kIEEE P802.11
Wireless LANs

|  |
| --- |
| CR for CID 14331, 14332, 14347 |
| Date: 2018-05-09 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Zhou Lan | Broadcom Ltd. | 250 Innovation Dr, San Jose, CA 95134 | +1-408-9223450 | zhou.lan@broadcom.com |
| Chunyu Hu | Broadcom Ltd. | 250 Innovation Dr, San Jose, CA 95134 |  | chunyu.hu@broadcom.com |
| Matthew Fischer | Broadcom Ltd. | 250 Innovation Dr, San Jose, CA 95134 |  | matthew.fischer@broadcom.com |

Abstract

This submission proposes resolutions for multiple comments related to TGax D2.3 with the following CIDs:

* 14331, 14332, 14347

Revisions:

* Rev 0: Initial version.
* Rev 1: Add capability bit for OMI Responder for UL MU Data Disable function support
* Rev 2: Modified in response to comments during initial presentation to TGax, to move behavioural language to behavioural subclause and to modify existing UL MU Disable occurrences as needed. Fixed doc numbering.
* Rev 3: modify to ensure that language is correctly written for the case of an AP that does not support the new UL MU Data Disable function, i.e. the combinations of the two bits collapse to an examination of only one of the two bits, table of interpretation of bits has a new column to differentiate the two cases

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 TGax Draft. This introduction is not part of the adopted material.

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 14331 | Zhou Lan | 287.42 | The UL MU Disable bit in the OM Control field is a bad design to lower down the whole network performance. Remove this bit and corresponding behavior in the spec. | as in the comment | **Revised –**Also, please refer to this document for the benefits of this bit:<https://mentor.ieee.org/802.11/dcn/16/11-16-0657-00-00ax-in-device-multi-radio-coexistence-and-ul-mu-operation.pptx>UL OFDMA is a mantory feature for 11ax. Allowing HE STA to temperaly disable the UL MU operation is for the coexistence purpose, given the fact there are other techinologies operating in the same frequence bands. However we should not abuse this bit to compromise the performance of 11ax and make 11ax less competive. We propose to have a separate UL MU Data Disable bit to allow non-AP STA to have the flexibility to only turn off the TB transmission for data frame; while the STA can still be triggered to transmit acknowledgment frame in TB frame. In such case, the Target RSSI in the trigger frame can be set to 127 to allow non-AP to use the maximum transmission power after power reduction of coexistence purpose and lowest mcs in the basic rate set. TGax editor to make the changes shown in 11-18/0522r3 under all headings that include CID 14331, 14332 and 14347. |
| 14332 | Zhou Lan | 287.42 | The UL MU Disable bit in the OM Control field is a bad design to lower down the whole network performance. Remove this bit and corresponding behavior in the spec. | as in the comment | **Revised –**Also, please refer to this document for the benefits of this bit:<https://mentor.ieee.org/802.11/dcn/16/11-16-0657-00-00ax-in-device-multi-radio-coexistence-and-ul-mu-operation.pptx>UL OFDMA is a mantory feature for 11ax. Allowing HE STA to temperaly disable the UL MU operation is for the coexistence purpose, given the fact there are other techinologies operating in the same frequence bands. However we should not abuse this bit to compromise the performance of 11ax and make 11ax less competive. We propose to have a separate UL MU Data Disable bit to allow non-AP STA to have the flexibility to only turn off the TB transmission for data frame; while the STA can still be triggered to transmit acknowledgment frame in TB frame. In such case, the Target RSSI in the trigger frame can be set to 127 to allow non-AP to use the maximum transmission power after power reduction of coexistence purpose and lowest mcs in the basic rate set. TGax editor to make the changes shown in 11-18/0522r3 under all headings that include CID 14331, 14332 and 14347. |
| 14347 | Zhou Lan | 60.38 | Remove UL MU Disable bit. It gives a backdoor for HE STA not to follow the scheduling instruction from AP and will affect the network performance. | as in the comment | **Revised –**Also, please refer to this document for the benefits of this bit:<https://mentor.ieee.org/802.11/dcn/16/11-16-0657-00-00ax-in-device-multi-radio-coexistence-and-ul-mu-operation.pptx>UL OFDMA is a mantory feature for 11ax. Allowing HE STA to temperaly disable the UL MU operation is for the coexistence purpose, given the fact there are other techinologies operating in the same frequence bands. However we should not abuse this bit to compromise the performance of 11ax and make 11ax less competive. We propose to have a separate UL MU Data Disable bit to allow non-AP STA to have the flexibility to only turn off the TB transmission for data frame; while the STA can still be triggered to transmit acknowledgment frame in TB frame. In such case, the Target RSSI in the trigger frame can be set to 127 to allow non-AP to use the maximum transmission power after power reduction of coexistence purpose and lowest mcs in the basic rate set. TGax editor to make the changes shown in 11-18/0522r3 under all headings that include CID 14331, 14332 and 14347. |

## Discussion:

Refer to the discussion in doc <https://mentor.ieee.org/802.11/dcn/16/11-16-0657-00-00ax-in-device-multi-radio-coexistence-and-ul-mu-operation.pptx> is the oringal proposal of UL MU disable bit in OMI.

UL OFDMA is a mantory feature for 11ax. Allowing HE STA to temperaly disable the UL MU operation is for the coexistence purpose, given the fact there are other techinologies operating in the same frequence bands. However we should not abuse this bit to compromise the performance of 11ax and make 11ax less competive.

DL OFDMA is mandatory for STA to support. In order to achieve gain againt 802.11ac SU mode, DL OFDMA Data transmission should be followed by a UL OFDMA acknowledgment frame transmission to optimize the throughput performance.

We propose to allow non-AP STA to have the flexibility to only turn off the TB transmission for data frame; while the STA can still be triggered to transmit acknowledgment frame in TB frame. In such case, the Target RSSI in the trigger frame can be set to 127 to allow non-AP to use the maximum transmission power after power reduction of coexistence purpose and lowest mcs in the basic rate set.

**9.4.2.237.2 HE MAC Capabilities Information field**

**TGax Editor:*change reserverd bit (B43) in the HE MAC capabilities field to “OM Control UL MU Data Disable RX support”***

**TGax Editor: *modify table Table 9-262z—Subfields of the HE MAC Capabilities Information field, as follows:***

**Table 9-262z—Subfields of the HE MAC Capabilities Information field**

|  |  |  |
| --- | --- | --- |
| HE Subchannel Selective Transmission Support(# 11837) | Indicates whether an HE STA supports an HE subchannel selective transmission operation described in 27.7.7 (HE subchannel selective transmission operation). | Set to 1 if supported. Set to 0 otherwise. |
| OM Control UL MU Data Disable RX Support  | Indicates whether an AP supports interpretation of the UL MU Data Disable subfield of the OM Control subfield as described in 27.5.3 (UL MU Operation) | Set to 1 if supported. Set to 0 otherwise.  |

**(#CID 14331, 14332 and 14347.)**

**9.2.4.6a.2 OM Control**

**TGax Editor: *modify subclause 9.2.4.6a.2 OM Control, as follows:***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B2 | B3 B4 |  B5 |  B6 B8 |  B9 |  B10 |  B11 |
|  | RX NSS | Channel width | UL MU Disable | TxNSTS | ER SU Disable | UL MU Data Disable | Reserved |
| Bits: | 3 | 2 | 1 | 1 | 3 | 1 | ~~2~~1 |

~~The UL MU Disable subfield is set to 1 to indicate that UL MU operation is suspended and set to 0 to indicate that UL MU operation is resumed. An AP sets the UL MU Disable subfield to 0.~~

The UL MU Disable subfield is combined with the UL MU Data Disable subfield and the recipient’s setting of the OM Control UL MU Data Disable RX Support subfield in the HE MAC capabilities to determine which HE TB PPDUs are possible by the STA to transmit these subfields, as indicated in Table 9-18xxx (UL MU Disable and OM Control UL MU Data Disable RX Support subfields interpretation).

**Table 9-18xxx—UL MU Disable and UL MU Data Disable subfields interpretation**

|  |  |  |  |
| --- | --- | --- | --- |
| **UL MU Disable subfield value** | **UL MU Data Disable subfield value** | **Interpretation by an AP that transmits a value of 0 in the OM Control UL MU Data Disable RX Support** | **Interpretation by an AP that transmits a value of 1 in the OM Control UL MU Data Disable RX Support** |
| 0 | 0 | All trigger based UL MU operations are enabled by the STA as defined in 27.5.3. | All trigger based UL MU operations are enabled by the STA as defined in 27.5.3. |
| 0 | 1 | All trigger based UL MU operations are enabled by the STA as defined in 27.5.3. | Trigger based UL MU Data transmission triggered by a Basic Trigger frame is suspended. Trigger based UL MU Control response transmission triggered by a Basic Trigger frame or a frame with TRS A-Control field present soliciting only Ack, or BlockAck frames are enabled by the STA.(see 27.8.3) |
| 1 | 0 | All triggered UL MU transmissions are suspended by the STA. The STA will not respond to any received Trigger frames, or TRS Control fields. | All triggered UL MU transmissions are suspended by the STA. The STA will not respond to any received Trigger frames, or TRS Control fields. |
| 1 | 1 | All triggered UL MU transmissions are suspended by the STA. The STA will not respond to any received Trigger frames, or TRS Control fields. | Reserved |

**27.5.3.2.1 General**

**TGax Editor: *modify section 27.5.3.2.1 as follows:***

**….**

An AP shall not send a frame that contains a TRS Control subfield (#13136) to a STA that has not set the TRS Support subfield (#13136) to 1 in the HE MAC Capabilities Information field of the HE Capabilities element it transmits.

NOTE—An AP does not send a Trigger frame containing a User Info field with AID12 subfield carrying the 12 LSBs of the AID of a STA or a frame addressed to a STA that carries a TRS Control subfield (#13136) if the AP has received from the STA an OM Control subfield with UL MU Disabled subfield set to 1 and UL MU Data Disable subfield to 0 (see 27.8.3 (Transmit operating mode (TOM) indication(#12841))).(#11319)

**27.5.3.3 STA behavior for UL MU operation**

**TGax Editor: *modify section 27.5.3.3 as follows:***

The UL MU Disable subfield is equal to 0 and the UL MU Data Disable subfield is equal to 0 in the most recent OM Control subfield (if any) sent by the STA to the AP ~~was not set to 1~~ or the UL MU Disable subfield is equal to 0 and the UL MU Data Disable subfield is equal to 1 in the most recent OM Control subfield (if any) sent by the STA to the AP and the frame that is being triggered is an acknowledgement (see 27.8.3 (Transmit operating mode (TOM) indication(#12841)) for further resctrictions).(#11319).

**27.8.3 Transmit operating mode (TOM) indication**

**TGax Editor: *modify section 27.8.3 as follows:***

TOM indication allows the OMI initiator to suspend and resume responding to ~~any~~ variants of the Trigger frame and TRS Control subfields per the UL MU Disable and UL MU Data Disable subfields settings as indicated in Table 9-18xxx (UL MU Disable and UL MU Data Disable subfields interpretation), or to adapt the maximum operating channel width and/or the maximum number of space-time streams, *NSTS*, that it can transmit ~~as a~~ in response to ~~a~~ Trigger frames and TRS Control subfields sent by the OMI responder.

NOTE—TOM indication does not relate to transmissions in PPDUs other than HE TB PPDUs. An AP does not perform TOM indication as an OMI initiator.

An OMI initiator that is a non-AP STA may indicate changes in its transmit parameters by sending a frame that contains the OM Control subfield to the OMI responder.

The OMI initiator shall set~~:T~~ the UL MU Disable subfield to 1 and the UL MU Data Disable subfield to 0 to indicate suspension of ~~the~~ UL MU operation (see 27.5.3 (UL MU operation) ~~otherwise it shall set the UL MU Disable subfield to 0 to indicate resumption or continuation of participation in UL MU operation~~.

If a HE non-AP STA has received the OM Control UL MU Data Disable RX Support field in the HE Capabilities element set to 1, then the HE non-AP STA, acting as an OMI initiator, may set the UL MU Disable subfield to 0 and the UL MU Data Disable subfield to 1 to indicate that only UL MU data transmission is suspended but UL MU control response transmissions in response to a Basic Trigger frame or a frame with TRS A-Control field present is not suspended (see 27.5.3 UL MU operation except only Ack or BlockAck frame transmission is allowed).

An OMI initiator shall set the UL MU Disable subfield to 0 and the UL MU Data Disable subfield to 0 to indicate resumption or continuation of participation in all triggered UL MU operations.

If an HE AP has set set the OM Control UL MU Data Disable RX Support field in the HE Capabilities element it transmits to 0, an associated STA shall not set the UL MU Data Disable subfield in the OM Control field to 1.

An AP that is an OMI initiator shall set the UL MU Disable and the UL MU Data Disable subfields to 0.

* The Tx NSTS subfield to the maximum *NSTS* that the STA will use for an HE TB PPDU sent in response to a Trigger frame or frame carrying a TRS Control subfield
* The Channel Width subfield to the maximum operating channel width that the STA will use for an HE TB PPDU sent in response to a Trigger frame or frame carrying a TRS Control subfield.

An OMI initiator that sent ~~the~~ a frame including the OM Control subfield should change its TOM parameters, Tx NSTS, UL MU Disable, UL MU Data Disable and Channel Width, as follows:

* When the OMI initiator changes a TOM parameter from higher to lower, it should make the change for that parameter only after the TXOP in which it received the immediate acknowledgment from the OMI responder.
* When the OMI initiator changes a TOM parameter from lower to higher, it should make the change for that parameter only after the TXOP in which it expects to receive acknowledgment from the OMI responder.

The TOM parameters UL MU Disable and UL MU Data Disable change~~s~~ from higher to lower when ~~its~~ their values change~~s~~ from ~~value~~ 0 to ~~value~~ 1.

An OMI responder that successfully receives a frame containing an OM Control subfield from an OMI initiator performs the following operations.

An~~The~~ AP OMI responder shall not send any Trigger frames or frames carrying a TRS Control subfield to a non-AP STA OMI initiator for subsequent TXOPs (see 27.5.3 (UL MU operation)) if the UL MU Disable subfield is 1 and the UL MU Data Disable is 0 in the most recently received OM Control subfield sent by the STA.

NOTE—A device ~~may~~ might have multiple radios that can create ~~result to~~ difficult in-device coexistence challenges. The device might set UL MU Disable subfield to 1 and the UL MU Data Disable subfield to 0 if it has trouble responding to a Trigger frame or a frame carrying a TRS Control subfield(#13136)(#14137) because the timing or high transmit power would cause interference with another radio in the device.

An~~The~~ OMI responder shall consider the OMI initiator as participating in UL MU operation for subsequent TXOPs when the UL MU Disable and the UL MU Data Disable subfields ~~is~~are 0 in the most recently received OM Control subfield with the following restrictions:

* The maximum NSTS that the OMI initiator can transmit in response to a Trigger frame or frame car-rying a TRS Control subfield(#13136)(#14137) is indicated in the Tx NSTS subfield of the OM Control subfield.
* The maximum operating channel width over which the OMI initiator can transmit in response to a Trigger frame or frame carrying a TRS Control subfield(#13136)(#14137) is indicated in the Channel Width subfield of the OM Control subfield.

An OMI responder that has transmitted the OM Control UL MU Data Disable RX Support subfield set to 1 shall regard an OMI initiator as capable of participating in UL MU operation only for the purpose of transmission of acknowledgments when the UL MU Disable subfield is equal to 0 and the UL MU Data Disable subfield is equal to 1 in the most recently received OM Control subfield from that OMI initiator.

The OMI responder shall indicate a number of spatial streams, NSS, in the Per User Info field of a Trigger frame, which contains the AID of the OMI initiator, that is less than or equal to the NSTS that is calculated from the Tx NSTS subfield of the OM Control subfield received from the OMI initiator.

The OMI responder shall indicate an RU allocation in the RU Allocation subfield of the Per User Info field of a Trigger frame or TRS Control subfield (#13136)(#14137) addressed to the OMI initiator, that is within the operating channel width specified in the Channel Width subfield of the OM Control subfield received from the OMI initiator and subject to the restrictions defined in 28.3.1.2 (OFDMA(#13427)).

**TGax Editor: *proposed text changes end here***