IEEE P802.11  
Wireless LANs

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| ARC SC teleconferences minutes 09 September 2021 | | | | |
| Date: 2021-09-09 | | | | |
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Abstract

This document contains the minutes of the IEEE 802.11 ARC SC teleconference held on 09 September 2021 at 19:00-21:00 h ET.

Note: Highlighted text are action items. A- precedes comments from the document’s author, C- precedes comments, R- precedes responses to comments.

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# Thursday 09 September 2021, 19:00-21:00 h ET

## Administration:

**Chair: Mark Hamilton, Ruckus/CommScope**

**Vice Chair: Joseph Levy, InterDigital**

**Secretary: Joseph Levy, InterDigital**

**Meeting called to order by the Chair 19:05 ET**

Agenda slide deck: 11-21/

**Agenda Slides 4-14:**

**Reminders to Attendees**

**Call for Patents:**

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

**IEEE SA Copyright Policy:**

The chair reviewed the Copyright policy.

**Participation:**

The chair reviewed the participation policy.

**Approval of the Agenda:**

* Attendance, noises/recording, meeting protocol reminders
* Policies, duty to inform, participation rules
* Contribution/discussion topics:
  + 802.11 TGbe’s evolving multi-link architecture contributions
    - [11-21/0396r4](https://mentor.ieee.org/802.11/dcn/21/11-21-0396-04-00be-11be-ap-mld-architecture-discussion-2.pptx) – Presented previously; background/high-level discussion
    - [11-21/1111r3](https://mentor.ieee.org/802.11/dcn/21/11-21-1111-03-00be-mld-architecture-part-2.docx)
* Next Steps

The Chair reviewed the agenda and called for comments or amendments to the agenda.

Discussion:

A Request for Interim Meeting time:

Mike Montemurro (Huawei) requested agenda time in the Wednesday 11:15 time slot to discuss a contribution (the contribution will be posted soon). The contribution is on, MLO – broadcast traffic. No number yet, will probably be a TGbe document, will announce on the ARC reflector. It is not proposing new features or capabilities, the contribution provides a discussion of the current features and capabilities and is being provided to sort things out.

C – The Wednesday 11:15 slot is not very Asia friendly.

Chair – Given the author’s wishes, it is the best we can do.

C – Asked about the Rojan’s document from today’s TGbe MAC call.

Joseph – gave him the status – Rojan will not be able to join this meeting and will conduct off line email discussions.

No amendments were provided.

The proposed agenda was accepted without objection.

The Chair reviewed the slide 16 – noting the “other” architecture items are.

## Contributions:

[**11-21/1111r3**](https://mentor.ieee.org/802.11/dcn/21/11-21-1111-03-00be-mld-architecture-part-2.docx) **– “MLD Architecture Part 2 - Mark Hamilton (Ruckus/CommScope)**

*Completed section till 5.1.5.10 durring 30 August ARC teleconference. (see 11-21/1424)*

[**11-21/1111r4**](https://mentor.ieee.org/802.11/dcn/21/11-21-1111-04-00be-mld-architecture-part-2.docx) **– “MLD Architecture Part 2 - Mark Hamilton (Ruckus/CommScope)**

Reviewing section 2.0.

C – Don’t we need more TGbe experts on this call to confirm this information.

C – Is it one supplicant that knows how to handle multiple keys.

C – It comes down to a group key exchange is done between the non-AP MLD and the AP MLD. What does the non-AP MLD do with the keys, does it send it down to each of the lower MACs or is it handled by the upper MAC. Either will work and I don’t think it needs to be specified.

C – On the AP side – the legacy MAC must be complete and provide legacy support. On the STA side you could have the non-AP install the keys into the MAC, There is one upper MAC. It would be cleaner to adopt the same model that we use on the same thing we have on the AP side. So if we created a requirement that an MLD AP would only handle non-AP MLDs we wouldn’t need the other legacy APs.

There is no need for multiple MACs. On the non-AP MLD.

There is one supplicant on the non-AP MLD and multiple authenticators at the MLD AP, one for the MLD AP SAP, and one for each non-AP MLD.

C – One GTK in legacy, for MLO we need multiple GTKs – so how does it work for the MLD AP? In the MLD AP there are several GTKs, we do need to change the primitive. Do we set each separately, or together, how, will these primitives be updated when they change?

C – 1) there were comments on the architecture in D1.1 – the interaction between the MLD and when legacy clients are services – the interaction needs to be explained more clearly. On the AP side the affiliated APs manage their own keys. On the supplicant side things should change. The AP MLD’s affiliated APs will support legacy STA. Therefore, the affiliated APs will update the GLKs to their legacy non-AP STAs as they do now and for non-AP MLDs side the GLKs are updated via the MLD link.

C – If there are several links, but you just want to update the GLK for one link what do you do? Do all the GLKs need to be sent at the same time?

R – The way the frames is flexible the AP MLD could either send all the GLKs together, or each one separately. The Group Key exchange occurs at the .1x layer and involves the PAE.

C – The frame formats to update the GLKs are currently in the draft.

C – There needs to be a way to remove an affiliated AP from an MLD AP. An affiliated AP leaving, should remove the link from the MLD. If an affiliated AP is added back in to the MLD does it unassociated or does it remain associated when it comes back? If something belongs to the MLD does it stay authenticated?

R – There may be signaling that is missing, but when an AP leaves, the affiliation of the MLD does not change. The Group keys for the APs that left are deleted. To reinstate an AP in the MLD AP – you would just need to send the GTK via the unicast link.

C – Clarified that the group keys that are gotten rid of are the ones associate with the AP that left. The other affiliated APs would maintain their keys.

C – On the AP we have an authenticator for the MLD, and one for each affiliated AP which handles the group keys for the link.

C – If the MLD does away what happens to the legacy clients? If the link goes away, what happens to the legacy clients?

R – The AP returning would be a new AP and it would instantiate again.

C – How many authenticators are there? Are there 1 for MLD and 1 for each affiliated AP?

C – the Group key is discarded, when we reconfigure the link or temporarily disable a link, how should we handle the group key?

R – If the MLD is still servicing its clients – then you could keep the state. But, if you are removing the state it all has to be reconfigured (instantiated). If it comes back, new group keys for the new link need to be provided.

C – When the group keys are updated, that is what happens. But that is not configuration. What about changing the link channel? One is a temporary disablement, the other is a permanent thing.

C – For legacy operation, if it is temporary, you could keep the keys.

C – The legacy APs basically behave, as they currently do.

C – Why would an AP be temporally disabled, AP in PS – there are two different cases. What is the scenario?

C – An AP can enable/disable, this is existing behavior (in the baseline).

C – What does it means that AP disabled temporarily?

R – When an AP is disabled all the STAs are disassociated.

C – that sound correct to me.

C – The whole AP removal is to be discussed in TGbe. Currently, the non-AP STA will need to reassociate to use the new AP.

C – One thing discussed offline is: when a non-AP MLD is associated to an MLD AP, sure there are links, the AP/STA association for the affiliated entities is not clear. I think it is a gray area in the spec today.

C – There was a proposal in 11-21/0524, to clarify this by using the word “connected”, but that was not accepted, we wound up using “associated”.

C – This is a hard problem to solve.

C – What relationship regarding the affiliated APs and affiliated STAs is the issue? The data path is well described, what else should be described.

C – This has been discussed, and the draft is using “associated”, but it was on a link basis. There is a link established, but the affiliated STA is not associated with the affiliated AP.

C – There is a state machine that describes this. But the affiliated state is not as clear as it could be.

C – the state machine uses the term associated. This is independent of the group addressed discussion.

A long discussion on Pt to Pt, and what it means, was had.

C – Pt to Pt is MAC SAP to MAC SAP, for MLD that is from the MLD AP MAC SAP to the non-AP MLD MAC SAP.

C – Link one already exists independent if there is a MLD – the expression is confusing. If link one is established is a better way to state the condition. Link 1 doesn’t exist before association, but it exists before establishment. Link 1 and Link 2 are not established because the non-AP MLD is assocated with the MLD AP – this is a little confused.

C – Are these links BSSs, a BSS is not the same thing as association.

C – A link is a channel and class.

C – There seem to be some details that still need to be worked out. It would be easy there was no legacy. The current draft is ok, but some things need to be explained better.

C – This is similar to the CAP/WAP – there were similar issues, with a controller – so a definition of the WTP wireless termination point was created. This may not be useful here, but we need to do something to explain this better.

C – Regarding the link – once there is an association, management frames can be exchanged, everything happens between the AP and STA. We could look at how to clarify this.

C - But the lower MAC can’t make these decisions, it is at the MLD level.

Discussion on the reference model 4-29a – about management:   
If there is a management frame – that goes from an affiliated AP to an affiliated non-AP STA. The primitives are generated in the lower MAC – and the the upper MAC encrypts, it.

C – For the beacon report – the measurement is made at the lower MAC, and then it is stuck back into the upper mac to go out over the air.

MLD has affiliated APs – affiliated APs represent different links. An MLD is a group of affiliated APs that with unique SSIDs.

C - A possible name is an MLD and its affiliated STAs.

C – For the non-AP MLD the affiliated STAs are the lower MAC and PHY.

## Next Steps:

Request for TGbe – be discussed Tuesday night (2021-09-14) – and there was also a request for TGbe discussion on Wednesday (21-09-15) @ 11:15 for discussion of 11-21/0209.

* **Upcoming Teleconferences – September Interim:**
  + **13 September 13:30-15:30 h ET**
  + **14 September 19:00-21:00 h ET**
  + **15 September 11:15-13:15 h ET**
  + **Annex G**
  + **TGbe multi-link architecture topic**
* **Teleconferences September to November (between the September Interim and November Plenary)**
  + TBD
* Contributions requested/expected:

## Adjourned: 21:00 h ET

## Attendance:

| **Name** | **Affiliation** |
| --- | --- |
| Asterjadhi, Alfred\* | Qualcomm |
| CHAN, YEE | Facebook |
| Coffey, John | Realtek Semiconductor Corp. |
| Fang, Yonggang | MediaTek Inc. |
| Hamilton, Mark | Ruckus/CommScope |
| Ho, Duncan\* | Qualcomm |
| Levy, Joseph | InterDigital, Inc. |
| Lu, kaiying | MediaTek Inc. |
| Montemurro, Michael | Huawei Technologies Co., Ltd |
| Petrick, Albert | Jones-Petrick and Associates, LLC. |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Shafin, Rubayet | Samsung Research America |
| Torab Jahromi, Payam | Facebook |
| Wang, Lei | Futurewei Technologies |
| Yang, Bo | Huawei Technologies Co., Ltd |
| Yang, Jay | Nokia |
| Yee, James\* | MediaTek |

\* Added based on Webex participants list.