IEEE P802.11
Wireless LANs

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| ARC SC Mixed Mode Minutes September 2024 – Interim |
| Date: 2024-09-12 |
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Abstract

This document contains the minutes of the IEEE 802.11 ARC SC mixed mode meeting held on 9 September July 2024 13:30-15:30 h HST and 12 September 2024 8:00-10:00 h HST.

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 09 September at 13:30-15:30 HST

## Administration:

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

**Vice Chair: Joseph Levy, InterDigital**

**Secretary: Joseph Levy, InterDigital**

**Meeting called to order by the Chair at 13:31 HST**

Agenda slide deck: [11-24/1370r4](https://mentor.ieee.org/802.11/dcn/24/11-24-1370-04-0arc-arc-sc-agenda-september-2024.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)

* **Two meeting slots this week, Monday PM1 and Thurs AM1**
* **Attendance, noises/recording, meeting protocol reminders**
* **Policies, duty to inform, participation rules**
* **Approve meeting minutes (slide 18)**
* **Contribution/discussion topics:**
	+ IEEE Std 802 project (slide 19 (and 20)) – Monday
	+ WBA liaison on QoS, and L4S (slide 21) – Monday
	+ Annex G way forward (slide 22) – Thursday
	+ 802.11 internal work related to IEEE Std 802 updates (slide 20) – where it fits
* **Next steps** (slide 23)

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

Approved by unanimous consent.

## Other ARC Work (slide 17)

The chair reviewed slide 17

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## Approval meeting minutes (slide 18)

Motion to approve the minutes of:

**July plenary:** [**11-24/1021r0**](https://mentor.ieee.org/802.11/dcn/24/11-24-1021-00-0arc-arc-sc-mixed-mode-minutes-july-2024-plenary.docx)

Discussion none.

Result: UC

## IEEE Std 802 project (slide 21)

Joseph Levy presented [11-24/1614r0](https://mentor.ieee.org/802.11/dcn/24/11-24-1614-00-0000-802revc-status-september-2024-update.pptx)

No questions or comments.

**WBA liaison on QoS, and L4S**

Greg White presented [11-24/1617r0](https://mentor.ieee.org/802.11/dcn/24/11-24-1617-00-0arc-overview-of-wba-l4s-implementation-guidelines.pptx)

In addition to IETF REC 9330 one can also look at 9331 and 9332

C – how should we read the data regarding L4S on/off?

C – Is there any feed back in the loop?

A– These are instance with feed back.

Q – On the L4S Test Results 1 – do you buffer?

A – All the buffering is in the sender.

C – If you try to get the last bit of throughput – would the latency to increase?

A – There is no way the sender could know without L4S so slow down to keep the queuing delay down.

C – Won’t Path MTU give you this information.

A – Path MTU will only address fragmentation, and not latency/buffering. The size of the frame is set by the hardware, not the buffer.

C – slide 8 – what is the meaning of driver and chip – is this all implemented in the MAC layer?

A – The intent is that the “chip” is the 802.11 MAC and the driver is the additional MAC support to implement L4S.

C – The driver is added MAC functionality which is added to the 802.11 MAC to allow L4S support?

A – Yes

C – How was the 90%/10% trade off decided?

A – Based on the simulations run the 90%/10% trade off was a sweet spot, to get flow fairness, using a strict priority schedular – if there was not traffic in the classic queue. A handshake must be performed, and this may not work as the packet may never be forwarded. The weight comes in to play when the ratio for L4S to classic flows is exceeded, e.g., greater then 90% L4S.

C – Could this adapted to the type of traffic?

A – Yes it could be, but it doesn’t seem to need to be adjusted – 90/10 seems work fine.

C – the 802.11 TGbn group has been discussion where this buffering needs to be and where is the line between the MAC and driver. The line you are showing between the driver and chip is not clear.

A – The implementation is making this assumption between the driver and the chip, and it seems to work

A – The implementor will be the one deciding how to divide the functions in the implementation. The congestion marking logic is probably not optimal and additional study should be done. There may be opportunities to improve how the marking is done.

C – If you set the 90/10 ratio – do you have to make sure the L4S flows have enough capability.

A – The classic flow will get more than their share of the medium and the L4S may be limited.

C – If there are a 100 classic flows and 1 L4S flow – doesn’t this cause an issue?

A – The coupled AQM – is limiting the classic flow rate – the L4S will limit the L4S flow to that limit. – The coupled flow rate limits the L4S rate to be the same. Not using a strict priority schedular – is the solution to stop the loss of these single packets

C – Is the throughput fairness per flow for classic vs L4S flow or fairness is for aggregate throughput across all L4S flows vs classic flows?

A – per flow

C – slide 19 – Is there is a coupling factor that can be adjusted?

A – Per flow fairness for classic is not perfect. The goal is to balance the flows for fairness – a definition of reasonable fairness being <3:1, is acceptable. Classic flow is very RTT sensitive – so if you have multiple classic flows with one having a short RTT vs a long RTT – there would be a difference in traffic flow.

C – What is the queue management across the flows?

A – If there are only classic flows – it calculates the number of drops and adjusts – there is no scheduler between the queues and there is no attempt to balance the flows or track them.

C – On slide 19 – is the delay for the classic flows also reduced?

A – Yes

C – Is this is because AQM is turned on.

A – Using video or voice traffic – making the EDCF aggressive does not help – we have future work to look at what happens if we set the priorities – this has not been done yet – we could give a flow greater bandwidth.

C – How would this impact the L4S traffic.

A – The L4S can adjust its rate. This is complicated.

C – Past experience working on ACM issues – ACM never worked due to the delay in the feed back. The delay caused problems; it caused oscillation. RTT should be included in the study, and it likely to cause oscillations, as it did in many ACN studies.

A – I don’t think it is fair to say it failed due to oscillation, but it failed due to dropped tail and there is no additional information beyond packet drops. Packet drops are not a good congestion indicator. If it was all oscillation – then this wouldn’t work on the internet as it does today.

C – How do you measure the delay? You reduced the offered load and lowered the delay. But, you are not addressing the throttled packets.

A – we are using TCP – but the more likely application is a real time data – the feed back could also be adjusting the codex rate.

C – But that is at the expense of the picture quality or voice quality – my question is does this have any value?

C – On slide 19 – if you have the thruput – why does the throughput increase as you move to right?

A – It may be the cubic congestion control – the more flows you have the better the performance of the cubic congestion control. I don’t know if I have enough insight to answer why.

C – There is a drop on the classic performance, and it is not just the throughput.

C – QMS dropping reduces the buffer delay.

A – Slide 29 - these are all MCS the TXOP is 2.5ms – but the data rates were different. I don’t remember how many bytes – the information is in the report.

C – Does this relate to this round tip time (RTT)?

Ans – It shouldn’t relate to the RTT – the transmitter is going at a constant rate. This could be studied in more detail.

Slide 31 – summary/key takeaways – there has been no study of the impact of existing tools to reduce MAC delay.

C – Would it be different if the TXOP time was different?

A – Don’t know, it could be looked at.

C – Normally for EDCA the AP is not restricted (it is more flexible) – do both AP and non-AP STAs have the same restrictions? Should they behave differently.

A – We were looking at possibly using different setting for the AP and non-AP STAs

C – It would be good to see this with different AP and non-AP STA parameters.

C – It seems this feedback loop depends on the STAs reporting back to the sender.

Ans - Yes

C – Is there case where the receiver does not send feed back?

A – If the receiver wants to participate in high throughput and low latency – the assumption is that the sender does not send the feedback.

C – There can be a method to mark the packets – but how do we do so?

A – There are many ways the receiver can do nefarious things – e.g., the receiver can request retransmissions. It is in everyone’s best interest to play nice on the internet – but will they?

C – if you are applying the congestion marking on other packets so the feed back is faster.

A – The return path is not necessary the same as the send path.

C – I was considering trying to feedback faster.

A – The feedback is at layer 4.

C – From implementations you have tested and simulations – there seems to be some benefits. However, it is not clear to me what needs to be implemented in TGbn? What is missing in the standards today? What are the gaps?

There was no time remaining in the meeting to answer the question.

Chair – The document is available – please go through it and continue this discussion off-line, on the reflector, or at a future meeting. EDCA optimization seems to be a separate topic.

(19 participants were physically present, and an additional ~32 were present virtually on the Webex)

Recess - 15:32 HST

# Thursday 12 September at 8:00-10:00 HST

## Administration:

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

**Vice Chair: Joseph Levy, InterDigital**

**Secretary: Joseph Levy, InterDigital**

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

Agenda slide deck: [11-24/1370r6](https://mentor.ieee.org/802.11/dcn/24/11-24-1370-06-0arc-arc-sc-agenda-september-2024.pptx)

Agenda Slides 4-15:

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## The Chair reviewed that approved Agenda (Slides 16)

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

Approved by unanimous consent.

## Annex G way forward (slide 22)

[11-23/0880r3](https://mentor.ieee.org/802.11/dcn/23/11-23-0880-03-0arc-revised-annex-g-containing-example-frame-exchange-sequences.docx) (Harry Bims) –

Harry reviewed the contribution.

C – Thanks, this is a lot of work and is interesting. For example, lets take the first STA in a BA that is done can go off and do something. As long as that STA doesn’t transmit on that channel. It is very wordy, I’m not sure how to improve. The layout may need to change.

A – this work is not trying to define the behavior; it is describing what is possible based on the normative text. Any changes to the normative behavior would require changes to the normative text, not this annex. This is just a description on what is possible.

C – On the bottom of page 9, “note however …” is important , may be this should be moved forward. The requirement to follow the NAV must be respected.

A – Different beams are different WM.

C – Well that is really not clear.

TXOP, NAV, frame exchange sequences, frame exchanges, BA were discussed. Also, the difference of frame exchanges and frame exchange sequences.

Way forward – continue to work the new annex G – and then generate a tutorial on FES for the WG.

Chair called for review of the document and comments, and off-line discussion to continue the work.

## 802.11 internal work related to IEEE Std 802 updates (slide 20)

It is looking like IEEE Std 802 is nearing completion and the 802.11 specification should be aligned with updated descriptions in IEEE Std 802:

* LPD and EPD has been removed, so we should probably remove them from 802.11.
* 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’s 1. But there are multiple transmitters, in parallel.
* What if we make the DS a bridge (small ‘b’)?

A reference on VLANs in 802.11: [802.11-08/0114r2](https://mentor.ieee.org/802.11/dcn/08/11-08-0114-02-0wng-segregated-data-services.ppt).

The Chair called for review and contributions to address these issues.

## Next Steps (slide 25)

L4S discussion way forward/plan?

Contributions requested/expected:

Annex G

Anything on 802REV?

QoS/L4S topic – one teleconference

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

“Other” (slide 17)

Nov session planning

1 or 2 slots? 2

Topics? Annex G, 802REVc, WBA QoS/L4S liaison follow-up, “Other” (slides 20 & 17)

Next Teleconference(s):

Sept to Nov teleconference plan… Any/How many telecons? 1 to be announced.

## Adjourned: 9:58 HST

Final Agenda: [11-24/1370r7](https://mentor.ieee.org/802.11/dcn/24/11-24-1370-07-0arc-arc-sc-agenda-september-2024.pptx)

Closing Report: [11-24/1637r0](https://mentor.ieee.org/802.11/dcn/24/11-24-1637-00-0arc-arc-closing-report-sep-2024.pptx)