IEEE P802.11  
Wireless LANs

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| ARC SC teleconferences minutes 26 April 2021 | | | | |
| Date: 2021-04-26 | | | | |
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Abstract

This document contains the minutes of the IEEE 802.11 ARC SC teleconference held on 26 April 2021 at 13:00-15:00 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 26 April 2021, 13:00-15:00 h ET

## Administration:

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

**Vice Chair: Joseph Levy, InterDigital**

**Secretary: Joseph Levy, InterDigital**

**Meeting called to order by the Chair 13:02 ET**

Agenda slide deck: [11-21/0725r0](https://mentor.ieee.org/802.11/dcn/21/11-21-0725-00-0arc-arc-sc-agenda-apr-26-2021.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.

**Participation:**

The chair reviewed the participation policy.

**Approval of the Agenda:**

* **Attendance, noises/recording, meeting protocol reminders**
* **Policies, duty to inform, participation rules**
* **Annex G way forward contribution/discussion:**
  + **Remove Annex G –** [**11-21/0578r0**](https://mentor.ieee.org/802.11/dcn/21/11-21-0578-00-0arc-obsolete-annex-g.docx) **– Graham Smith**
  + **Replace Annex G with some other notation/style –** [**11-21/0414r2**](https://mentor.ieee.org/802.11/dcn/21/11-21-0414-02-0arc-draft-examples-of-a-proposed-notation-for-frame-exchange-sequence-sequences-in-annex-g-of-802-11-2020.docx) **– Harry Bims**
  + **Limit the scope of Annex G?**
* **Do we have enough information to make a decision?**
* **Next Steps**

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 without comment.

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

## Contributions:

**Remove Annex G –** [**11-21/0578r0**](https://mentor.ieee.org/802.11/dcn/21/11-21-0578-00-0arc-obsolete-annex-g.docx) **(**[**11-21/0433r1**](https://mentor.ieee.org/802.11/dcn/21/11-21-0433-01-0arc-obsolete-aneex-g.docx)**) – Graham Smith**

**Replace Annex G with some other notation/style –** [**11-21/0414r2**](https://mentor.ieee.org/802.11/dcn/21/11-21-0414-02-0arc-draft-examples-of-a-proposed-notation-for-frame-exchange-sequence-sequences-in-annex-g-of-802-11-2020.docx) **– Harry Bims**

These contributions have been discussed, but not fully reviewed. Neither of the authors are on the call.

No one volunteered any discussion points.

Limit the scope of Annex G?

Also, reviewed the SP slide 17 – to review the possible “resolutions”.

The group was split on which way to progress.

C – Limiting the scope of annex G – looks like it will be a complicated task. Adding some statements at the beginning stating what types of STAs the annex applies to, does not seem possible. There are problems in VHT, HE, and there are anticipated issues with EHT (be). Trying to make statements saying it doesn’t apply to the VHT/HE/EHT, but it doesn’t seem practical. It is also possible converting the annex to a table could be useful, but that looks like a heavy lift.

C – Was the ax amendment included this evaluation?

C – Annex G is incomplete for the ax amendment, but some content was added. The status is currently being reviewed. This review may generate a contribution for the Interim Session, next week.

Harry Bims – joined the meeting and reported his status on [11-21/0414r2](https://mentor.ieee.org/802.11/dcn/21/11-21-0414-02-0arc-draft-examples-of-a-proposed-notation-for-frame-exchange-sequence-sequences-in-annex-g-of-802-11-2020.docx): No additional work has been done as agreed at the last meeting. Until we have clarity on the preferred direction, I will not do any more work. The contribution is twofold: 1) there is too much detail in the current annex G and 2) the detail forces complex notation/style which complicates the annex, making it difficult to maintain and understand.

General agreement that ARC should clarify its scope and clarify the preferred direction before more work is done.

Chair – ARC left-off getting into the latter part of your document – where you have sequences that are a whole feature set up exchanges. Providing a full process. Do you intend to go to that level for all features?

R – It is important to provide this information. It should provide the information to refer the reader to where the exchanges are. It will continue to be normative, but not to the level of detail currently in Annex G in the current specifications.

C – Annex G should be restricted to SIFs and PIFs exchanges – channel access related procedures. We could re-name Frame Exchange sequences as SIF sequence.

It is very complicated. This is the way we maintain control of medium access – it would become related to frames that must follow each other.

Chair – Picking up what Graham has done. We should deal with the SIFs separated or not interrupted exchanges. While having an introduction for the novice is useful, there is a difference regarding what a SIF separated frame exchange is and an exchange of frames that rely on contention to gain channel access. The specification should be clear what type of frame exchange is being described.

C – Frame exchange sequences are not interruptible, and they are defined that way. There are other frame exchanges, but these are not frame exchange sequences, they are just an exchange of frames.

C – There are a lot of interdependencies – and the interdependencies will come to light if we do the work.

C – The use is maintaining control of the medium – it is true that not just SIFs is used to maintain control – under HCCA – the frame sequences – also, a SIFs separated exchange of frames is not necessarily a frame exchange sequence. GAS uses the term – but the GAS frame exchanges are not uninterruptable. Maybe having a go at defining a term “frame exchange sequence”.

Chair – there seems to be a general agreement in the document. Graham has tried to define what a frame exchange sequence and also that there are some frame exchanges.

C – The spec must have a clear definition – frame exchange sequences are used in the normative text –this is a Rev me discussion.

Chair – Anything that ARC does will be a recommendation to TGme.

C – I think the definition should go into the definitions section and not in Annex G.

Chair – There are multiple steps here: 1) need to decide what the definition should be, 2) then check the normative use of the term. This would separate the non-interruptible exchanges for the interruptible ones. If the non-interruptible exchanges can be defined outside of annex G, then annex G can be made to be informative.

C – Frame exchange sequences are a way to maintain control of the channel and PS does not change. The exact sequence of frames is important – for a TXOP. We should separate the two cases. Where a frame exchange sequence is occurring between two STAs – without referring the exact exchange. The rule around how frames are sequenced to maintain control of the media or PS state.

C – The specification uses the term differently and there is no specific definition. Once we have definition it would be useful to provide them in one location.

C – A generic definition – if it is a sequence of frames that is exchanged with SIFs – we could provide a definition to do this. As to annex G itself – in DNG and combinations in there – to be comprehensive – the way Annex G is written what can possibly be the next frame. While this is interesting, it will not serve a real purpose. The specification needs to provide defined flows – will annex G be a catchall or reset function. Annex G could provide descriptions of sequences that are of interest – but the main sequences not the corner case sequences. If there is one that is multiple frames – it could be described.

Mark – When the medium releases is important – so describing these sequences is important.

C - First cut definition: frame exchange sequence: A sequence of frames exchanged between two STAs where the frames either solicit an immediate response from the other STA or are the response to a frame that solicited an immediate response. A frame exchange sequence is carried in a sequence of SIFS separated PPDUs that might include a PPDU that does not carry any frames (e.g., an NDP PPDU).

Chair – This seems to be in the right direction. I think we should start with Graham’s document.

C – One challenge that we have had is what is a frame.

C – A frame is defined it is an MPDU. The use of the word frame in the PHY has been removed.

Question – Do we use frame to MSPDU?

Question – Is an NDP a frame?

C – We mean MPDUs or NDPs and MMPDU is a type of MPDU. An MMPDU can be broken into several MPDUs.

C – The PPDUs are SIF separated, not the MPDUs - This is critical in PS – as you don’t change changes the PS mode during a frame exchange sequence.

C - There is also the PIFs issue. Using SIFs as part of the definition seems difficult.

Question – During a TXOP is there only one frame exchange sequency or more than one?

There was some agreement on more than 1 frame exchange sequency in a TXOP is possible.

C – MU stuff – should be ok. These are frame exchange sequences.

C – Now that we seem to be moving away of the PHYs – we should move away from PHY characteristics (e.g., SIFs) as part of the definition.

C – The exchange is limited and is limited to a timed response.

C – We don’t need to discuss the PHY limits only the uninterruptible nature of the exchange.

C – There are exchange of frames – but these are not a frame exchange sequence.

Question – Is a fragmented MSDU a frame exchange sequence?

C – A fragmented MSDU is a burst of data frames – that are acked and is a frame exchange sequence. In annex G there are single frames that are broadcasted, which are listed. A beacon is a frame exchange sequency.

It was noted that there is a remnant of delayed block ACK – but most of it is removed in TGmd.

Question – Is error recovery a frame exchange sequence? Plus PIFs – HCCA – is it an issue? Also, dual CTS stuff?

C – It is doable with SIFs.

C – Recovery (PIFs error) is not a frame exchange sequence.

Chair – Since we seem to be aligned – as a direction we should look at Graham’s document – work to get a definition. Once the definition is clear, then the specification needs to be fixed where it is used, and then we can “fix” Annex G.

C – If the specification doesn’t try to define what is happening at the physical layer – these sequences are easier to explain.

C – Agreeing, with starting with Graham’s thoughts and working to a definition and then we will remove the use of annex G from for defining the sequences – then annex G can be informative and just say what to send and in what order.

C – Annex G has been become inaccurate – for ac slightly, more so for ax and ad/ay – so it is incomplete. Specification of channel access and PS need the concept of frame exchange sequences – therefore there should be a definition of frame exchange sequences, as it is necessary for the behavior to know what not to interrupt.

C – Harry’s thing is something we should do but it is not normative but informative.

C – The critical thing is that “frame exchange sequence” was defined in Annex G- once we define it elsewhere is there a need for Annex G?

“Frame exchange sequences” – is two terms: Currently we have a frame exchanges as defined in Annex G and we have a “new term”. So, we have: 1) how you maintain control of the media and 2) what sequence you send frames in.

Agreement – that separating these two types will work.

Will continue the discussion on the reflector – towards resolution of a definition and Graham’s documents.

## Next Steps:

**Upcoming Teleconferences:**

* **TGbe concepts**
  + April 29: 19:00 ET, 2 hours
* **May interim**
  + **Monday May 10, 13:30 ET**
  + **Wednesday May 12, 11:15 ET**
* **Contributions requested/expected:**

## Adjourned: 14:30 h EDT

**Attendance:**

| **Name** | **Affiliation** |
| --- | --- |
| Au, Kwok Shum | Huawei Technologies Co., Ltd |
| Bims, Harry | Bims Laboratories, Inc. |
| Derham, Thomas | Broadcom Corporation |
| Hamilton, Mark | Ruckus/CommScope |
| Hervieu, Lili | Cable Television Laboratories Inc. (CableLabs) |
| Levy, Joseph | InterDigital, Inc. |
| Montemurro, Michael | Huawei Technologies Co., Ltd |
| Palayur, Saju | Maxlinear Inc. |
| Petrick, Albert | Jones-Petrick and Associates, LLC. |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Stacey, Robert | Intel Corporation |
| Stanley, Dorothy | Hewlett Packard Enterprise |
| Torab Jahromi, Payam | Facebook |
| Wang, Lei | Futurewei Technologies |