IEEE P802.11  
Wireless LANs

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | CR of CID 14328 | | | | | | Date: 2018-1-1 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | Email | | Zhou Lan | Broadcom Ltd. | 250 Innovation Drive San Jose CA 95134 | (+1) 408 543 3450 | [zhou.lan@broadcom.com](mailto:zhou.lan@broadcom.com) | | Chunyu Hu | Broadcom Ltd. | 250 Innovation Drive San Jose CA 95134 |  | [chunyu.hu@broadcom.com](mailto:chunyu.hu@broadcom.com) | | Matthew Fischer | Broadcom Ltd. | 250 Innovation Drive San Jose CA 95134 |  | [matthew.fischer@broadcom.com](mailto:matthew.fischer@broadcom.com) | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

Comment resolution with proposed changes to TGax D2.0 for CIDs from the WG LB for TGax related to CID 14328.

The CID list is:

14328,

The proposed changes on this document are based on TGax Draft 2.0.

**REVISION NOTES:**

R0: Initial draft with comments from group.

**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 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.***

**CIDs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 14328 | Zhou Lan | 226.30 | 27.2.5.2 | MU-RTS procedure doesn't provide sufficient support for range extension mode operation. A near edge STA after receive MU-RTS frame from AP may not be able to succesfully deliever CTS back to AP. As a consequence AP cannot use ER SU PPDU for DL transmission to the near edge STA. Need to enhance the MU-RTS/CTS operation to enable ER SU PPDU transmission. | as in the comment | Revised-  Agree in principle.  TGax editor makes changes as shown in 11-18/xxxr0 that are marked with CID 14328 |

**Discussion:**

Refer to contribution IEEE 802.11-18/31r0 for discussions.

**Proposed Changes to Draft Text of TGax D2.0:**

TGax editor: change section 9.3.1.23 as follows

**9.3.1.23 Trigger frame format**

……

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B26 B11 | | B12 B19 | B20 | B21    B24 | B25 | B26 B31 | B32    B38 | B39 |  |
|  | AID12 | | RU Allocation | Coding Type | MCS | DCM | SS Allocation/ Random Access RU Information | Target RSSI | ~~Reserved~~  Poll-CTS | Trigger Dependent User Info |
| Bits: | 12 | | 8 | 1 | 4 | 1 | 1 | 9 | 1 | variable |
|  | | Figure 9-52g--User Info field | | | | | | | | |

…

The Target RSSI subfield of the User Info field indicates the target receive signal power averaged over the AP's antenna connectors for the HE TB PPDU that is the response to the Trigger frame. The resolution for the Target RSSI subfield in the User Info field is 1 dB. The Target RSSI subfield encoding is defined in Table 9-25i (Target RSSI subfield encoding).

The Poll CTS subfield of the User Info field is set to 1 to indicate that the STA identified in the User Info field is required to send a CTS frame SIFS sending the HE TB PPDU solicited by the trigger frame as defined in 27.2.5.4. (Poll CTS procedure) The Poll CTS subfield in a MU-RTS Trigger frame is always set to 0.

…

TGax editor: insert the following section after section 27.2.5.3 as follows.

**27.2.5.4 Poll CTS procedure**

An HE AP may request one or more STAs to transmit CTS frame after the transmission of the HE TB PPDU that is sent in response to a Trigger frame that has the Poll-CTS subfield set to 1.

After transmitting a Trigger frame that is not an MU-RTS and that has a value of 1 in the Poll-CTS subfield, the HE AP shall use a transmission timeout value (PollCTSTimeout) with a value of 2×aSIFSTime + aSlotTime + aRxPHYStartDelay + HE TB PPDU Duration as indicated in the Length subfield of the Common Info field of the Trigger frame. If a PHY-RXSTART.indication primitive does not occur during the PollCTSTimeout interval, the STA shall conclude that the Poll CTS procedure has failed, and the HE AP shall invoke its backoff procedure upon expiration of the PollCTSTimeout interval. If a PHY-RXSTART.indication primitive does occur during the PollCTSTimeout interval, the HE AP waits for the corresponding PHY-RXEND.indication primitive to determine whether the Trigger frame transmission was successful. The recognition of a valid frame sent by any recipient of the non MU-RTS Trigger frame in an HE TB PPDU or of a CTS with an RA that matches the HE AP MAC address shall be interpreted as a successful completion of the Trigger frame transmission.

Note-The reception of a CTS frame from any of the MU-RTS recipients confirms that the Trigger frame was correctly received and provides NAV protection to the transmitting STAs. The reception of a CTS is not intended to serve as the indication that permits the HE AP to proceed with the following frame exchange and is not required if a solicited HE TB PPDU is correctly received.

If an HE STA receives a Trigger frame that is not a MU-RTS and that has a value of 1 in the Poll-CTS subfield, the HE STA shall transmit a CTS frame at the SIFS time boundary after the end of the solicited HE TB PPDU frame when the following conditions are met:

* The Trigger frame has one of the User Info fields addressed to the STA. The User Info field is addressed to a STA if the AID12 subfield is equal to the 12 LSBs of the AID of the STA and the Trigger frame is sent by the AP with which the STA is associated with or by the AP corresponding to the transmitted BSSID if the STA has indicated support for receiving Control frames with TA set to the Transmitted BSSID (Rx Control Frame To MultiBSS set to 1 in HE Capabilities element).
* The solicited HE TB PPDU is transmitted per the UL MU CS condition indicates that the medium is idle (see 27.5.3.5 (UL MU CS mechanism)).
* The UL MU CS condition indicates that the occupied channels of the CTS transmission are idle (see 27.5.3.5 (UL MU CS mechanism)).

Otherwise, the STA shall not send a CTS frame response.

The CTS frame sent in response to a Trigger frame that is not an MU-RTS shall be carried in a non-HT or non-HT duplicate PPDU (see Clause 17).

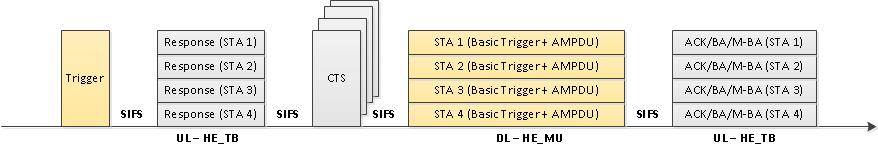
The CTS frame sent in response to a Trigger frame that is not an MU-RTS shall be transmitted on the primary 20 MHz channel, primary 40 MHz channel, primary 80 MHz channel, 160 MHz channel, or 80+80 MHz channel. The bandwidth of the occupied 20 MHz channels shall include the RU indicated in the RU Allocation subfield of the User Info field of the Trigger frame. The non-AP STA shall set the BW for the CTS so that the RU that is indicated in the Trigger frame is included in the CTS transmission bandwidth.

A non-AP HE STA transmitting a CTS frame in response to a Trigger frame that is not an MU-RTS shall follow the same rules specified for setting the TXVECTOR parameters as specified for the CTS response to an MU-RTS Trigger frame as defined in section 27.2.5.3 (CTS response to MU-RTS).

An HE STA that transmits a CTS frame SIFS after the solicited HE TB PPDU in response to a Trigger frame that is not an MU-RTS shall follow the synchronization requirement defined in 17.3.9.10 (Pre-correction accuracy requirements).

Note-The STA may maximize the transmission power of the transmitted CTS to achieve the best protection range.

Figure 27-x (An example of a Trigger frame that is not an MU-RTS soliciting a CTS frame response from multiple STAs   
after their HE TB PPDU transmissions) shows an example of a frame exchange sequence that uses a Trigger frame that is not an MU-RTS to solicit simultaneous CTS frame responses after the HE TB PPDU transmissions. In this example, the trigger frame can be any Trigger frame that is not an MU-RTS, such as BSRP, BQRP and NRP.

****

**Figure 27-x—An example of a Trigger frame that is not an MU-RTS soliciting a CTS frame response from multiple STAs after their HE TB PPDU transmissions**

TGax editor: insert the following section after section 27.2.5.3 as follows.

**27.5.3.2.4 AP access procedures for UL MU operation**

When an AP receives an immediate response with at least one MPDU from at least one STA solicited by a Trigger frame or UMRS Control field, the procedures described in 10.22.2.7 (Multiple frame transmission in an EDCA TXOP) apply.

When an AP does not receive an immediate response with at least one MPDU from at least one STA solicited by a PPDU that contains at least one Trigger frame with Poll-CTS subfield set to 0 the backoff procedure described in 10.22.2.2 (EDCA backoff procedure) applies.

An AP may use any AC for sending a PPDU that contains only Trigger frames. If the PPDU contains frames that are not Trigger frames in addition to a Trigger frame, then the AP shall access the medium using the primary AC as defined in 10.22.2.6 (Sharing an EDCA TXOP).

**End of proposed changes.**