IEEE P802.11
Wireless LANs

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| ARC SC Mixed Mode Minutes March 2025 – Plenary |
| Date: 2025-03-11 |
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Abstract

This document contains the minutes of the IEEE 802.11 ARC SC mixed mode meeting held on 11 March 2025 13:30-15:30 h EDT, 12 March 202,5 8:00-10:00 h EDT, and 13 March 2025 13:30-15:30 h EDT.

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

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# Tuesday 11 March 2025 13:30-15:30 h EDT

## Administration:

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

**Vice Chair: Joseph Levy, InterDigital**

**Secretary: Joseph Levy, InterDigital**

**Meeting called to order by the Chair at 13:40 EDT**

Agenda slide deck: [11-25/0222r2](https://mentor.ieee.org/802.11/dcn/25/11-25-0222-02-0arc-arc-sc-agenda-march-2025.pptx)

Agenda Slides 4-15:

Registration Reminder

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 (Slides 16)

* **Three meeting slots this week**
* **Attendance, noises/recording, meeting protocol reminders**
* **Policies, duty to inform, participation rules**
* **Approve meeting minutes (slide 18)**
* **Contribution/discussion topics:**
	+ **IEEE Std 802 internal alignment work (slide 19) – Tues PM1**
	+ **Annex G way forward (slide 20) – Wed AM1 and Thurs PM1**
	+ **WBA liaison on QoS, and L4S (slide 21) – on hold pending TGbn and REVmf**
* **Next steps (slide 22)**

The Chair reviewed the agenda and called for comments and additions.

Approved by unanimous consent.

## Approval meeting minutes (slide 18)

Motion to approve the minutes of:

**January interim:** [**11-24/2119r0**](https://mentor.ieee.org/802.11/dcn/24/11-24-2119-00-0arc-arc-sc-mixed-mode-minutes-january-2025-interim.docx)

Move Dan Harkins

Second Guido Hiertz

Discussion none.

Result: UC

## ARC - Other (slide 17)

The chair reviewed slide 17

## IEEE Std 802 internal alignment work (slide 19)

**802.11 relevant topics, to continue alignment with IEEE Std 802:** [**11-25/0150r4**](https://mentor.ieee.org/802.11/dcn/25/11-25-0150-04-0arc-initial-thoughts-on-arc-misc-802-topics.docx)

* EPD and LPD terms are going away – we need to update 802.11 to align
* Review MAC address ordering discussion, and 802.11 assumptions
	+ <https://mentor.ieee.org/802.1/dcn/24/1-24-0034-00-Mntg-proposal-to-revise-bit-ordering-material-in-p802revc-d2-0.docx>
* Review 802.1AC mapping from ISS to 802.11 MAC SAP interface
* Consider any changes to remove 802.2/LLC terms?
* 802.11’s “Portal”, and mapping to/usage of IEEE Std 802 terminology
* Access Domains: “802 Access Domains”?
	+ Interconnection of Access Domains?
	+ In 802.11, Access Domain is BSS. Is that still the view, for 802.11be/MLD?
	+ Other 802s? 802.3 Multi-carrier fiber – 1 Access Domain, or many? We think it is 1. But there are multiple transmitters, in parallel.
* What if we make the DS a bridge (small ‘b’)?
* Consider adding something about VLANs (just informational?) into 802.11? Relationship (if we talk about it) to security domains (e.g., Authenticator relationship)? VLAN-aware STAs? What about GLK/non-GLK STAs? (cf 11-08/0114r0)

[**11-25/0150r4**](https://mentor.ieee.org/802.11/dcn/25/11-25-0150-04-0arc-initial-thoughts-on-arc-misc-802-topics.docx) – Presented by Mark Hamilton

Comment on the replacement of LPD and EPD,

C – Can’t we just redefine what LPE and EPD mean and not change the spec.

C – Shouldn’t we split the two terms T2EO into T2E and T2O.

A – asking if there is any objection to just maintaining his proposal.

C – Requesting that it be clear that EPD has 6 octets less that LPD

C – Suggestion to add a note that there is a 6 octet difference

C – Support for 802.11 setting the default to EPD – T3E

C – There are frames where LPD is more efficient ISI frames for example.

R – The default behavior should be stated and should be EPD.

C – Please keep the existing acronyms.

C – Wouldn’t it be better to reference the old spec, keeping the old reference.

A- I’d rather not, referencing older versions of the spec tends to cause problems.

C – 4.3.32 may be a place for some of these changes.

C – Agreeing that clause 4.3.32 needs to change. EPCS will require technical changes.

There is an architecture issue with EPCS STAs being able to receive LPD data frames and EPD group addressed frames.

**Way forward – keep LPD and EPD as is in the spec – but updated Acronyms/abbreviations list and add definitions of the terms and then correct the architectural error introduced by EPCS – editing 4.3.32 and potentially other clauses.**

**Bottom line more work needs to be done.**

**On the Adress convention – the 802.11 specification only uses non-bit reversed, need to fix where there are colons – there will only be hyphen between Hex values in the specification. See clause 9.2.2 (page 606) and look at/check clause 1.4.**

**Agreed way forward on the DS training frame – delete 8802-2 reference and just define the frame.**

The Chair requested the review of [**11-25/0150r4**](https://mentor.ieee.org/802.11/dcn/25/11-25-0150-04-0arc-initial-thoughts-on-arc-misc-802-topics.docx).

Recessed 15:32 EDT

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# Wednesday 12 March 2025 8:00-10:00 h EDT

**Meeting called to order by the Chair at 8:05 EDT**

Agenda slide deck: [11-25/0222r2](https://mentor.ieee.org/802.11/dcn/25/11-25-0222-02-0arc-arc-sc-agenda-march-2025.pptx)

Agenda Slides 4-15:

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* **Next steps (slide 22)**

The Chair reviewed the agenda and called for comments and additions.

C – Will there be L4S discussions?

Chair - There are no planned for ARC, but maybe in TGbn or TGmf discussions.

Also reviewed slide 20 as part of the agenda:

**Annex G way forward:**

* + - Consider scope/purpose for (new) Annex G – informative or normative, etc.
		- Straw Poll in Jan: “Do you support deleting Annex G?” 2/6/5.
		- Continue discussion on a “replacement” Annex G
			* [11-23/0880r7](https://mentor.ieee.org/802.11/dcn/23/11-23-0880-07-0arc-revised-annex-g-containing-example-frame-exchange-sequences.docx) (Harry Bims)

**Possible Annexes:**

* + - “Frame Exchange” and “Frame Exchange Sequence” concepts, introduction? (Does .15 concept have any relevance/starting-point for this?); Is FES from a given STA’s perspective, or “global”?; Clarify that a sequence of Frame Exchanges is not (necessarily) a Frame Exchange Sequence – it could be just a dialog (or some other distinguishing word) of FEs.

* + - [11-25/0193r0](https://mentor.ieee.org/802.11/dcn/25/11-25-0193-00-0arc-frame-exchange-sequence-and-fig-10-14.pptx) (Graham Smith) – Figure 10-14, how many frame exchanges sequence(s)?
		- List/”index” of frame exchanges, as a “novice” introduction/reference list?
		- Put an informative discussion of “architecture” (portal, etc.) versus “real-world” implementations, in an Annex also – but that’s a separate task, in a separate Annex

**Other concepts to consider adding:**

* + - NAV protection is still required, if a STA ends FES “early”
		- There are really multiple “wireless media” (different channels, etc. – and what about different “domains” as a result of beamforming?) which operate independently
		- Consider if/how to roll Annex O and Annex Y material into Annex G.

Agenda approved by unanimous consent.

## Annex G Way forward – Step 2

[11-25/0193r2](https://mentor.ieee.org/802.11/dcn/25/11-25-0193-02-0arc-frame-exchange-sequence-and-fig-10-14.pptx) – Graham SMITH

C – Control of the WM is controlled setting the NAV and by LBFT, uses of SIFs.

A – There is no other proposed definition, and the exchange shown is a frame exchange sequence – and control of the WM is key.

C – Commenting on the word “control” – the frame sequence does want to maintain control of the WM. The control is done by NAV and SIFs – so the definition is clear. While the tools to maintain the control. It is the frame exchange sequence do this.

C – There is control of the WM. To be consistent with the spec STA 1 could change state after BA/Ack. Each STA has a different view of the FES. You can have multiple FES within a NAV or controlled WM. The FES is controlling the internal state of the STA.

C – If STA4 is not an 802.11 STA – saying STA4 will understand the FES is incorrect. This does not make sense. The specification should not change in a way that breaks what our technology does. There are very different behaviors of devices in the market. So, we are continuously breaking assumptions that were thought of being important, e.g., fairness – is no longer being respected.

A – STA 4 is an 802.11 device.

Chair – We need to also consider what TGbn is doing, the multiple AP stuff and TXOP management. We had agreed, it is clear that we don’t have consistent agreement in the industry and the standard. We as ARC should try to provide clarity on this discussion.

C – There is a difference between signaling a new state and the actual state the STA is in. STA1 after it sends its ACK/BA, it can then do something else. So, there is an end of something for STA 1 when it sends the BA/ACK.

C – The discussion in TGbn will likely change the behavior of FES – there is nothing stopping certain behavior proposed by TGbn.

C – In clause 6 – e.g. 6.5.3.2.4 – sets when the behavior begins based on the concept of the FES.

C – 1) control of the WM is not what is shown on the screen, There can be multiple FESs in a TXOP. 2) when the TXOP ends, all FESs need to come to an end, most of the time. 3) the only thing the concept of a FES does, is that during a FES a STA is not allowed to do things that would make the STA unavailable to exchanges the frames in the FES.

A – A TXOP and a FES are not the same thing – yes you can have several FES in a TXOP.

C – The more I think about this – the more we should not interpret too much into the Standard. This discussion reminds me that we should remind ourselves what we had in the beginning. The contention free period was used for simple exchanges. I think we should have simple concepts and we used that can be used together. So, control of the WM is done using a set of tools. The discussion about FES and WM control are different and address different aspects of STA behavior.

C – Question regarding the term “currently” what does it mean?

R – It means that there is an ongoing FES which is known.

C – The STA needs to find out what is going on.

Chair – I think I’ve heard 2 or maybe 3 views and we have not reached agreement.

[11-23/0880r7](https://mentor.ieee.org/802.11/dcn/23/11-23-0880-07-0arc-revised-annex-g-containing-example-frame-exchange-sequences.docx) - Harry Bims

C – 10-14 – the FES of FES3 – what does the FES consist of?

A – FES3 – VUT MU PPDU, its BAR, and its BA/Ack.

C – This does not provide of the control of the WM.

C – Clause O is on Frame exchanges not FES.

Recessed 10:00 EDT

# Thursday 13 March 2025 13:30-15:30 h EDT

**Meeting called to order by the Chair at 13:40 EDT**

Agenda slide deck: [11-25/0222r4](https://mentor.ieee.org/802.11/dcn/25/11-25-0222-04-0arc-arc-sc-agenda-march-2025.pptx)

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* **Next steps (slide 22)**

The Chair reviewed the agenda and called for comments and additions.

There were none.

Approved by unanimous consent.

## Annex G way forward – Step 2 (slide 20)

Continue discussion on a “replacement” Annex G

[11-23/0880r7](https://mentor.ieee.org/802.11/dcn/23/11-23-0880-07-0arc-revised-annex-g-containing-example-frame-exchange-sequences.docx) (Harry Bims) – for reference

[11-25/0488r0](https://mentor.ieee.org/802.11/dcn/25/11-25-0488-00-0arc-fes-concepts-and-straw-polls.pptx) Presented by Harry Bims

C- active support by the STAs in the FES is expected, not just not hindering the exchange.

1. That would be a positive step.

[11-25/0193r4](https://mentor.ieee.org/802.11/dcn/25/11-25-0193-04-0arc-frame-exchange-sequence-and-fig-10-14.pptx) Presented by Graham Smith – how many frame exchanges sequence(s) are there?

The author provided a summary of the updated material.

C – Does this align with the SPs of [11-25/0488r0](https://mentor.ieee.org/802.11/dcn/25/11-25-0488-00-0arc-fes-concepts-and-straw-polls.pptx).

A – I was trying to find places where the behavior is restricted, e.g., can’t scan.

C – Slide 13 – issue with the word “current”

Discussion – looking at “the current FES” vs. “a current FES”

C – new language – introducing participation in a FES – there are special rules. STA2 – see a gap in the FES, STA2 is participate in the FES and is aware it can’t do anything else. Separation of WM access and FES are separable.

A – This is an obvious concept.

C – SCAN is kind of unique as it may cause the STA to leave the current channel, and this should not be done during a frame exchange sequence. MLME SCAN is a process – so it really doesn’t matter as frames are not transmitted until they are allowed.

C – So the first sentence should end “scan process”. The restriction of the FES is unnecessary as a busy channel is all that matters.

A – None of this is needed. Supporting ending after “scan process”.

C – A full stop after “scan process” is needed. Is this 1 or 4 windows in a FES, each STA finishes at a different time.

Back to Harry’s SPs

SP1 – differed – WM needs better understanding be for this SP.

SP2 – we don’t have an agreement on what a FES is. We have some agreement on participating in a FES. C – Is it a should or a shall?

C - What about broadcast

SP2 – differed.

SP3 – Mark is this obvious – differed.

SP4 – differed

SP5 – agreed by unanimous consent.

SP6 – differed

## Next Steps (slide 22)

**Contributions requested/expected:**

**Annex G**

**Changes to align with IEEE Std 802 (removal of EPD/LPD, etc.)**

**“Other” (slide 17) – Note: this is the alignment of the “control” MLMEs.**

**L4S discussion if/as needed**

**May session planning**

**3 slots**

**Topics: Annex G, Changes to align w/IEEE 802, “Control” MLME, WBA QoS/L4S liaison follow-up**

**Next Teleconference(s):**

**Mar to May teleconference plan… Any/How many telecons?**

**Conflicts to avoid:**

**Continue with Monday 1PM ET (2 hours) or 2PM ET (1 hour)? Dates to avoid??**

**Will be coordinated with other TG chairs, and announced later**

## Adjourned: 15:33 EDT

Final Agenda: [11-25/0222r5](https://mentor.ieee.org/802.11/dcn/25/11-25-0222-05-0arc-arc-sc-agenda-march-2025.pptx)

Closing Report: [11-25/0498r1](https://mentor.ieee.org/802.11/dcn/25/11-25-0498-01-0arc-arc-closing-report-mar-2025.pptx)