IEEE P802.11  
Wireless LANs

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| Resolution for CID 1347, | | | | |
| Date: 2018-04 | | | | |
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Abstract

This submission proposes resolutions for CID 1347

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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| CID | Commenter | Clause | Page | Line | Comment | Proposed |
| 1347 | Mark Rison | 10.3.4.3 | 1607 | 40 | 10.3.4.3 (Backoff procedure for DCF) says (paragraph 5) [context:backoff suspended when medium busy]: "The medium shall be determined to be idle for the duration of a DIFS --->\*or EIFS\*<---- as appropriate ... before the backoff procedure is allowed to resume".  This conflicts with a reading of the lettered paragraphs in 10.22.2.4,which determine the corresponding rules for EDCA. Note in particular that the only mention of EIFS is in b), which is therefore crucial. The prologue to the lettered items says "EDCAF operations shall be performed at slot boundaries, defined as follows on the primary channel, for each EDCAF:".  b) Following EIFS - DIFS + AIFSN[AC] x aSlotTime + aSIFSTime - aRxTxTurnaroundTime of idle medium after the last indicated busy medium as determined by the physical CS mechanism that was the result of a (11ah)non-S1G frame reception that has resulted in FCS error, or (11ah)of a frame reception that has resulted in PHY-RXEND.indication (RXERROR) primitive where the value of RXERROR is not NoError. Note in particular that EIFS here is applied only for busy medium that was the result of the error itself. So it seems that when there is later busy medium, and hence the backoff is suspended in the sense of 10.3.4.3, the catch-all item e) for what to do following busy medium applies. This makes no mention of using EIFS, so the medium only has to be clear for the standard formula involving AIFS at this point. FWIW, the EDCA version probably makes more sense. The point of EIFS is to clear out a single possible bad frame from consideration. Repeated use of EIFS after that has happened doesn't seem useful. | Delete " or EIFS" in " The backoff counter is next decremented after the medium has been determined to be idle for the duration of a DIFS or EIFS, as appropriate" in 10.4.3.4 |

Commentor is using D0.1 text (but a D1.0 reference?):

D0.1 1429.25

If the medium is determined to be busy at any time during a backoff slot, then the backoff procedure is suspended; that is, the backoff timer shall not decrement for that slot. The medium shall be determined to be idle for the duration of a DIFS or EIFS, as appropriate (see 10.3.2.3 (IFS)), before the backoff procedure is allowed to resume. Transmission shall commence when the backoff timer reaches 0.

This was changed as a result of CID 189 to make it clear what “suspended” means and now reads:

10.3.4.3 **Backoff procedure for DCF**

1608.20

“If the medium is determined to be busy at any time during a backoff slot, then the backoff counter shall not be decremented for that slot. The backoff counter is next decremented after the medium has been determined to be idle for the duration of a DIFS or EIFS, as appropriate (see 10.3.2.3 (IFS)), plus aSlotTime.(#189)

(#189)Transmission shall commence when the backoff counter equals 0.”

The EDCA TXOP rules is in 10.23.2.4 (not 10.22.2.4) and reads as follows:

EDCAF operations shall be performed at slot boundaries, defined as follows on the primary channel, for each

EDCAF:

a) Following AIFSN[AC] × aSlotTime – aRxTxTurnaroundTime of idle medium after SIFS (not

necessarily idle medium during the SIFS) after the last busy medium on the antenna that was the

result of a reception of a frame with a correct FCS (11ah)or of an S1G frame. Note that upon

reception of an S1G frame, an S1G STA updates its RID counter based on information obtained

from the RXVECTOR as described in 10.3.2.5 (Setting and resetting the RID(11ah)) and this update

does not depend on the outcome of the FCS check.

**b) Following EIFS – DIFS + AIFSN[AC] × aSlotTime + aSIFSTime – aRxTxTurnaroundTime of idle**

**medium after the last indicated busy medium as determined by the physical CS mechanism that was**

**the result of a (11ah)non-S1G frame reception that has resulted in FCS error, or (11ah)of a frame**

**reception that has resulted in PHY-RXEND.indication (RXERROR) primitive where the value of**

**RXERROR is not NoError.**

c) When any other EDCAF at this STA transmitted a frame requiring acknowledgment, the earlier of

1) The end of the AckTimeout interval timed from the PHY-TXEND.confirm primitive, followed

by AIFSN[AC] × aSlotTime + aSIFSTime – aRxTxTurnaroundTime of idle medium, and

2) The end of the first AIFSN[AC] × aSlotTime – aRxTxTurnaroundTime of idle medium after

SIFS (not necessarily medium idle during the SIFS, the start of the SIFS implied by the length

in the PHY header of the previous frame) when a PHY-RXEND.indication primitive occurs as

specified in 10.3.2.10 (Acknowledgment procedure).

d) Following AIFSN[AC] × aSlotTime – aRxTxTurnaroundTime of idle medium after SIFS (not

necessarily medium idle during the SIFS) after the last busy medium on the antenna that was the

result of a transmission of a frame for any EDCAF and which did not require an acknowledgment

and after the expiration of the TXNAV timer if nonzero, and, if dot11MCCAActivated is true, the

expiration of the RAV timer if nonzero.

e) Following AIFSN[AC] × aSlotTime + aSIFSTime – aRxTxTurnaroundTime of idle medium after

the last indicated busy medium as indicated by the CS mechanism that is not covered by a) to d).

f) Following aSlotTime of idle medium, which occurs immediately after any of these conditions, a) to

f), is met for the EDCAF.

First EDCA procedure should be basically the same as DCF but where DIFS is replaced by AIFSN x slottime.

So a) corresponds to the DCF condition of “the medium has been determined to be idle for the duration of a DIFS ….plus aSlotTime.”

Second let’s remind ourselves what EIFS is:

**10.3.2.3.7 EIFS**

A DCF shall use EIFS before transmission, when it determines that the medium is idle following reception of a frame for which the PHY-RXEND.indication primitive contained an error or a frame for which the FCS value was not correct. Similarly, a STA’s EDCA mechanism under HCF shall use the EIFS–DIFS+AIFS[AC] interval.

So b) corresponds to the DCF condition of “the medium has been determined to be idle for the duration of a …EIFS ….plus aSlotTime.”

(Note: the addition of the “aRxTxTurnaroundTime” has caused me grief for some time but I will not digress now).

EDCA then adds more conditions, all using the AIFSN x Slottime + SIFS:

c) The STA itself transmits from a different EDCAF, requiring an ACK. No need for EIFS here.

d) The STA itself transmits from a different EDCAF, not requiring an ACK. No need for EIFS here.

e) Is “catch all” but I have to admit I have no idea what condition it may mean in practice.

So what is the commenter saying?

*“Note in particular that EIFS here”, i.e. condition b)” is applied only for busy medium that was the result of the error itself.”*

Correct, the packet did not check out, so the NAV is suspect, so EIFS applies and this corresponds exactly with DCF.

*“So it seems that when there is later busy medium, and hence the backoff is suspended in the sense of 10.3.4.3” Backoff procedure for DCF,” the catch-all item e) for what to do following busy medium applies.*

**I don’t agree with this. I read the rules as applying to each and every backoff slot. So if the medium goes busy, in any backoff slot, one of a), b), c) or d) would apply**.

*This makes no mention of using EIFS, so the medium only has to be clear for the standard formula involving AIFS at this point.  
FWIW, the EDCA version probably makes more sense. The point of EIFS is to clear out a single possible bad frame from consideration. Repeated use of EIFS after that has happened doesn't seem useful*

**Each backoff slot is independent. If medium goes busy during a backoff slot, the backoff timer stops. If the NAV is interpreted correctly, i.e. the interfering packet is correctly received, then the STA waits as per a), c) or d). If the packet was in error, then the STA waits as per b).**

**Then the timer starts again. If the medium goes busy again, either in the same backoff slot or a different one, the same conditions apply. If a “bad” packet caused an EIFS wait, then after the wait that packet is out of there, but true if another ‘bad’ packet came in, then the STA must wait EIFS again.**

Now we look at the commenter’s Proposal

*Delete " or EIFS" in " The backoff counter is next decremented after the medium has been determined to be idle for the duration of a DIFS or EIFS, as appropriate" in 10.4.3.4*

If we did this, then we would have EIFS for EDCA, and not for DCF. This, I feel, would not be acceptable as basically DCF and EDCA should be basically the same.

**Proposed RESOLUTION**

REJECT

EDCA and DCF backoff procedures should be basically the same. Removing EIFS condition only from DCF would be a major difference to EDCA. EIFS is required to account for packets detected where the NAV information is not reliable.