IEEE P802.11
Wireless LANs

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| Resolutions for CIDs 8055 and 8170 |
| Date: 2016-07-15 |
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Abstract

This submission proposes resolution for CID 8055 8170

Green indicates material agreed to in the group,

yellow material to be discussed, red material rejected by the group and

cyan material not to be overlooked.

The “Final” view should be selected in Word.

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| Identifiers | Comment | Proposed change |
| CID 8055Mark Rison11.2.2.61585.20 | Can EOSP be signalled in a frame that does not require an ack, in U-APSD?  (See CID 7592.)  This would be a bad idea, as it would mean the non-AP STA would be left hanging if it missed that one transmission, but on the other hand it probably has to be allowed both for backward compatibility and for corner cases (e.g. AP only as no-ack traffic to transmit in that SP) | At the end of step h or step j add "The AP should not set the EOSP field to 1 in a frame that is not an individually addressed Data frame that requires acknowledgment." |

Discussion:

h) The AP considers an APSD STA to be in awake state after it has sent a QoS +CF-Ack frame, with the EOSP subfield in the QoS Control field equal to 0, to the APSD STA. **If necessary, the AP may generate an extra QoS Null frame, with the EOSP set to 1**. When the AP has transmitted an individually addressed frame to the STA with **the EOSP subfield set to 1** during the SP except for retransmissions of that frame, the AP **shall not transmit any more frames to that STA** using this mechanism until the next SP. The AP shall set the **EOSP subfield to 1 to indicate the end of the SP** in APSD.

j) If the AP does not **receive an acknowledgment to an individually addressed Data frame** that requires acknowledgment and **that is a non-A-MPDU frame** containing all or part of an MSDU or A-MSDU sent **with the EOSP subfield equal to 1**, it shall retransmit that frame at least once within the same SP, subject to applicable retry or lifetime limit. The maximum number of retransmissions within the same SP is the lesser of the maximum retry limit and dot11QAPMissingAckRetryLimit. If the AP does not **receive an acknowledgment to an individually addressed Data frame** that requires acknowledgment and that is not the initial attempt in this SP to send a frame w**ith the EOSP subfield equal to 1,** it may retransmit that frame in the next SP, subject to applicable retry or lifetime limits. An AP that transmits an **A-MPDU containing Data frames in which the EOSP field is equal to 1** and that receives a BlockAck frame that does not acknowledge all of those MPDUs should not transmit any missed Data frames within the current service period because the destination STA might now be asleep.

The commenter is right that is a bad idea to set the EOSP in a frame that does not get ACK’d and for U-APSD to work, it seems essential that the ACK is sent.

True the standard does have the option of No ACK policy set in the QoS Control field. In view of the description in 10.25 it would certainly not be good to use it with U-APSD and it should have been positively stated that it should not be used with U-APSD.

***10.25 No Acknowledgment (No Ack)***

*When a QoS Data frame is transmitted with the Ack Policy subfield set to No Ack, there is no MAC-level recovery, and the reliability of this traffic is reduced, relative to the reliability of traffic with other acknowledgment policies, due to the increased probability of lost frames from interference, collisions, or timevarying channel parameters. A protective mechanism (such as transmitting using HCCA, RTS/CTS, or the mechanism described in 10.26 (Protection mechanisms)) should be used to reduce the probability of other STAs transmitting during the TXOP.*

I wonder if the “that requires acknowledgment” phrase is something that was put in for the wrong reason.

“If the AP does not receive an acknowledgment to an individually addressed Data frame that requires acknowledgment…”

Mark R opined that it was put in because previously the text wrongly assumed you always got an acknowledgement to an individually addressed Data frame. That is exactly what I am getting at, corrected the wrong thing, it should have been made clear that No-Ack should not be used with U-APSD not that a No Ack was possible. It should be clear that using No-Ack with U-APSD is clearly wrong, as the commenter points out.

WAIT it is not in 802.11 – 2012. Hence there is a good case, in my mind, that we could make it mandatory not to use No-ACK?

I note that the original text was to a “**directed frame**”.

“When the ( ) AP has transmitted a **directed** frame to the STA with the EOSP subfield set to 1 during the SP except for retransmissions of that frame.”

And

 “If the ( ) AP does not receive an Ack to a **directed** MSDU sent with the EOSP subfield set to 1, it shall retransmit that frame at least once within the same USP”

So what was meant by directed? Seems quite clear, addressed to a non-AP STA. Mark R says, “No, I think “directed” was used to mean “unicast”/”individually addressed” which actually is what I was trying to say. So I agree, but it does have a feeling of “I’m really sending you this, directing it to you, and I expect an ACK”. True no mention of Ack policy but I am making a point here.

But an interpretataion of this is that even if the ACK policy is set to no-ack, strickly the packet is retransmitted, it is an individually addressed packet – now that is obviously silly, hence the addition of the “that requires acknowledgment” but for me the original intention was clear, that the founding fathers (and mothers) of 11e did not intend QoS No Ack to be used with U-APSD but now we are explicitly condoning it. Where, for example is the text to say what to do if EOSP set for no-Ack MPDU? Is it sent once and then assume STA sleeps, sent twice to make sure…?

So at the end of all that, I totally agree with the commenter but I would dearly love to make the use of QoS No Ack not allowed for U-APSD as I am convinced that that was, is, the intention?

OK so basically I agree with the proposed change and suggest inserting at end of h). OPTION A

But I would also like to try the bolder resolution. OPTION B

 No objections to Option A but some rervations on B. Hence A adopted.

**Proposed Resolution**

REVISED (This resolution is essentially as proposed by the comment)

P1585.11 Insert at end of h), new paragraph

“The AP should not set the EOSP field to 1 in a frame that is not an individually addressed Data frame that requires acknowledgment”.

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| Identifiers | Comment | Proposed change |
| CID 8170Mark Rison10.3.4.31293.18 | What does "CWindow" indicate in Figure 10-15, exactly?  It seems to be some kind of fixed period after DIFS for any station that just transmitted a frame, but no such period exists.This comment, as CID 7788, was rejected on the basis that "The Cwindow is there to indicate the presence and use of the contntion window in the backoff procedure." but the term "contention window" is not clearly defined anywhere in the spec (the only things that are described are the "contention window limits" and the "contention window parameter", not what a "contention window" actually \*is | Delete "CWindow" from Figure 10-15, including the key |

Discussion:

First of all I note that the term “CWindow” is horrible. It should be “CW” as defined in 3.4.

Is contention window (CW) really not defined anywhere?

P72.48 (MR – “Uses but does not define”)

*This differentiation is achieved by varying the following for different UP values:*

*— Amount of time a STA senses the channel to be idle before backoff or transmission, or*

*—* ***The length of the contention window to be used for the backoff****, or*

*— The duration a STA transmits after it acquires the channel.*

1264.48 Rules for HCF contention ( MR “Defines CWmin but not what CW is”)

*The* ***contention window limits*** *aCWmin and aCWmax, from which the random backoff is computed,*

1290.41

Backoff Time = Random() x aSlotTime (10-1)

where

Random() = Pseudorandom integer drawn from a uniform distribution over the interval [0,CW], *CW is an integer within the range of values of the PHY characteristics aCWmin and aCWmax, aCWmin ≤ CW ≤ aCWmax*. It is important that designers recognize the need for statistical independence among the random number streams among STAs.

*The contention window (CW) parameter shall take an initial value of aCWmin.*

Indeed 52 instances of CW would hopefully explain its use but as MR notes nothing that defines it as such. But it is explained in detail.

I contend, based on 1290.41 (10-1) that i**n fact, CW or contention window is the time of the backoff in units of aSlotTime**. Do we need to have this stated independently – maybe a good idea.

So, now to the figure, there appears to be no explanation given anywhere in text that addresses the Fig 10-15 directly.



The intention is as follows:

Station A has just transmitted a frame, so it performs the backoff procedure (even though no additional transmission is due (P1293.22).

Stations B, C and D are waiting until Station A has finished transmitting. They all three select a “backoff” time based upon the CW parameters. Station C wins and transmits, causing Stations B and D to show “Remaining backoff”. This is the time passed on to after the next DIFS, and then to the next DIFS after that for Station B.

So, is the term “CWindow” apprearing above 4 of the 11 “Backoff” time misleading? (Assuming that it should be “CW”). Yes I think it can be improved.

**Proposed Resolution**

REVISED

At P 1293.3 In Figure 10.15 make the following changes (see below):

Delete “CWindow” from the figure including the key.

Delete “Backoff” from Station B row.

In the key, replace “Backoff” with “Backoff (CW)”

AND

Add at 1290.51 “The contention window (CW) parameter is the Backoff Time in units of aSlotTime.”

