IEEE P802.11  
Wireless LANs

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| ARC SC teleconference Minutes 18 Oct 2018 | | | | |
| Date: 2020-10-18 | | | | |
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Abstract

This document contains the minutes of the IEEE 802.11 ARC SC teleconference held on 18 October 2020 at 19:00-21:00 h ET.

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

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# Monday 18 October 2020, 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 19:03 ET**

Agenda slide deck: [11-20/1616r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1616-01-0arc-arc-sc-agenda-19-oct-2020.pptx) proposed agenda copied here for reference (will be r2 out of the meeting):

**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 (1 hour on each topic):**

11-20/1639r1 - 11be architecture discussion - Mark Hamilton

11-20/1660r0 - 11be Soft AP MLD definition – Jinjing Jiang

The Chair reviewed the Administrative information in the agenda document, [11-20/1616r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1616-01-0arc-arc-sc-agenda-19-oct-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:**

**Administration**

**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 (1 hour on each topic):**
* [**11-20/1639r1**](https://mentor.ieee.org/802.11/dcn/20/11-20-1639-01-00be-11be-ap-mld-architecture-discussion.pptx) **- 11be architecture discussion - Mark Hamilton**
* [**11-20/1660r1**](https://mentor.ieee.org/802.11/dcn/20/11-20-1660-01-0arc-discussion-on-soft-ap-mld-definition.pptx) **- 11be Soft AP MLD definition – Jinjing Jiang**

**Next Steps**

**Adjourn**

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 accepted by unanimous consent.

## 802.11 TGbe’s evolving multi-link architecture

[**11-20/1639r1**](https://mentor.ieee.org/802.11/dcn/20/11-20-1639-01-00be-11be-ap-mld-architecture-discussion.pptx) **- 11be architecture discussion - Mark Hamilton**

Presented by Mark Hamilton. This document considers the previous discussions held in the ARC SC session on 6 August, 24 August, and 16 September, and is an attempt to start over. This document is more in line with current TGbe thinking (based on TGbe passed motions) and is focused on the AP as a first step to better understand MLO and MLD requirements and 802.11 architecture impacts.

C – Regarding retransmission if it is on another links – then it is at the MLD level– if it on the same link it is not MLD.

A – If the retransmission is on the same link – then it is link level. Hasn’t 11be invented a new type of retransmission that could be on a different link?

C – Data can be transmitted on any of the links, you want to have a retransmission buffer, it is tied to data transmission, and it has a sequence number and reordering buffer.

R – But sequence number would be the same.

R – Yes it would have the same sequence number as it is a retransmission and TGbe allows retransmissions to be transmitted on other links.

A – Even this cross-link retransmission has the same transmission number.

R – Agree, it needs to be the same sequence number, using different numbers will not work.

R – Agree, the sequence number is the same. But retransmission on other links the key is different.

R – The group address is different.

R – The AID is different.

R – Maybe the MAC header is per link. The data frame itself is different. The sequence number is the same for the repeated data frame.

A – It would be very helpful to get a clear list of what changes and what doesn’t change.

R – This information can be provided; do we need to create this term here (now).

A – If retransmission doesn’t mean what it has always meant, we should have a new term.

C – I don’t know if retransmission is on another link?

R – If there is an MLD level retransmission, you are creating a link level retransmission. We shouldn’t discuss this here (now), it should be discussed in TGbe.

C – An MLD retransmission must use another links MAC header, so this different.

R – Transmissions may or may not be at the MLD level. If you have a packet in to the MLD it is assigned a sequence number, and then assigned to “link 1”. It is possible to retransmit the same packet on “link 1”, but it is also possible use a new PN, with the same sequence number and transmit it on a different link, as a retransmission.

A - Does the TA change?

R - On each link you use the TA of each link separately. You could transmit quickly on each link, but you could use. If you use refragmentation, ... let’s forget about fragmentation.

R – fragmentation is TBD in TGbe.

C – GTK is per link, but group address is different.

R – This depends on the TBDs –

C – Fragmentation will be different.

C – The purpose of the discussions in the ARC SC is to address/discuss the impact of TGbe decisions on the 802.11 architecture and provide a place to discuss these details. The decision regarding how TGbe specifies MLO in the 802.11be specification is the domain of TGbe. The ARC SC does not dictate to TGbe, it only advises and provides a place for 802.11 architecture and TGbe experts to discuss the TGbe architecture and its potential impact.

Slide 5 -

Q - Questioning Doze and MLD, how is this managed?

R – Currently the rules are very clear, if a STA is in PS Doze the AP must buffer the frames.

C – Based on what TGbe agreed on in the motions, you can use awake doze to manage each link

R – Is that the TGbe status.

C – PS mode can be extended to MLO, each link may have a PS state (doze/awake), there is no incompatibility, individually addressed frames can be buffered by the AP MLD, when all MLO links are in doze, when one or more links are in awake state they should be used to send frames.

C – Buffering should only occur when all MLO links are in Doze.

C – There are a lot of motions in BE that have passed. We should consider them in this discussion.

Q – How is the choice of link described in MLO, in the motions to date?

R – The choice of link for a frame is implementation is specific.

Q – In the MAC where is the decision being made as to which link is used.

C – It should be added, but it would be a box with no performance/requirements.

C – As the real time arguments, it is up to the implementation. But it may be necessary to add some minimum requirements.

C – PS behavior may be one of things that need to be specified.

C – PS is flexible as to where each frame goes regarding a link.

C – There has been discussion and questions regarding the TSN stuff, rules may come out of that.

C – An outcome of MLO in TGbe is that it is very dynamic. So, the link choice is not assumed.

The presenter agreed to do additional research on TGbe motions and update this contribution.

[**11-20/1660r0**](https://mentor.ieee.org/802.11/dcn/20/11-20-1660-00-0arc-discussion-on-soft-ap-mld-definition.pptx) **- 11be Soft AP MLD definition – Jinjing Jiang**

Jinjing presented.

C - on slide 3 a non-AP MLD has three links, why do you say there is not sufficient to isolate the 5GHz and 6 GHz device.

R – it is assumed that the client device does not have enough space to isolate the devices.

C – Some devices will be able to isolate the devices.

R – True, but these will be a high-end device, but not all devices may want to meet this costly performance requirement. There is a lot of debate on how do UL/DL on a non-AP MLD.

Jay -for option to (slide 9) – you say you use the same channel connector. This is not clear.

R – The use of the term RF chain was considered and avoided to avoid this confusion we chose to use antenna connector. Additional discussion on how to describe this if we use RF chains, when the same hardware is used with different parameters on different links.

C – A soft AP seems to require a subset of AP features, a recommended practice on what a Soft AP is may be the correct way to proceed. Trying to do this in the Spec will just delay the amendment and add lots of complexity.

R – thanks we will think about it.

C – Regarding battery powered, it will limit lots of use cases. The example you gave it in the mobile case, there are cases in the home, consumer electronics – where a soft AP may be desired. These products may plug into the wall. So, let’s not add the battery constraint. I think we should be able to come up with a definition, it is challenging to use the non- STR device, we should have a non-STR AP – for the point to point case. Can you constrain to a point to point case?

R – Battery powered is not something preferred to be used to discriminate the soft AP. Regarding further optimization and point to point, it is not the optimal case, more work is necessary.

C – Support this work going forward, just suggesting a way forward.

C – There are regulatory issues that need to be considered, e.g. client or master.

R – There is no need for this to be very different on the client side. The AP will have limited function.

C – The regulations in 6GHz are much different for an AP or client.

R – Regarding 6GHz the possibility of having a mobile AP is still being considered.

C –Support for a recommended practice. The soft AP is different entity, from regulatory, access, and requirements angel. So, from an architecture standpoint – we need to look at all of the issues discussed.

C – on slide 6 – The specification has not needed this type of material, because a soft AP was an AP with some limited capabilities. If this is a non-STR AP – then the requirements for a non-STR AP will need to be created.

R – It would be a non-STR AP – but an AP vendor will need to implement an STR AP. Therefore, the soft AP needs to be added.

C – on slide 6 – If this is just adding a new name for a non-STR AP, it will confuse things, adding an ambiguous term will not help. There is the possibility of multiple regulatory issues in and out of the 6 GHz band. I don’t think we should go this way.

R – the current situation, it seems impossible to use the term non-STR AP. If we can get the soft AP definition agreed.

C – reiterating – support for a recommended practice. Also, the recommended practice might require some changes to SPEC.

C – Currently there is a requirement that an MLD AP must be STR. So, providing a non-STR AP is in conflict.

C – The TGbe process is still early in the process for there is lots of time, this can be addressed things move forward.

C – until the standards allows for non-STR AP there will be line that can’t be crossed.

C – a recommended practice would also help with regulatory.

C – a recommended practice could help define things and address multiple issues discussed.

R – In terms of performance – I don’t think it is a fair thing. If you want to implement a full-blown AP it is allowed. But, if someone want to implement a soft AP it is restricted, it should also be allowed.

C – Now that the key AP features are defined, what this new thing needs to be defined. Also, how it relates to the existing entities and features needs to be agreed.

R – We don’t want these types of device to be crippled by the STR AP. Maybe if we back off the R1 requirement, we may be able to do more.

The Chair – reviewed the list of past contributions.

The Chair called for 802.11bc and 802.11bd input.

## Next Steps:

**Next Teleconference(s):**

Note: There has been a request for discussion of TGbc and TGbd. Teleconference plan for those discussions is pending contributions

TGbe related teleconference(s):

* Next meetings during November plenary:
* Monday, November 2, 13:30-15:30 ET
* Wednesday, November 4, 11:15-13:15 ET

## Adjourned – 21:01 h EDT.

Note: final agenda slide deck is: [11-20/1616r1](https://mentor.ieee.org/802.11/dcn/20/11-20-1616-01-0arc-arc-sc-agenda-19-oct-2020.pptx)

**Attendance:**

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