IEEE P802.11  
Wireless LANs

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| ARC SC teleconferences minutes 21 June 2021 | | | | |
| Date: 2021-06-21 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Joseph LEVY | InterDigital Communication, Inc. | 111 W 33rd Street New York, NY 10120 | +1.631.622.4139 | [jslevy@ieee.org](mailto:jslevy@ieee.org) |
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Abstract

This document contains the minutes of the IEEE 802.11 ARC SC teleconference held on 21 June 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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# Thursday 21 June 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 13:03 ET**

Agenda slide deck: [11-21/0996r1](https://mentor.ieee.org/802.11/dcn/21/11-21-0996-01-0arc-arc-sc-agenda-jun-21-2021.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.

**Core Principles:**

The Chair reviewed the IEEE Core Principles.

**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:**
  + **Current plan:** 
    - **Replace any references in main body text (to Annex G or “frame exchange sequence” in various spellings) with normative text in-place, add definition(s), etc.**
    - **Create a new and more useable Annex G with a friendly notation/style and cross-references to main body text for technical details – make it more of an introduction/overview of 802.11 frame exchanges**
  + **Obsolete Annex G, part 2 -** [**11-21/0921r1**](https://mentor.ieee.org/802.11/dcn/21/11-21-0921-01-0arc-obsolete-annex-g-part-2.docx) **– Graham Smith**
  + **Divorce frame exchange/Annex G -** [**11-21/0833r1**](https://mentor.ieee.org/802.11/dcn/21/11-21-0833-01-0arc-frame-exchange-sequence-annenx-g-divorce.docx) **– Robert Stacey**
  + **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**

The Chair reviewed the agenda and called for comments or amendments to the agenda.

No amendments were provided.

The proposed agenda was accepted without objection.

## Contributions:

Chair - We are still trying to sort out the definition of “Frame Exchange Sequence”

**Obsolete Annex G, part 2 -** [**11-21/0921r1**](https://mentor.ieee.org/802.11/dcn/21/11-21-0921-01-0arc-obsolete-annex-g-part-2.docx) **– Graham Smith**

Graham presenting – r1 added the results from the discussion on the June 3 meeting. Looking to define a definition for a frame exchange sequence, then we can unlink the definition from Annex G.

The document provides a summary of June 3 discussions, on TXOP and why do we need a definition of a Frame Exchange Sequence.

There is a new “Strawman proposal” on page 5.

C – A frame exchange sequence is between two STAs – but a TXOP is not restricted to a pair or STAs. A frame exchange sequence could end without a back-off procedure – especially during a TXOP, as when the exchange ends and a new exchange between two different STAs begins without a back-off procedure.

R – This is why I tried to define all the cases.

Chair – last time we went round and round on trying to define when the frame exchange sequence ends in a TXOP.

C – A TXOP as a time reserved of the WM that is controlled by a STA. A frame exchange sequence is something solicited between two STAs and it ends when the soliciting stops.

A – on page 2 – discussing 4-way handshake as a test case.

C – These exchanges of frames are not frame exchange sequences. E.g. a 4-way handshake or GAS exchange. The sounding exchange, NDPA, and NDP are frame exchange sequences.

C – What was wrong with the immediate exchange definition.

A – What is meant by an immediate response is not well defined.

C – It was intuitive enough. There are many frame exchanges that have immediate responses. But, there is no clear definition of what an immediate response is.

Chair – a sequence of fragments was a challenge. How is it described.

C – For a sequence of fragments the trigger is the more bit. It is fragment/fragment/fragment followed by an ack reply.

Some discussion on this, people think it is fragment ack fragment ack.

Agreement All the fragments are ACKed.

C – The concept of soliciting is clear. The third party is not important. A frame exchange sequence may be protected.

C – For the fragment burst sequence, how the duration field is set?

C – The requirement is to set the NAV to cover the ACK – or till the beginning of the next fragment.

C – Is this concept of protection is important for the definition? The frame exchange sequence is independent of the protection.

C – Aren’t fragment sent over multiple frames?

C – A MAC frame is an MPDU.

C – MAC Frame is synonymous with MPDU

C – There are also PHY frames.

Some discussion on how fragmentation is used – the advantages of rety, ext. and partial reception.

C – This discussion explains why the “immediate response” was removed from the definition.

Additional discussion of the fragmentation regarding it being a frame exchange sequence.

A – Going back to the list of frame exchanges in the document.

A successful transmission – is a frame exchange sequence.

Regarding a TXOP – there may be more than 1 frame exchange sequence in a TXOP.

Regarding protected by a NAV, is that does not seem to be an adequate requirement to define a frame exchange sequence.

C – The initiator is not free to do something else with a peer until the frame exchange sequence completes.

Discussion of NAV – and a statement that NAV is not what defines a frame exchange sequence.

A – NAV is used with the RTS/CTS.

C – Is a frame exchange sequence SIFs separated in all cases or is it only particular cases.

Chair – This should be looked at top down and not bottom up, is frame exchange sequence different than a TXOP.

A – What is the purpose of defining it.

Chair – PS and other things like that use it as a restriction for changing state and it is a sequence that the transmitter should not interrupt.

Why can’t the receiver interrupt it? The receiver can’t start a new reception with the peer until the frame exchange sequence completes.

C – There is no guarantee that the sequence will complete.

C – Therefore, the initiator cannot do anything else until the sequence completes with the peer?

C – Fragment transmission – it was defined before QoS.

Chair – we are converging on a definition - a frame exchange sequence is a sequence between peers that must complete before changes in “configuration” is allowed (e.g.; PS).

10.23.2.3 “the completion of a frame exchange sequence, such as …

10.23.2 has many references to frame exchange sequences.

Note: ANEXX G came in in 2012.

So its not just PS state, there is behavior that is defined in a TXOP.

It is also used in multi-frame transmission. Figure - 10.25 and related.

Chair – Should we have a reserved term for frame exchange definition?

Looking back to 2007 – frame exchange sequence was defined in 9.12. – there are 72 references - So frame exchange sequences have been around a long time.

C – Proposing using SIF separated frame exchange sequence where it should be used and frame exchange sequence where SIF separation is not used.

Chair – Is a TXOP one long SIFs separated frame exchange sequence.

C – What comes first – NAV protection or frame exchange sequences.

A: quoting – G.2

C – But G.2 doesn’t cover fragmented packets.

Chair – We have unpacked two different concepts:

1. Frame exchange sequence is the consistency of shared sate between the peers – that the “shared state” can’t change until this exchange completes.
2. Control of the WM is something else.

C – Control of the WM is a TXOP thing.

C – These concepts seem to be confused in the spec and should be separated.

C – Only one MSDU can be fragmented at any time, per 11ax. But ax soften this requirement some.

C – There are requirements that frame exchange sequences must complete before channel changes can be made.

A – Moving back to the definition:

The problem is when you remove the SIFs from the definitions. It will be very difficult to define this.

But, it is not just that it is SIF separated.

C – Looking back at books and papers that discuss frame exchange sequences the definition is: Two stations transmitting data frames, with SIF separation and ACKs. Which is a basic exchange sequence. But, today it is more complex.

Frame exchange sequence: A sequence of frames exchanged between two specific STAs, during which the STAs share unchanging state information about their common link, such as power save state, channel and band, etc.

## Next Steps:

Remind everyone – our next call is at the plenary.

There are ARC discussion in the TGbc meetings.

* **Upcoming Teleconferences:**
  + **Annex G**
    - **July plenary**
  + **TGbe multi-link architecture topic**
    - **July plenary**

Note TGbc architecture discussions, ongoing

Contributions requested/expected:

## Adjourned: 15:00 h ET

## Attendance:

| **Name** | **Affiliation** |
| --- | --- |
| Bajko, Gabor | MediaTek Inc. |
| Hamilton, Mark | Ruckus/CommScope |
| Levy, Joseph | InterDigital, Inc. |
| NANDAGOPALAN, SAI SHANKAR | Infineon Technologies |
| Petrick, Albert | Jones-Petrick and Associates, LLC. |
| Rolfe, Benjamin | Blind Creek Associates |
| Rosdahl, Jon | Qualcomm Technologies, Inc. |
| Smith, Graham | SR Technologies |
| Stacey, Robert | Intel Corporation |
| Stanley, Dorothy | Hewlett Packard Enterprise |
| Torab, Payam\* | Facebook |

\* Added based on Webex participants list.