IEEE P802.11
Wireless LANs

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| Resolution for comment 1751 received for CC on 11bn D0.1 |
| Date: 2025-07-30 |
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Abstract

This document contains a proposed resolution to comment 1751 received on 802.11bn D0.1.

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| **CID** | **Commenter** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 1751 | Michail Koundourakis | 37.11.2 | Improve feedback in BlockAck frames, to help recipient's link adaptation decisions. | Add a "parity errors count" subfield to feed back that the receiver of the A-MPDU experienced a number of parity errors. This tells the transmitter of the A-MPDU that the recipient tried to receive the MPDUs (as opposed to , it was not available to try to receive, which is typical for coex). | Revised –Agree in principle with the comment.TGbn editor to make the changes shown in 11-25/1009r0. |

Introduction

**Problem statement**

* A STA might be unable to receive an MPDU in an A-MPDU because of coex issues
* If the recipient STA does not ack MPDUs for this reason, the originating STA will typically assume a channel problem and reduce the rate for subsequent transmissions
* This worsens the problem, since the consequent increased PPDU duration increases the likelihood of coex collision
* In the worst case, the rate is reduced so much that even a single MPDU does not fit between consecutive coex events; as a result, data flow stops and the link is dropped

**AP cannot differentiate errors using only a single "Internal (in device) Error Occurred" bit. E.g.:**



**Proposed solution**

* Enable the BlockAck frame(s) to carry new information, to help the originator distinguish between coex issues and channel issues
* Coex issues might include hidden node issues, if these can be identified
* Specifically, return (feed back to the A-MPDU originator)
	+ **The** **number of A-MPDU subframes with a MPDU delimiter error or an FCS error**
		- Not caused by Coex
		- Cannot be a perfect count of missed MPDUs, since if A-MPDU subframe is corrupted resync to next header is not guaranteed
		- Not counting when did not even try to receive, due to coex issues
	+ **The relative (percentage of the PPDU duration) or the absolute (in usec) cumulative away time during the PPDU**

**Possible AP behaviour**

* If the originator had many MPDUs unacknowledged:
	+ If the recipient only reported a few bad MPDUs/delimiters and a significant cumulative away time, the originator could surmise the recipient was just away due to coex issues for the unacked MPDUs, and use this as a hint not to change the rate
	+ If the recipient reported many bad MPDUs/delimiters, the originator could surmise bad radio conditions, and use this as a hint to rate-adapt
	+ If the recipient only reported a few bad MPDUs/delimiters and a zero or small cumulative away time, or there was no BA, the originator could surmise really bad radio conditions, and use this as a hint to rate-adapt

Using the same examples as above, this is how the new feedback may work:



***TGbn editor: please modify the following subclause:***

37.11.2 Dynamic Unavailability Operation (DUO) mode

*TGbn editor: please add a paragraph, at the end of the subclause, as tagged with [#1751] below.*

A non-AP STA that is a TXOP responder may use a Multi-STA BlockAck frame that is sent in response to a PPDU containing one or more frames requiring an immediate response to indicate in-device coexistence issues, using a Per AID TID Info subfield that provides PPDU reception feedback information, as follows:

* The Bad MPDU Count field can indicate the number of MPDU delimiter and FCS errors observed in the PPDU.
* The No Rx Report Type field and No Rx Report field can indicate the portion of the PPDU, if any, that could not be received due to in-device coexistence restrictions.
* The In-Device Error field can indicate whether an in-device error occurred during the reception of the PPDU.

NOTE 1 — If the AP receives an indication from the STA that the STA observed MPDU delimiter or FCS errors, then the expectation is that these were caused by unknown channel errors, i.e. the STA’s receiver was not impacted by in-device coexistence when these errors occured.

NOTE 2 — The combination of the MPDUs transmitted by the AP in the PPDU that require an immediate response, the MPDUs acknowledged in the Multi-STA BlockAck frame, and the Bad MPDU Count, No Rx Report Type, No Rx Report and In-Device Error fields can be used by the AP as an input to its rate selection algorithm, which is out of scope of the standard.*[#1751]*

* + - * 1. **Overview**

***TGbn editor: Please change the text and figure below as follows:***

If the AID11 subfield of the AID TID Info subfield is not 2045, and if the combination of the Ack Type subfield and TID subfield is not equal to 0 and 13 or 14 respectively, then the Per AID TID Info subfield has the format shown in Figure 9-60 (Per AID TID Info subfield format if the AID11 subfield is not 2045 and if the combination of the Ack Type subfield and TID subfield is not equal to 0 and 13 or 14 respectively).

…

If the AID11 subfield of the AID TID Info subfield is not 2045, and if the Ack Type subfield is equal to 0 and the TID subfield is equal to 13 then the Per AID TID Info subfield has the format shown in Figure 9-60a (Per AID TID Info subfield format if the AID11 subfield is not 2045 and if the combination of the Ack Type subfield is equal to 0 and the TID subfield is equal to 13 or 14 respectively).

|  |  |  |  |
| --- | --- | --- | --- |
|  | AID TID Info | Block Ack Starting Sequence Control | Feedback |
| Octets: | 2 | 0 or 2 | 0, 4, 8, 16 or 32 |
| * Per AID TID Info subfield format if the AID11 subfield is not 2045 and if the combination of the Ack Type subfield is equal to 0 and the TID subfield is equal to 13 or 14 respectively
 |

…

|  |
| --- |
| * Context of the Per AID TID Info subfield and presence of optional subfields if the AID11 subfield is not 2045
 |
| Ack Type subfield values | TID subfield values | Presence of Block Ack Starting Sequence Control subfield and Block Ack Bitmap subfields | Context of a Per AID TID Info subfield in a Multi-STA BlockAck frame |
| 0 | 0–7 | Present | Block acknowledgment context:Sent as an acknowledgment to QoS Data frames that solicit a BlockAck frame response or to a BlockAckReq frame. |
| 1 | 0–7 | Not present | Acknowledgment context:Sent as an acknowledgment to a QoS Data or QoS Null frame that solicits an Ack frame response. |
| 0 or 1 | 8–1~~3~~2 | N/A | Reserved |
| 0 | 13 | Present | Feedback context:Sent as unavailability feedback |
| 1 | 13 | Not present | Reserved |
| 0 | 14 | Present | Reception context:Sent as PPDU reception feedback |
| 1 | 14 | Not present | All ack context:Sent as an acknowledgment to an A-MPDU that contains an MPDU that solicits an immediate response and all MPDUs contained in the A-MPDU are received successfully. |
| 0 | 15 | N/A | Reserved |
| 1 | 15 | Not present | Management/PS-Poll frame acknowledgment context:Sent as an acknowledgment to a Management or PS-Poll frame. |
| NOTE 1—Additional rules for acknowledgment, block acknowledgment and the all ack context are defined in 26.4.2 (Acknowledgment context in a Multi-STA BlockAck frame) for a multi-TID A-MPDU.NOTE 2—As HE STAs do not use HCCA (see 10.23.1), TID values from 8 to 15 are not used in QoS Data frames. |

If a Per AID TID Info subfield has the Ack Type subfield equal to 0 and the TID subfield equal to 14 then:

* It includes PPDU reception feedback information instead of acknowledgment status (see Table 9-39 (Context of the Per AID TID Info subfield and presence of optional subfields if the AID11 subfield is not 2045)).
* The AID11 subfield of the AID TID Info subfield is reserved.
* A PPDU Rx Feedback field is included in the Per AID TID Info subfield instead of a Block Ack Bitmap subfield with a length defined in Table 9-40 (Fragment Number field encoding for the Multi-STA BlockAck variant), and the format is defined in Figure 9-60c (PPDU Rx Feedback field format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 – B9 | B10 | B11 – 18 | B19 – 20 |  |
|  | Bad MPDU Count | No Rx Report Type | No Rx Report | In-Device Error | Reserved |
| Bits: | 10 | 1 | 8 | 2 | variable |
| Figure 9-60c – PPDU Rx Feedback field format |  |  |

The Bad MPDU Count field indicates the number of MPDU delimiter and FCS errors observed in the A-MPDU pre-EOF padding, or is set to all-ones if this information is not provided.

NOTE—This count can be determined while processing an A-MPDU pre-EOF padding by incrementing a counter every time an invalid MPDU delimiter is found (and so resynchronisation to the next valid MPDU delimiter is required), and every time a valid MPDU delimiter is found but the FCS of the corresponding MPDU is not correct.

The No Rx Report Type field indicates the format of the No Tx Report field.

If the No Rx Report Type field is 0, the No Rx Report field, if not all-ones, indicates the time during which the STA could not receive the PPDU during its transmission, in units of 64 μs. If the No Rx Report Type field is 1, the No Rx Report field indicates the percentage of the PPDU duration during which the STA could not receive the PPDU; values above 100 other than all-ones are reserved. The No Rx Report field is set to all-ones if this information is not provided.

The In-Device Error field indicates whether an in-device occurred, as shown in Table 37-xx.

Table 37-xx—In-Device Error field values

|  |  |
| --- | --- |
| In-Device Error field value | Meaning |
| 0 | No error occurred |
| 1 | An in-device error occurred  |
| 2 | An error occurred but no in-device error occurred |
| 3 | Information not provided |

The Bad MPDU Count, No Rx Report and In-Device Error fields are not all set to all-ones.