The proposed (r6) agenda was approved by unanimous consent.

**Future sessions / SC activities**

Two items are suggested to be added to the ARC activities:

* + - Noting that IPv6 has facilities for generation of (local?) MAC Addresses based on the IPv6 address, we should discuss whether/how a STA can have Multiple MAC Addresses. This led to questions about whether a STA can perhaps have “multiple radios” too, although we don’t have a clear definition of “radio”. We already have some architectural concepts about shared PHYs (from 11ad), but this is probably different. Probably relates to the “split” PHY discussion that we think may follow from the WUR topic.
    - Request to have discussion about system architecture(s) for common use scenarios. IEEE 802.11 has a lot of flexilibity but little guidance on when or how it would be applied to various scenarios. It could help the industry and implementers to have some guidance.

Chair will add these to the November topics, with a reminder that we are contribution driven, so we need contributions on these topics to progress them.

**Planning for July, slide 39:** [**11-18/0644r3**](https://mentor.ieee.org/802.11/dcn/18/11-18-0644-03-0arc-arc-sc-agenda-may-2018.pptx)

Planning – November 2018 – 3 Slots plus Joint session with TGba? TGba felt (in yesterday’s meeting) that more joint discussion was probably not needed.

**Teleconferences:**

Let’s see how the WBA liaison discussion goes today, and come back to this.

**IETF/802 Cooridination topics:**

Chair coordinated with Peter Yee (IETF Liaison) off-line. Agreed bullets on slide 16 are the interesting activities for 802.11.

IETF’s DetNet is a “planning ahead” concept. For example, “I need bandwidth tomorrow at 8am for 5 minutes” type of need/request. TSN is the flexible/responsive to immediate needs concept.

Reviewed the material on slide 23 of the agenda deck.

There were no comments.

**Does TGba discussion lead into other “split” PHYs (LC, 28 GHz (Phazr))?**

This topic is not really ready for discussion, until we complete the work on TGba/WUR.

**WBA Liaison on MAC Address randomization:**

Liaison is here: [11-18/1579r0](https://mentor.ieee.org/802.11/dcn/18/11-18-1579-00-0000-2018-09-liaison-from-wba-re-mac-randomization-impacts.docx)

Chair created a copy (new document) to capture notes in-line, as we discuss. This was posted as [11-18/1671r0](https://mentor.ieee.org/802.11/dcn/18/11-18-1671-00-0arc-notes-for-response-to-wba-liaison-on-mac-address-randomization.docx) at the end of the meeting.

At a high-level, we need to make the point that MAC Address randomization is already happening in the field, although perhaps only for pre-association. One member points out experiments in their lab with devices that randomize the association address, also, however.

Reminded that IPv6 can also generate unique “33-33” MAC Addresses on individual links/connections. We’ll probably move that consideration into the new topic we’ve added to the ARC work list. But, it is worth keeping in mind for this discussion, as they are probably related in effects on the system.

We should point out that 802.11aq requies the setting of the “Local bit” on random MAC Addresses. This prevents some of the collisions mentioned in the liaison. It also means it is easy to tell if the address is ‘real’ or random.

802.11aq also focuses on pre-association, though. Much of the discussion in the liaison is about while associated, so is beyond 802.11aq.

The important point, is that MAC Address randomization provides privacy. Systems that rely on MAC Addresses for unique (global?) identification need to be modified to achieve such indentification with methods that preserve users’ privacy.

802.11-2016 says that a MAC Address shall not change for the duration of an association. Is that a ‘shall’ or a ‘should’ – need to double-check.

Other IEEE Standards (1609.2 mentioned) have randomization for OCB operation, and it hasn’t been a problem. Does that help us identify solutions to the concerns raised in the liaison?

Went through the liaison, point-by-point, commenting on each major bullet. Results are captured in [11-18/1671r0](https://mentor.ieee.org/802.11/dcn/18/11-18-1671-00-0arc-notes-for-response-to-wba-liaison-on-mac-address-randomization.docx):

* + - MAC-based identification is BAD. Don’t do it. Find a better way.
    - IEEE 802.11 will consider the reference above to the use of the same address for the duration of an association to an ESS, to recommend it apply for any connection to the same Hotspot network. But this may raise issues, and is probably not sufficient to solve all the issues WBA raises.
    - Agreed that 802.11 should look into the (somewhat common) practice of • Different bands using different SSIDs (2.4GHz and 5GHz). This will probably cause lots of issues.
    - Agreed that 802.11 should look into the use of random MAC Addresses with broadcast Probe Requests. Does this affect infrastructure handling of Probe Response information, and/or connection to post-association handling of the client?
    - Other WBA concerns are covered by, “MAC-based identification is BAD. Don’t do it. Find a better way.”
    - We should look at the work in 802.1CQ on centralized control methods for the (local) random addresses. This should completely eliminate the collision concerns.

Out of time. Will continue on a conference call, and in November.

**Agreed on Oct 11, 12-noon ET, 1.5 hours duration, for a conference call.**

No further business for this week.

**Adjourned: 12:33 CET**