IEEE P802.11
Wireless LANs

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| ARC SC Meeting Minutes 06 August 2020 |
| Date: 2020-08-06 |
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Abstract

This document contains the minutes of the IEEE 802.11 ARC SC teleconference held on 08 August 2020 at 10:00.

Note: Highlighted text are action items. C- proceeds comments, R- proceeds responses to comments

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# Thursday 06 August 2020, 10:00-12:00 h EDT

**Administration:**

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

**Vice Chair: Joseph Levy, InterDigital**

**Secretary: Joseph Levy, InterDigital**

**Meeting called to order by the Chair 10:03 EDT,**

Agenda slide deck: [11-20/1190r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1190-00-0arc-arc-sc-agenda-6-aug-2020.pptx) proposed agenda copied here for reference (will be r2 out of the meeting):

**Administration:**

The Chair reviewed the Administrative information in the agenda document, [11-20/1190r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1190-00-0arc-arc-sc-agenda-6-aug-2020.pptx)

**Call for Patents:**

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

**Participation:**

The chair reviewed the participation policy

**Approval of the Agenda:**

**Administrative Items**

**802.11 TGbe’s evolving multi-link architecture**

* **How does the architecture (still evolving) within 802.11 TGbe fit into or affect the overall (baseline) 802.11 architecture?**
* **Contributions:**
	+ [**https://mentor.ieee.org/802.11/dcn/20/11-20-1148-00-00be-discussion-on-mld-architecture.pptx**](https://mentor.ieee.org/802.11/dcn/20/11-20-1148-00-00be-discussion-on-mld-architecture.pptx) **- Po-Kai Huang**
	+ [**https://mentor.ieee.org/802.11/dcn/20/11-20-1131-01-00be-multi-link-reference-model-discussion.pptx**](https://mentor.ieee.org/802.11/dcn/20/11-20-1131-01-00be-multi-link-reference-model-discussion.pptx) **- Yonggang Fang**
	+ [**https://mentor.ieee.org/802.11/dcn/20/11-20-1171-00-00be-multi-link-ap-network-reference-model-discussion.pptx**](https://mentor.ieee.org/802.11/dcn/20/11-20-1171-00-00be-multi-link-ap-network-reference-model-discussion.pptx) **- Yonggang Fang**
	+ [**https://mentor.ieee.org/802.11/dcn/20/11-20-1122-00-00be-802-11be-architecture-association-discussion.pptx**](https://mentor.ieee.org/802.11/dcn/20/11-20-1122-00-00be-802-11be-architecture-association-discussion.pptx) **- Joseph Levy**
* **Next Steps**

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

**Contributions:**

[**11-20/1148r0**](https://mentor.ieee.org/802.11/dcn/20/11-20-1148-00-00be-discussion-on-mld-architecture.pptx) **- Discussion on MLD architecture - Po-Kai Huang (Intel)**

Po-Kai Huang presented.

Q - Regarding the figure on Slide 4, what is the meaning of the arrow between MAC Sublayer and the Common MLD entity, should there be arrows between the Common MLD entity and the MAC sublayer Management entity or the MLD Management entity?

Discussion followed and it is possible that arrows may need to be added between the Common MLD entity and the management entities.

Q - Different STAs see different MACs (ac, ax, …) how do you see this working?

A – you are looking at 2 MLD operation – we have different AP – each AP has the ability to talk to their STAs. So, I didn’t draw them together. Because it can deal with legacy STA.

C – This is not the same as legacy, there are now two MAC SAPs. This is a new concept for 802.11, as is the lower layer MAC SAP.

A – This architecture was based on the transparent FST architecture. This diagram is for MLD only, legacy can coexist with this, but it is not drawn on top of this.

C – For transparent FST, there is a single MAC SAP – here you seem to have different BSS IDs.

A – This was drawn for MLD, it does not show the full complex drawing including legacy sublayer/legacy control. I don’t think we need to draw this MLD reference model to include the legacy locations.

Q - In the .11 spec will it have a common stack with the legacy or is there a different entity.

A – There is a common reording buffer, so there is only one MLD SAP. There is communication between all the MACs in the MLD.

Q - There is a single sublayer Management entity – do we need additional arrows?

Ans – same as above

Q/C – This is a starting point – the reference model is very important – where is data plane and control plane, are we confusing the data and control planes. It would be best to be clear with regard to control plane and data plane. The drawing does not seem to include all the SAPs.

A – This is a drawing of the control plane.

C – We should look at the current base line in the specification to insure we are including all necessary SAPs.

Q – How does this relate to single radio MLD?

A – This architecture allows for communication on each PHY at the same time or if there are constraints one PHY at a time. This reference model allows for this behavior. The drawing only shows two PHYs, which is adequate for this reference model.

C – There is only one MAC layer and one PHY layer in the single receiver.

A – The figure is conceptional – how show different MAC address are used can be added in the future. Different links have different capabilities, this needs to be considered and addressed. Traditionally, in the 802.11 reference model the different PHYs each have a MAC address. In Wi-Fi Alliance this is not address, this fine point of implementation is not considered. There must be communication between different MACs.

C – Looking at the current 80+80 – 802.11 looks at both 80 MHz PHYs as one device, here 3 PHYs need to be considered – two is not adequate. Also the PHYs will each have different requirements. Each radio will have different data bandwidth depending on its configuration.

A – Considering only 2.4, 5, and 6 bands, and there will be different PHYs

C – the requirement of having multiple PHYs will impact devices ability to use this feature. This is wrong and should be fixed, it should state that there at least 3 and not 3.

A – The defined ML picture – allows for flexibility – it does not mandate how many links we will have. This is a model.

C - This is oversimplified just as an 80+80 is simplified – this should be clearer in the Specification.

A – This was adequate for the 80+80.

C – It should be clear that this is an example.

A - It can be made clear that this an example.

C – From an AP point of view – it is a single box with multiple AP capabilities. It is either hard coded, to a legacy AP or an MLD and it is all in the same AP.

A – It can be interpreted that way – if it legacy it is fixed.

Q – Where does the security module sit? If the AP is acting an MLD and a legacy AP there are different security entities?

A – The MLD security is at the MLD level. The figure clearly show this.

C – How are multiple Virtual AP addressed

A - Multiple SSIDs will have different SAPs. Multiple BSS ID is a different dimension.

C – This is a logical STA, these figures and the architecture do not specify physical STA or AP device.

C – Multiple SSIDs will have multiple MAC SAP, not single MAP SAP. From the MAC SAP you do the routing.

A – The SAP is an interface to push the routing.

C – There will be multiple MAC addresses.

A – How to deal with multiple MAC address need more discussion.

C – The legacy AP goes through its own MAC SAP.

A – Agree the legacy AP has its own MAC SAP – the mapping is already in the specification.

Chair – The addressing structure needs to be clarified. Offline discussion is suggested.

Q – How does this relate to the SSID?

A – This has nothing to do with the SSID – this is just describing the control and management.

Q – For a single AP MLD – is it possible to have different BSSIDs over the different links? I don’t think we can allow different BSSIDs.

A – This diagram is based on the current TGbe agreements. All the agreements were carefully considered. There are different parameters here. For MLD there is one BSSID/ one SSID – because it is one network – it is all the same security domain.

Q – There is a single PMK?

A – Yes a single PMK.

C – Adding the SSID to the figure will make it very complicated. This is not the preferred way to proceed.

[**11-20/1131r1**](https://mentor.ieee.org/802.11/dcn/20/11-20-1131-01-00be-multi-link-reference-model-discussion.pptx) **- Multi-link reference-model discussion - Yonggang Fang (ZTE TX)**

 Yonggang Fang – presented

Q – Figure 9 has two MLE sets, it looks like you have two associations – it is preferred to have one exchange with all the parameters. What is your opinion on having two interfaces with one association?

A – We can use one association, even with the two MLME SAP separately. Looking at the current – 6.3 – it doesn’t differentiate for each STA – it may be necessary to have a STA ID/link ID. A compatibility ID may also be necessary. This is why these are shown as being separate.

Q – There are two SMEs shown, what does it mean when you have two of them.

A – It means we can either use STA1 or STA2 for authentication, authentication will be at the MLD level.

C – The parameters should be from the top – for individual entities, it should be added on top of it, and the control is not from the top.

A – Agree that the common parameters are from the MLD level, but either link can be used to transmit the information, via either layer.

Q – Is it necessary to define the split for lower and upper MAC?

A – If it is defined, it should be specified as a lower and upper MAC.

A – The PMK (pairwise master key) and PTK (pairwise transient key) would be in the upper layer (the MLD level) and the GTK (group temporal key) is in the low layer (the link level).

Chair – there are a number of items that need to be shared between the layers– interoperability should be carefully considered.

C – MTK (mesh temporal key) is a group address security.

C – We only need to define what is common for MLD, this should be discussed in TGbe. It is best to discuss this in TGbe as there are a lot of implementation issues with defining the lines on figure 19. The specification should only deal with an implementation as an example, it should not require a implementation.

A – If there will be a MAC upper layer and a MAC lower layer – They should be defined, and the interface needs to be defined. But this may not be needed.

Q – Do you agree there a specific function we need, and it should be shared across the entities?

A – Yes, this should be done.

Chair – I didn’t intend for this discussion to be held in the ARC SC.

Chair - There is no time to discuss the remaining documents:

1. <https://mentor.ieee.org/802.11/dcn/20/11-20-1171-00-00be-multi-link-ap-network-reference-model-discussion.pptx> - Yonggang Fang
2. <https://mentor.ieee.org/802.11/dcn/20/11-20-1122-00-00be-802-11be-architecture-association-discussion.pptx> - Joseph Levy

A meeting will be scheduled for Thursday 20 August (in two weeks) to continue these discussions. Additional contributions are welcome. (*note: there was a conflict with the 20 August meeting, so the next meeting was scheduled for 24 August*)

**Adjourned – 12:00 (noon) EDT.**

Note: final agenda slide deck is: [11-20/1190r0](https://mentor.ieee.org/802.11/dcn/20/11-20-1190-00-0arc-arc-sc-agenda-6-aug-2020.pptx)

**Attendance:**

| **Name** | **Affiliation** |
| --- | --- |
| Ansley, Carol | CommScope |
| Asterjadhi, Alfred | Qualcomm Incorporated |
| Au, Edward\* | Huawei\* |
| Bajko, Gabor | MediaTek Inc. |
| Bankov, Dmitry | IITP RAS |
| Berkema, Alan | HP Inc. |
| Bims, Harry | Bims Laboratories, Inc. |
| Bredewoud, Albert | Broadcom Corporation |
| Chitrakar, Rojan | Panasonic Asia Pacific Pte Ltd. |
| Das, Subir | Perspecta Labs Inc |
| Dong, Xiandong | Xiaomi Inc. |
| Duan, Ruchen | SAMSUNG |
| Ecclesine, Peter | Cisco Systems, Inc. |
| Fang, Yonggang | ZTE TX Inc |
| Hamilton, Mark | Ruckus/CommScope |
| Ho, Duncan | Qualcomm Incorporated |
| Hu, Chunyu | Facebook |
| Huang, Lei | Panasonic Asia Pacific Pte Ltd. |
| Huang, Po-Kai | Intel Corporation |
| Ji, Chenhe | Huawei Technologies Co., Ltd |
| Khorov, Evgeny | IITP RAS |
| Kim, Sang Gook | LG ELECTRONICS |
| Kim, Sanghyun | WILUS Inc. |
| Klimakov, Andrey | Huawei Technologies Co., Ltd |
| Levitsky, Ilya | IITP RAS |
| Levy, Joseph | InterDigital, Inc. |
| Li, Yiqing | Huawei Technologies Co. Ltd |
| Lindskog, Erik | SAMSUNG |
| Lu, Liuming | ZTE Corporation |
| Marks, Roger | EthAirNet Associates |
| Max, Sebastian | Ericsson AB |
| Naribole, Sharan | SAMSUNG |
| Patil, Abhishek | Qualcomm Incorporated |
| Patwardhan, Gaurav | Hewlett Packard Enterprise |
| Pushkarna, Rajat | Panasonic Asia Pacific Pte Ltd. |
| Riegel, Maximilian | Nokia |
| Smith, Graham | SR Technologies |
| Stanley, Dorothy | Hewlett Packard Enterprise |
| Startsev, Ivan | IITP |
| Sun, Bo | ZTE Corporation |
| Torab Jahromi, Payam | Facebook |
| Wang, Lei | Huawei R&D USA |
| Yang, Jay | Nokia |
| Yee, James | MediaTek Inc. |
| yi, yongjiang | Futurewei Technologies |
| Zuo, Xin | Tencent |

\* Attendance not from IMAT, attendee requested to be added