IEEE P802.11  
Wireless LANs

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| ARC SC teleconferences minutes 29 April 2021 | | | | |
| Date: 2021-04-29 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Joseph LEVY | InterDigital Communication, Inc. | 111 W 33rd Street New York, NY 10120 | +1.631.622.4139 | [jslevy@ieee.org](mailto:jslevy@ieee.org) |
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Abstract

This document contains the minutes of the IEEE 802.11 ARC SC teleconference held on 29 April 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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# Monday 29 April 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 19:02 ET**

Agenda slide deck: [11-21/0739r0](https://mentor.ieee.org/802.11/dcn/21/11-21-0739-00-0arc-arc-sc-agenda-apr-29-2021.pptx)

**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.

**Core Principles:**

The Chair reviewed the IEEE Core Principles.

**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**
  + [**11-21/0396r0**](https://mentor.ieee.org/802.11/dcn/21/11-21-0396-00-00be-11be-ap-mld-architecture-discussion-2.pptx) **(continued from Apr 8)**
  + **(**[**11-21/0316r0**](https://mentor.ieee.org/802.11/dcn/21/11-21-0316-00-0arc-mlo-architecture-reference-model.pptx) **reviewed during plenary) 11-21/0577r0**
* **Next Steps**

The Chair reviewed the agenda and called for comments or amendments to the agenda. Document 11-21/0577r0 a detailed text proposal for 802.11be.

The proposed agenda was accepted without comment.

Chair reviewed agenda deck slide 16 – The ARC other topics slide and discussed ongoing ARC activities.

## Contributions:

* [**11-21/0396r1**](https://mentor.ieee.org/802.11/dcn/21/11-21-0396-01-00be-11be-ap-mld-architecture-discussion-2.pptx) **(continued from Apr 8) – r1 displayed but not posted, will be after the meeting.**

Quick review of the document slides 2-4 the general model –

Specific aspects slide 13 –

For MLO – authenticator resides in the MLD SME, there is a different authenticator for legacy STAs. 11-21/0483.

Slide 14 – note added to MLD Peer -> MLD (known by association)

PS is per link – but the MLD coordinates the PS state. (Legacy PS is not changed) – it is very clear you can decide which DIM you would want to receive. It is clarified in the spec.

C – The model is documented in the .11be spec – it can’t be described in a compact manner.

C – The MLD needs to know the PS state on each link. It is complicated on the AP MLD side, the AP MLD needs to keep track of everything and how the links map to PS.

C – The AP MLD just has to know – otherwise it doesn’t know when to transmit traffic.

C – Where do PS polls go.

R – A PS poll is only sent when you are in PS mode on all links.

C – Where does the non-AP MLD – send the PS poll to and on what link?

R – The bottom line is the non-AP MLD decides which link to wake-up on and would send the PS poll or equivalent on the link that it wakes-up, it is a coordinated behavior.

C – This in line with the base line behavior – there are no changes.

C – For the queuing of MLD/Legacy MPDUs – is there an issue with sharing a PHY?

R – This is a known thing, virtual APs do it now with no issue.

C – Slide 15 – has QoS. EDCA queues –

C - There is only one queue. MBSS ID –

C – The spec doesn’t say there is only one queue for virtual AP, it is silent on this issue.

R – It is specified this way in the standards, but practically implementations use one set of queues. There are separate queues per access category. From a MAC point of view, they are separate but only one frame can be transmitted at a time.

C – How do you reset the different AC for the same PHY.

C – What is externally visible – the retry case is interesting as a retry may use a different link.

11.10.14 – Multiple BSSID set – uses a single a common operating class, channel, and channel access functions. There may be an inconsistency in 802.11-2020. When MLD is told a frame failed – it can then decide which link it is resent on.

A discussion followed on how queuing works

C – the AP can queue two frames simultaneously – PN – is used to order the transmission of the frames. This it taken care of the by the ordering buffer. If you have a block ack agreement – then you can do whatever you want. If you don’t have a BA agreement you have to everything in order.

C – This is already in the spec; it is in the .11be spec. Without a BA agreement the frames must be sent in order. How ordering is done is purely implementation.

Multiple participants confirmed the need for transmission in order unless a BA agreement is in place. Therefore, for non-BA you can only have one pending packet at a time as the reorder buffer is tied to BA. The queuing of a retry is implementation depend for MLO.

C – If the EDCA queues are per link – if two entities are queuing into the same queue – it is an implementation thing to avoid the collision.

Moving on to Slide 14

SAPs - for the non-AP MLD for mobility – the MLD MAC address is maintained.

Some discussion on TLDS – this being handled in TGbe, but the work is not yet complete.

C – What about OCB?

R – I can’t think of a use case where MLO will be important for OCB.

C – I can think of multiple cases where multiple links would be beneficial to OCB.

R – you have a clean slate if it is OCB –

C – what is the difference between having to OCB STAs and an OCB MLD.

C – GAS/ANQP – as long as the affiliated STA are constant with the STA – it will work. An unassociated peer goes to the legacy stack. The legacy and MLD share the same advertisement.

R – Pre-association you use the legacy stack. Post association you use the MLD stack.

There was some discussion on ranging and pre-association security. The pre-association security is with the legacy STA. There does not seem to be a reason to pre-association with an MLD. There does not seem to be a use case for pre-association MLD security.

C – TIM bits – will be addressed, TGbe contributions are being worked.

C – All Beacons, Probes – Will all go from legacy stack (but legacy stack will add ML element as appropriate).

Robust management frames – all use the same PTK – individually address – it just works.

Group address – it also just works based on the GTK, IGTK. – but there is an alternative being proposed.

A long discussion on what to do with proposal to change things. Should ARC note that an item is still in discussion. Is this capturing the state in .11be.

For management – via group address is handled via each pair of affiliated STAs.

C – There is not a technical reason that say this doesn’t work – it may be a matter of implementation choice. This could yield some simplifications. It could be a valid choice to not have a common GTK or to have one. It is an implementation choice.

C – What is in the draft now works – why add anything extra. Packets sent from the AP is understood by both the MLD and legacy devise. GTK and SNS common – (Apple proposal) these are linked. It will work, the whole package needs to be looked at.

C – Are we sure there are no problems, this may need more work. The part of concern is if the frame is specific to the state of the MLD – it will now have to send it to all the legacy APs. It is the hand-off that is of concern, also the non-AP MLD will have to put this back together.

*Resulting note in Mark’s presentation – Note: In this document notes such as: TBD, TBR, question marks and text notes are meant to remind the ARC group that additional discussion on the topic may be necessary. These notes are not an assessment of the status of TGbe or the .11be specification.*

## Next Steps:

**Upcoming Teleconferences:**

* May interim session
  + May 10: 13:30 ET, 2 hours
  + May 12: 11:15 ET, 2 hours
* Contributions requested/expected:

## Adjourned: 21:00 h EDT

**Attendance:**

| **Name** | **Affiliation** |
| --- | --- |
| Au, Kwok Shum | Huawei Technologies Co., Ltd |
| Bajko, Gabor\* | Mediatek |
| Fang, Yonggang | MediaTek Inc. |
| Hamilton, Mark | Ruckus/CommScope |
| Ho, Duncan | Qualcomm Incorporated |
| Huang, Po-Kai | Intel Corporation |
| Levy, Joseph | InterDigital, Inc. |
| Montemurro, Michael | Huawei Technologies Co., Ltd |
| Naik, Gaurang | Qualcomm Incorporated |
| Petrick, Albert | Jones-Petrick and Associates, LLC. |
| Rolfe, Benjamin | Blind Creek Associates |
| Roy, Richard | SRA International |
| Sun, Bo | ZTE Corporation |
| Torab Jahromi, Payam | Facebook |

\* Added based on Webex participants list.