IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Comment resolutions for definitions etc. | | | | |
| Date: 2011-05-11 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Yusuke Asai | NTT | 1-1, Hikarinooka, Yokosuka-Shi, Kanagawa, 239-0847, Japan | +81 49 859 3494 | asai.yusuke@lab.ntt.co.jp |
| Takeo Ichikawa | NTT | 1-1, Hikarinooka, Yokosuka-Shi, Kanagawa, 239-0847, Japan | +81 49 859 3079 | Ichikawa.takeo@lab.ntt.co.jp |
| Raja Banerjea | Marvell | 5488 Marvell Lane, Santa Clara CA, 95054 | +1 408 489 7129 | rajab@marvell.com |
| Simone Merlin | Qualcomm | 5665 Morehouse Dr., San Diego, CA 92121 | +1 408 222 3713 | smerlin@qualcomm.com |
| Allert Van Zelst | Qualcomm | Straatweg 66-S, Breukelen, The Netherlands | +31346259663 | alert@qualcomm.com |

Abstract

This document proposes resolutions for the comments about the definitions in section 3.2 and etc.

Revision History

R7: Resolution for CID 83 (Usage condition of Short GI) has been revised.

R6: Resolution for CID 83 (Usage condition of Short GI) has been changed.

R5: Resolution for CID 239 and 1805 (definition of MU-MIMO), and status of CID 21 (changed to withdrawn) have been updated.

R4: Iinitial version after clearning up editorial errors.

Notes on this document:

* Comments are from: 11-11-0276-00-00ac-tgac-d0-1-comments.xls.
* Comments refer to: Draft P802.11ac\_D0.1.pdf and Draft P802.11ac\_D0.4.pdf
* In providing instruction for spec editing, the following conventions are used.
  + Red text indicates changes to be applied to existing text in Draft P802.11ac\_D0.1.pdf or Draft P802.11ac\_D0.1.pdf.
  + Text in blue is text copied from the 802.11n-2009 baseline that was not shown in the 11ac draft and that need be added to the draft, with the modifications shown in green.
  + Text in black is unmodified text from Draft P802.11ac\_D0.1.pdf.
  + Italic light gray text indicates instruction to the editor.

Proposed Resolutions

* **Comments related to the definition of MU-MIMO (CID 239 and 1805)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 239 | Hart, Brian | 3.1 | 2 | 9 | TR | MU-MIMO definition could be confused with FDMA or cellular. For greater definitional power, append "over the same bandwidth in the same area; typically to or from a common STA" | As in comment | Agree in principle.  In addition, it is needed to add the information that “a common STA” have two or more antennas. Because, in the context of the phrase, “a common STA” is either a source of DL MU-MIMO or a destination of typical uplink MU-MIMO. | MU |
| 1805 | Yee, James | 3.1 | 2 | 10 | TR | the MU-MIMO definition does not require any STA to have multiple antennas. It also seems to be redefining MIMO when a definition already exists. | Should clarify definition and reuse MIMO definition in the baseline spec. | Agree in principle. Actually, the phrase of “with potentially multiple antennas” includes single antenna case.  But “potentially multiple” should be replaced with “one or more” to avoid any confusion. | PHY |

**Proposed response to CID 239 and 1805**:

***Change the following sentences in Section 3.1 of TGac Draft D0.1: (P3L9)***

**multi-user multiple input, multiple output (MU-MIMO):**

A technique where multiple STAs, each with ~~potentially multiple~~ one or more (#1805) antennas, transmit ~~and/~~or receive independent data streams simultaneously~~.~~ over the same channel bandwidth; typically to or from a common STA with two or more antennas, respectively. (#239)

* **A comment related to the definition of DL MU-MIMO (CID 237)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 237 | Hart, Brian | 3.1 | 2 | 13 | TR | 11ad has redefined "downlink", so the 802.11 downlink is now a more general term than many folk realise, and as a modifier does not automatically mean AP to clients. | Liase with 11ad to find a cleaner way forward | Disagree. | MU |

**Discussion:**

The definitions of "downlink" in REVmbD8.0 and TGad draft D2.0 are as follows:

* (REVmbD8.0) **downlink:**

A unidirectional link from an access point (AP) to one or more non-AP stations (STAs).

* (TGad) **downlink:**

A unidirectional link from an access point (AP) to one or more non-AP stations (STAs) or a unidirectional link from a non-AP destination directional band (DBand) STA to a non-AP source DBand STA.

Although the definition of “downlink” has been modified in TGad draft, it still includes the original meaning, “*the communication flow from an AP to one or more STAs.”*

In addition, it is clear that the term of “downlink” in DL MU-MIMO does not include the second meaning of the modified definition, “*a unidirectional link from a non-AP destination directional band (DB) STA to a non-AP source DBand STA*” because the specification related to DBand STA is out-of-scope in TGac.

Therefore, the definition of DL MU-MUMO in TGac draft D1.0 is appropriate.

**Proposed response to CID 237**:

Disagree.

* **A comment** **related to the definition of sedondary 40 MHz channel (CID 1574)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1574 | Zhu, Chunhui | 3.2 | 3 | 6 | TR | In a 160 or 80+80 VHT BSS, a secondary 40MHz subchannel may not always be adjacent to the primary 40MHz channel. It may be adjacent to another secondary 40MHz channel. | Leave to the PHY ad hoc | Disagree. | COEX |

**Discussion:**

The definition of primary and secondary 40 MHz channels in TGac D0.1 are as follows:

* **primary 40 MHz channel: (P2L64)**

In an 80, 160 or 80+80 MHz VHT BSS, the 40 MHz subchannel that includes the primary 20 MHz channel and can be used to setup a VHT 40 MHz BSS.

* **secondary 40 MHz channel: (P3L6)**

In an 80 MHz VHT BSS, the 40 MHz subchannel adjacent to the primary 40 MHz channel that together form the 80 MHz channel of the 80 MHz VHT BSS. In a 160 or 80+80 MHz VHT BSS, the 40 MHz subchannel adjacent to the primary 40 MHz channel that together form the primary 80 MHz channel.

The following figure shows all of the possible configurations for primary 20 MHz, secondary 20 MHz, and secondary 40 MHz channels.



These configurations are “primary 80 MHz channel” of 160MHz or 80+80 MHz channel. From this figure, primary 40MHz channel and secondary 40MHz channel are always adjacent with each other, so the original text is not needed to revise.

**Proposed response to CID 1574**:

Disagree. Because primary 40MHz channel and secondary 40MHz channel are always adjacent with each other.

* **A comment related to the definition of MU TXOP (CID 21)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 21 | Asai, Yusuke | 3.2 | 4 | 48 | TR | “MU TXOP” should be defined in section 3.2. | Insert the following definitions in section 3.2:  MU TXOP: A TXOP using MU-MIMO transmission. | ~~Agree.~~ Withdrawn by commentor | PHY |

**~~Proposed response to CID 21:~~**

***~~Add the following sentences in Section 3.2 of TGac Draft D0.1 (P3L4):~~***

**~~multiuser (MU) transmit opportunity (TXOP):~~** ~~A TXOP using MU-MIMO transmission.~~

* **Comments related to the definition of ACK Policy Subfield (CIDs 25 and 1235)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 25 | Asai, Yusuke | 7.1.3.5.3 | 8 | 21 | TR | "an A-MPDU subframe with EOF subfield of the A-MPDU delimiter field set to 1" should be replaced with "VHT single MPDU", because "VHT single MPDU" is defined as "an MPDU that is the only MPDU carried in an A-MPDU carried in a VHT PPDU, and with the EOF subfield of the MPDU delimiter field equal to 1". | As in comment. | Agree. | MAC |
| 1235 | Stephens, Adrian | 7.1.3.5.3 | 8 | 22 | TR | Now that you have a definition of a single VHT MPDU, you can use that definition to simplify text. | change to "... or carried in a single VHT MPDU".  And change the guard on the next block to "Otherwise:" | Agree. | MAC |

**Proposed response to CID 25 and 1235:**

***Add the following sentences in Section 3.2 of TGac Draft D0.1 (P8L21):***

~~In a frame that is a non-A-MPDU frame~~ When not carried in an A-MPDU subframe or ~~carried in an A-MPDU subframe with EOF subfield of the AMPDU delimiter field set to 1~~ carried in a VHT single MPDU(#25, #1235):

The addressed recipient returns an ACK or QoS +CF-Ack frame after a short interframe space (SIFS) period, according to the procedures defined in 9.2.0b.9 (ACK procedure) and 9.9.2.3 (HCCA transfer rules). For QoS Null (no data) frames, this is the only permissible value for the Ack Policy subfield.

~~In a frame that is part of When carried in an A-MPDU subframe with EOF subfield of the A-MPDU delimiter field set to 0~~Otherwise(#1235):

The addressed recipient returns a BlockAck MPDU, either individually or as part of an A-MPDU starting a SIFS after the PPDU carrying the frame, according to the procedures defined in 9.2.0b.10 (BlockAck procedure), 9.10.7.5 (Generation and transmission of BlockAck by an HT STA), 9.10.8.3 (Operation of HT delayed Block Ack), 9.15.3 (Rules for RD initiator), 9.15.4 (Rules for RD responder) and 9.19.3 (Explicit feedback beamforming).

* **A comment related to short GI (CID 83)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 83 | Asai, Yusuke | 22.3.9.2.3 | 102 | 1 | TR | The usage of short GI for DL MU-MIMO transmission should be clear. | Add the sentence "In a MU-MIMO PPDU, short GI may be used only when all of the STAs that receive the MU-MIMO frame support short GI mode." to the Description column of short GI in Table 22-9. | ~~Agree. The condition when short GI can be used should be noted explicitly for clarification.~~  Agree in principle. The definitions of conditions when short GI may be used should be converged in “9.16 Short GI operating.” | PHY |

**Proposed response to CID 83:**

***~~Add the following sentences in Section 3.2 of TGac Draft D0.1 (P102L7):~~***

~~Set to 1 if short guard interval is used in the Data field. In an MU-MIMO PPDU, only when all of the STAs that receive the MU-MIMO frame support short GI mode, it may be used.~~

***~~Add the following sentences in Section 9.16 of TGac Draft D0.4 (P70L8):~~***

~~A STA may transmit a frame with TXVECTOR parameters FORMAT set to VHT and NUM\_USERS set to greater than 1 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met:~~

~~—  The STA is a VHT STA.~~

~~— The TXVECTOR parameter FORMAT is equal to VHT.~~

~~— The RAs of the PPDUs contained in the MU transmission corresponds toSTAs for which the Short GI subfield of the most recently received VHT Capabilities element contained a value of 1.~~

(Colored markers are just for clarification.)

***Add the following sentences in Section 9.16 of TGac Draft D0.4 (P70L8):***

A STA may transmit a frame with TXVECTOR parameters NUM\_USERS set to greater than 1 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met:

— The STA is VHT STA.

— The TXVECTOR parameter FORMAT is equal to VHT.

— The RAs of the all of the MPDUs contained in the MU PPDU transmission corresponds to STAs for which the following conditions are satisfied:

- If CH\_BANDWIDTH is set to HT\_CBW20, the Short GI for 20 MHz subfields of the most recently received HT Capabilities element contained a value of 1 and dot11ShortGIOptionInTwentyActivated is present and is true.

- If CH\_BANDWIDTH is set to HT\_CBW40 the Short GI for 40 MHz subfields of the most recently received HT Capabilities element contained a value of 1 and dot11ShortGIOptionInFortyActivated is present and is true.

- If CH\_BANDWIDTH is set to HT\_CBW80, the Short GI for 80 MHz subfields of the most recently received VHT Capabilities element contained a value of 1 and dot11ShortGIOptionIn80Activated is present and is true.

- If CH\_BANDWIDTH is set to HT\_CBW160 or HT\_CBW80+80, the Short GI for 160 MHz and 80+80MHz subfields of the most recently received VHT Capabilities element contained a value of 1 dot11ShortGIOptionIn160and80p80Activated is present and is true.