IEEE P802.11
Wireless LANs

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| TLC Signaling |
| Date: 2019-03-01 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Matthew Fischer | Broadcom |  |  | Matthew.fischer@broadcom.com |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

 |

Abstract

Proposed language to create a mechanism in the BlockAck frame to signal a request by a receiver to Temporarily Limit the Connection.

The proposed changes address CID 2656 of LB236 on TGmd D2.0.

Changes are referenced to TGmd D2.2.

**REVISION NOTES:**

**R0**:

initial

**R1**:

Update to D2.2

**R2**:

Add second bit and encoding for two values one for TLC and one for Interference Mitigation Request

Modify behavioural language to reflect new bit addition and new signalled indication (IMR)

**R3**:

Change from coded 2 bit value LAR field to 2 separate bits to indicate all combinations of the two signals, TLC and IMR

Removed the word “temporarily” from the behavioural part of the document because the language provided no further hints as to the meaning of temporarily, instead, the implication is that Temporarily is as long as the initiator wants it to be, as indicated by signalling TLC==0

**R4**:

Changes following review during cc June 21, 2019

10.26.10a - A few editorial changes, including add “frame” after each occurrence of BlockAck, remove references to MMPDU (not covered by BA agreements)

3.4 abbrev+acronyms – new proposed changes, with addition of TLC and IMR expansions

10.3.2.9 – new proposed changes, allow the block ack agreement receipient to not respond to RTS at its discretion as long as it has an outstanding TLC==1 or IMR==1 with the originator.

10.26.10a – add a note at the end that mentions the recipient behaviour regarding optional CTS response with a reference to the change in 10.3.2.9 CTS and DMG CTS procedure

**R5**:

Fix revision notes header that had wrong revision number

Change “temporary” to “temporarily”

Update to D2.3 (single change: the caption of Figure 9.42)

Update doc reference

**R6**:

Expand names in the field format diagram, no acronyms allowed as per style guide

Editorial changes, including adding “frame” after RTS, CTS as needed, letter transpositions, plural to singular changes, unnecessary adjectival phrases,

9.3.1.8.1 – rewrite of the TLC and IMR subfield descriptions, editorial, merging because of some commonality, while retaining the differences as appropriate.

Update doc reference

**R7**:

Move red text up to discussion section

Update doc reference

**END OF REVISION NOTES**

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGmd Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGmd Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGmd Editor: Editing instructions preceded by “TGmd Editor” are instructions to the TGmd editor to modify existing material in the TGmd draft. As a result of adopting the changes, the TGmd editor will execute the instructions rather than copy them to the TGmd Draft.***

**CIDs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2656 | Matthew Fischer | 9.3.1.8.1 | 825 | It would be nice to have the ability to inform the transmitter of an AMPDU that missing acknowledgements for some MPDUs are not due to a poor MCS choice, but instead, to local interference that occurred during the AMPDU reception. An indication of such occurence should be signaled in the BA. | Add a mechanism in the BA frame to allow a recipient transmitting the BA to indicate to the originator that missing acknolwedgements within the BA frame are due to local interference or buffer constraints and not a poor MCS choice. | Revise - TGmd editor to make changes as shown in 11-19/0306r7 that are marked with CID 2656 which create a new bit in the BA control field to indicate that there is a Temporarily receive resource constraint at the transmitter of the BA. |

**Discussion:**

Capability? To provide a hint to the originator regarding the 00 condition meaning no further restriction, in particular, that RTS-CTS exchange is not needed. But the original rules would apply, in which case, the originator probably has multiple inputs and multiple paths to determining when to use RTS-CTS. A 00 condition would never be interpreted as an absolute command or indication that RTS-CTS is NOT needed, but rather that a previously indicated condition of interference is no longer applicable. I.e. an implicit capability based on previous reception of a value of “1” in either field.

Action frame? BA is already going to be transmitted in response to the receipt of any correctly decoded MPDU from an AMPDU which reduces overhead. BA can be sent without a preceding AMPDU, i.e. as an initiating frame in a TXOP.

**Proposed Changes to TGmd D2.3:**

***TGmd editor: within TGmd D2.2, in 3.4 Abbreviations and acronyms, add the following acronyms in an appropriate location:***

**3.4 Abbreviations and acronyms**

TLC temporarily limited connection

IMR interference mitigation requested

**9.3.1.8.1 Overview**

***TGmd editor: within TGmd D2.2, in Figure 9-42 – BA Control field format, change bits B5 and B6 from reserved to TLC and IMR as shown, adjusting the reserved field size and bit locations as appropriate:***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 B4 | B5 | B6 | B7 B11 | B12 B15 |
|  | BA Ack Policy | Multi TID | Compressed Bitmap | GCR Mode | Temporarily Limited Connection **(#2656)** | Interference Mitigation Requested **(#2656)** | Reserved | TID\_INFO |
| Bits: | 1 | 1 | 1 | 2 | 1 | 1 | 5 | 4 |

**Figure 9-42—BA Control field format**

***TGmd editor: within TGmd D2.2, in an appropriate location within 9.3.1.8.1 Overview, insert the following text and table:***

The Temporarily Limited Connection (TLC) subfield and Intereference Mitigation Request (IMR) subfields are used to communicate a request for link activity modification. A value of 1 in the TLC subfield indicates that the transmitting STA is requesting the originator to reduce the rate of transmission of octets to the recipient for the associated TID. A value of 0 in the TLC subfield indicates that the transmitting STA is not requesting the originator to reduce the rate of transmission of octets to the recipient for the associated TID. A value of 1 in the IMR subfield indicates that the transmitting STA is requesting the originator to employ a means of interference mitigation when transmitting frames to the recipient for the associated TID. A value of 0 in the IMR subfield indicates that the transmitting STA is not requesting the originator to employ a means of interference mitigation when transmitting frames to the recipient for the associated TID. **(#2656)**

***TGmd editor: within TGmd D2.2, add the following text to the end of subclause 10.3.2.9 CTS and DMG CTS procedure, as shown:***

**10.3.2.9 CTS and DMG CTS procedure**

A STA that is required to transmit a CTS frame in response according to the rules in this subclause and that has transmitted a BlockAck frame with either or both of the IMR and TLC subfields set to 1 and that receives an RTS frame from the originator of the corresponding block ack agreement may refrain from transmitting the CTS frame when it anticipates that the transmission of MPDUs protected by the RTS frame is likely to fail due to interference or resource constraints. The STA may continue this behaviour until the most recently transmitted BlockAck frames for each outstanding block ack agreement with the originator contained a value of 0 in both the IMR and TLC subfields.

***TGmd editor: within TGmd D2.2, insert the following new subclause in an appropriate location (suggested to be immediately following 10.26.10 (DMG block ack with flow control)):***

**10.26.10a Link Activity Modification Signaling (#2656)**

A STA that is a recipient in a block ack agreement may set the TLC subfield to 1 in a BlockAck frame to request that the originator limit the rate of transmission to the recipient of octets of MSDUs belonging to the TID indicated in the BlockAck frame. If the BlockAck frame containing the TLC subfield equal to 1 is transmitted in response to the receipt of an A-MPDU, the lack of indication of acknowledgement of some of the MPDUs from the corresponding A-MPDU should not be assumed by the originator to have been due to bit errors but instead to a limited resource availability at the recipient.

A STA that is a recipient in a block ack agreement may set the IMR subfield to 1 in a BlockAck frame to request that the originator perform interference mitigation for TXOPs that address the recipient. If the BlockAck frame containing the IMR subfield equal to 1 is transmitted in response to the receipt of an A-MPDU, the lack of indication of acknowledgement of some of the MPDUs from the corresponding A-MPDU should not be assumed by the originator to have been due to bit errors but instead to errors induced by interference at the recipient.

A STA that receives a BlockAck frame with the TLC subfield equal to 1 should limit the rate of transmission to the STA that transmitted the BlockAck frame of octets of MSDUs matching the TID of the BlockAck frame. The amount of reduction in the rate of transmission is beyond the scope of the standard. A STA that receives a BlockAck frame with the TLC subfield equal to 0 should not limit the rate of transmission to the STA that transmitted the BlockAck frame of octets of MSDUs matching the TID of the BlockAck frame.

A STA that receives a BlockAck frame with the IMR subfield equal to 1 should invoke interference mitigation procedures for TXOPs that include MPDUs that are addressed to the STA that transmitted the BlockAck frame. Interference mitigation includes, but is not limited to an RTS/CTS exchange with the STA that transmitted the BlockAck frame. A STA that receives a BlockAck frame with the IMR subfield equal to 0 may refrain from employing interference mitigation procedures for TXOPs at its discretion when the TXOPs include MPDUs that are addressed to the STA that transmitted the BlockAck frame.

A STA should set the TLC subfield to 0 and the IMR subfield to 0 in a BlockAck frame to indicate a request to the receiving STA that it should not limit the rate of transmission of octets of MSDUs to the transmitting STA and that no interference mitigation procedures are requested for TXOPs that address the STA.

NOTE – A STA that transmitted a value of 1 in either or both of the TLC and IMR subfields of a BlockAck frame can choose to not respond to an RTS frame from the originator as described in 10.3.2.9 (CTS and DMG CTS procedure).

**End of proposed changes.**