IEEE P802.11
Wireless LANs

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| “Annex G (part 2)”  |
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Abstract

Look at defining Frame Exchange Sequence that does not reference ANNEX G

Rev 1 – Added results of discussion on June 3

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| At first look, it may seem obvious that we must keep Annex G as it meticulously defines all the packet exchanges and is normative, but there are consequences.“***frame exchange sequence*:** A sequence of frames specified by Annex G”Hence, any sequence of frames not in Annex G is not, on the face of it, a valid sequence. In Draft D0.0 “frame exchange” 309 instances, of which “frame exchange sequence” 128“valid response” 4 instances“frame sequence” 23 instances“see Annex G” 5 instances“in Annex G” 9 instancesIf we can remove “Annex G” from the definition, then it all gets easier. We could keep Annex G, or remove it, but let’s first see if we can agree on a correct definition for “frame exchange sequence”.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_What exactdISCUSSION ON June 3ly is a “frame exchange sequence”? In G.2. Basic Sequences, “Except where modified by the *pifs* attribute, frames are separated by a SIFS or RIFS.”Hence, “frame exchange sequences” appear to be a sequence of frames separated by an IFS.Note the definition of “successful transmission”***successful transmission***: A transmission and the reception of its expected immediate response or a transmission for which no immediate response is expectedThe only thing missing is “sequence”. For example, consider a TXOP where we can have a succession of data/ACK exchanges, all seperated by SIFS. Is this a series of “successful transmissions” rather than one successful transmission? I think it is. So *frame exchange sequence =* several *successful transmissions***Consider the 4-way handshake**. This is a *frame sequence,* i.e., a sequence of 8 or more frames, that consists of 4 *frame sequence exchanges* OR four *successful transmissions*. IS THAT RIGHT? Can we agree on the use of the terms? In this case, *successful transmission = frame exchange sequence*In case of TXOP, that is not true. What is a frame sequence? (Note these are not formal definitions, I am just trying to see if we all understand their usage)***Frame sequence***: a sequence of frames sent to make something happen, e.g. 4 way handshake, umpteen figures with “frame exchange” in the title. A succession of frames in some order, BUT although each frame may have an immediate response frame (e.g., ACK), each ‘request’ frame may come after a back off.What is a “**Frame exchange sequence**” **?**It needs to get across the concept of “immediate response”, where “Immediate response” means RIFS, SIFS, PIFS or DIFS between frames/packets, including, for example, TXOPs (EDCA and HCCA), and RTS/CTS exchange before data packetsSuggested definitions:Explicit definition as proposed by Robert:***frame exchange sequence***: A frame that is not an immediate response and that does not solicit an immediate response or a sequence of frames exchanged between two STAs where each frame in the sequence is addressed to the other STA and either solicits an immediate response from the other STA or is the response to a frame from the other STA that solicits an immediate reponseMy only problem with this is “immediate response” and “response to previous frame. In a TXOP is the next data frame a response to the preceeding data/ACK? Simple (builds upon the *successful transmission* definition)***frame exchange sequence –*** A successful transmission or a sequence of exchanged frames, each frame seperated from the previous frame by an IFS***.***It is accurate but DIFS can occur even with back-off.***frame exchange sequence –*** A successful transmission or a sequence of exchanged frames that ends when a backoff procedure is required.I think this is getting close. *Successful transmission* covers the single frame and request / immediate response and frame exchange sequence ends when a backoff procedure takes place.MAYBE, ***frame exchange sequence***: A successful transmission or a sequence of frames exchanged between two STAs which ends when a backoff procedure takes place.Before continuing, I suggest we get agreement on a new definition for “frame exchange sequence” |  |  |  |  |  |  |
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Proposals considered and discussed at ARC meeting 6/3/2021

***frame exchange sequence***: A successful transmission or a sequence of frames exchanged between two STAs which ends when a backoff procedure takes place.

***frame exchange sequence***: A successful transmission or a sequence of frames exchanged between two specific STAs which is protected by a Duration field.

Note: *A TXOP is a frame exchange sequence or a number of parallel frame exchange sequences in the case of MU transmissions.*

***frame exchange sequence***: A successful transmission or a sequence of frames that are protected by a Duration field.

Note: *A TXOP is a frame exchange sequence or a number of parallel frame exchange sequences*

Note:

***successful transmission***: A transmission and the reception of its expected immediate response or a transmission for which no immediate response is expected

**transmission opportunity (TXOP):** An interval of time during which a particular quality-of-service (QoS)

station (STA) has the right to initiate frame exchange sequences onto the wireless medium (WM).

NOTE—A TXOP is defined by a starting time and a maximum duration.

**transmission opportunity (TXOP):** An interval of time during which a particular quality-of-service (QoS)

station (STA) has the right to initiate a frame exchange sequence or a number of parallel frame exchange sequences onto the wireless medium (WM).

NOTE—A TXOP is defined by a starting time and a maximum duration.

DISCUSSION June 3, 2021

**How closely linked are “frame exchange sequence” and TXOP?**

Points:

1. A “standard” TXOP between two unique STAs, is a frame exchange sequence.
2. TXOP MU
	1. Is the TXOP duration protected?
	2. Is it a number of frame exchange sequences in parallel?
	3. Is it a series of frame exchange sequences?
	4. Is it a series of frame excahange sequences in parallel?
	5. Does it matter which way we define it?

**What is the purpose of defining “frame exchange sequence”?**

1. **Power save**:

We have the rule that the Power Save status cannot be changed during a frame exchange sequence.

Pretty sure MU TXOP is not in Annex G, so nothing in Spec to say if power save status can change during such a TXOP.

Specifying that an MU TXOP is a number of frame exchange sequences in parallel would clearly say no STA should change power save status during a TXOP or an MU TXOP. Does that break anything?

1. **A sequence of frames that are not to be interrupted by a third STA**

A sequence of frames protected by a Duration field.

* + Works for a data/ACK, data/BA,
	+ Works for RTS/CTS/data/ACK – duration field counts down
	+ Works for a TXOP – duration field counts down.
	+ In a way works for a single packet as duration is set to zero
1. **Any other reason?**

“Valid” exchanges?

**Maybe combine all the thoughts:**

PROPOSAL

***frame exchange sequence***: A successful transmission, a sequence of frames exchanged between two specific STAs which ends when a backoff procedure takes place, or a sequence of frames exchanged between two specific STAs which is protected by a Duration field value.

Note: *A TXOP is a frame exchange sequence or, in the case of MU transmissions, a number of parallel frame exchange sequences.*

*And*

**transmission opportunity (TXOP):** An interval of time during which a particular quality-of-service (QoS) station (STA) has the right to initiate a frame exchange sequence or a number of parallel frame exchange sequences onto the wireless medium (WM).

NOTE—A TXOP is defined by a starting time and a maximum duration.