### IEEE P802.11Wireless LANs

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| 11ax D2.0 Comment Resolution for CID 14207 |
| Date: 2018-02-23 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Yunbo Li | Huawei Technologies | F1-17, Huawei Base, Longgang District, Shenzhen 518129 | +86-18666203037 | liyunbo@huawei.com |
| David Xun Yang | Huawei Technologies |  |  | David.yangxun@huawei.com |
| Yingpei Lin | Huawei Technologies |  |  | linyingpei@huawei.com |
| Qiang Guo | Huawei Technologies |  |  | Qiang.Guo@huawei.com |
| Yongho Seok | MediaTek Inc. |  |  | yongho.seok@mediatek.com |

Abstract

This submission proposes resolution for CID 14207.

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 D0.1 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D0.1 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.***

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| **CID** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 14207 | 206.55 | 10.28.2 | When STA with less antennas than AP, after the STA obtain the channel, and do UL SU transmission, it is a kind of waste of antennas at AP side. If the STA grant the channel to AP and let AP schedule a UL MU MIMO transmission, it could fully use the antennas (spatial streams). | After STA grant the channel to AP, allows the AP to shechle UL MU-MIMO transmission. In order to guarantee the throughput of initiator STA, the AP should allocate the same number of spatial streams as the UL SU transmission. | Revised – agree in pricipleThe DL MU-MIMO already adopted in RDG in 11ax draft 1.3 (see CR of CID 3160).The UL MU-MIMO procedure is proposed to be enabled by AP as a RD responder to fully use the spatial resource while not reduce the transmit rate of RD initiator.Make changes as in doc 18/0512r4. |

**Discussion:**

In 11ax, if the RD responder is an HE AP, the RD response burst can contain HE MU PPDU target to multiple STAs, which include the RD initiator.



The above procedure could fully use the AP’s spatial resource through DL MU-MIMO transmission during DL period, but only SU transmission could be used for UL period. When the AP have more antennas than the STA, it is kind of waste in spatial domain for the AP.

If the HE AP as RD responder is allowed to trigger UL MU-MIMO transmission, the AP could fully use the spatial resource by allocate the extra spatial streams to other STAs that are not RD initiator.

E.g., when the STA has one antenna and the AP has 4 antennas, the STA as RD initiator can only transmit an SU PPDU to AP in single stream. When the HE AP as RD responder is allowed to trigger UL MU-MIMO transmission, the AP could schedule upto 4 spatial streams during UL period. There is an obvisous and significant throughput gain.

The updated procedure can be as follows.



Further two technical issues for discussion:

1. In order to guarantee the throughput of RD initiator, **propose the RD responder shall not reduce the initiator’s number of spatrial streams during UL MU-MIMO transmission**.
2. In current spec, there is a rule “the RD responder shall not transmit any frame causing a response after SIFS with an Address 1 field that does not match the MAC address of the RD initiator”. The concern maybe that the transmission from STAs that are not RD initiator may interfere the OBSS transmission.

When AP as RD responder send a Trigger frame, if it set the CS Required subfield to 1, the STAs indentified in the User info fields are required to use ED to sense the medium and to consider the medium state and the NAV in determining whether or not to respond. In that case, the concern could be released.

**It is proposed that when an AP as RD responder send a Trigger frame, the AP shall set the CS Required subfield to 1.**

***TGax editor: Modify the Paragraphs on section 10.28.2 as the following:***

**10.28.2 Reverse direction (RD) exchange sequence**

If the RD initiator is an HE-STA and the RD responder is an HE AP, the RD responder may transmit a Basic Trigger frame to trigger more than one STAs to do UL MU-MIMO transmission. The triggerred STAs shall include the RD initiator.

***TGax editor: Modify the Paragraphs on section 10.28.4 as the following:***

**10.28.4 Rules for RD responder**

An RD responder shall not transmit an MPDU (either individually or aggregated within an A-MPDU) that is

not one of the following frames:

— Ack

— Compressed BlockAck

— Compressed BlockAckReq

— Extended Compressed BlockAck

— Extended Compressed BlockAckReq

— QoS data

— Management

— Basic Trigger

During an RD response burst any PPDU transmitted by an RD responder shall contain at least one MPDU with an Address 1 field that matches the MAC address of the RD initiator, and the inclusion of traffic to STAs other than the RD initiator in a VHT MU PPDU shall not increase the duration of the VHT MU PPDU beyond that required to transport the traffic to the RD initiator. The RD responder shall not transmit any frame except Basic Trigger causing a response after SIFS with an Address 1 field that does not match the MAC address of the RD initiator. The RD responder shall not transmit any PPDUs with a CH\_BANDWIDTH that is wider than the CH\_BANDWIDTH of the PPDU containing the frame(s) that delivered the RD grant.

When the RD responder transmits a Basic Trigger frame, the CS Required subfield shall be set to 1, the allocated number of streams for the RD initiator in the Basic Trigger frame shall not be smaller than the number of streams of the RD initiator’s last PPDU.

If an RD initiator sets the RDG/More PPDU field to 1 in a +HTC frame transmitted during a TXOP and sets the AC Constraint subfield to 1 in that frame, the RD responder shall set the same AC as RD initiator’s in the Preferred AC subfield of the Trigger Dependent User Info field in the Trigger frame.