IEEE P802.11
Wireless LANs

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| Comment Resolution on Virtual CS |
| Date: 2017-05-07 |
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Abstract

This submission proposes resolutions of comments received from TGax comment collection (TGax Draft 1.0).

* CIDs: 8555 (1 CID)

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Added text to exclude operations on 2.4 GHz band and simplified the text.
1. **Introduction**

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. The introduction and the explanation of the proposed changes are 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.***

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| CID | Page Number | Line Number | Comment | Proposed Change | Resolution |
| 8555 | 170 | 36 | Based on the description of the subsequent paragraph, the ED based CCA considers the status of a wide band channel on a 20 MHz granularity, i.e. as long as the 20 MHz channels containing the allocated RUs are considered idle, even if the other 20 MHz channels are busy (including the primary 20 MHz), a STA is still allowed to transmit the HE trigger- based PPDU. However, the virtual CS i.e. NAV is considered over the whole wide band. Even a narrow band OBSS transmission on the primary 20 MHz channel will set the STA's Inter-BSS NAV thereby rendering all the remaining 20 MHz channels of the wide band unusable for UL MU even when the ED based CCA returns idle on those 20 MHz channels. As such, it will be beneficial to record, in addition to the duration of the Inter-BSS NAV, the busy/idle state of the 20 MHz channels other than the primary 20 MHz. If the 20 MHz channels containing the allocated RUs are considered idle by both the ED based CCA as well as the inter-BSS NAV, a STA should be allowed to transmit the HE trigger- based PPDU on the allocated RU. This will prevent a narrow band OBSS transmission from blocking the use of a wide band channel for UL MU. | When recording the inter-BSS NAV set by an inter-BSS PPDU, in addition to recording the NAV duration of the Inter-BSS PPDU, the busy/idle state of the 20 MHz channels other than the primary 20 MHz are also recorded. A STA may also keep this record in conjunction with the HE bandwidth query report operation. This allows the virtual CS to be considered on a 20 MHz granularity as well i.e. the virtual CS is considered busy on a 20 MHz channel only if the NAV counter is nonzero and the 20 MHz channel was recorded as busy when the NAV was recorded. If the 20 MHz channels containing the allocated RUs in a Trigger frame are considered idle by both the ED based CCA as well as the virtual CS, a STA is allowed to transmit the HE trigger- based PPDU on the allocated RU | Revised.Agree in principle with the comment. Proposed resolution accounts for the suggested change.TGax editor to make the changes shown in 11-17/0336r1. |

**Discussion:** Refer to 11-17-0337-01-00ax-Virtual-CS-during-UL-MU.pptx

**Propose:**

Revised for CID 8555 per discussion and editing instructions in 11-17/0336r1.

**27.2.3 Updating two NAVs**

***TGax editor: Modify the paragraphs below in 27.2.3 as the following:***

The requirements in 10.3.2.1 (CS mechanism) apply(#7167) to an HE STA maintaining two NAVs with the exception of the virtual CS indication of medium. For an HE STA maintaining two NAVs, if both the NAV timers are 0, the virtual CS indication is that the medium is idle; if one of the two NAV timers is nonzero, and if the STA has dot11Per20MHzVirtualCSOptionImlemented set to true, the virtual CS is indicated per 20 MHz channel as described in 27.5.2.8 (Per-20 MHz Virtual CS), else (#8555) the virtual CS indication is that the medium is busy.

27.5.2.4 UL MU CS mechanism

***TGax editor: Modify the paragraphs below in 27.5.2.4 as the following:***

A NAV is considered in virtual CS for a STA that is solicited by a Trigger frame for transmission unless one of the following conditions is met: (#4831)
 — The NAV was set by an intra-BSS frame

 — The NAV counter is 0 (#5992)

NOTE 1—The details of how a STA is solicited by the Trigger frame for transmission are described in 27.5.2.2.2 (Allowed settings of the Trigger frame fields and UL MU Response Scheduling A-Control subfields).

For a STA that is solicited by a Trigger frame for transmission, the indication of the virtual CS is described as follows~~.~~:

 — If no NAV is considered, then the virtual CS indicates idle.

 — If a NAV is considered for a non-AP STA with dot11Per20MHzVirtualCSOptionImlemented set to true then virtual CS is indicated per 20 MHz as described in 27.5.2.8 (Per-20 MHz Virtual CS). (#8555)

 — Otherwise, the virtual CS indicates busy. (#5992)

***TGax editor: Add the following subclause at the end of subclause 25.5.2.7 NDP feedback report procedure***

**27.5.2.8 Per-20 MHz Virtual CS (#8555)**

Per-20 MHz Virtual CS allows non-AP HE STAs to indicate the virtual CS on a 20 MHz granularity during UL MU CS. Per-20 MHz Virtual CS may only be used by HE STAs operating in the 5 GHz band. An HE STA that implements the Per-20 MHz Virtual CS has dot11Per20MHzVirtualCSOptionImlemented equal to true.

A non-AP HE STA with dot11Per20MHzVirtualCSOptionImlemented set to true shall maintain an internal variable OBSS\_BW to record the channels overlapped by PPDUs identified as inter-BSS or cannot be identified as intra-BSS or inter-BSS. Whenever a non-AP HE STA with dot11Per20MHzVirtualCSOptionImlemented set to true updates its Basic NAV as described in 27.2.3 (Updating two NAVs), the STA shall update the OBSS\_BW as described below. Note that the method of identifying a PPDU as intra-BSS or inter-BSS is described in 27.2.1 (Intra-BSS and inter-BSS frame determination).

If a non-AP HE STA with dot11Per20MHzVirtualCSOptionImlemented set to true is able to determine the channel width information from the received PPDU and if the channel width is larger than the current OBSS\_BW value, the STA shall update the OBSS\_BW based on the channel width information.

If a non-AP HE STA with dot11Per20MHzVirtualCSOptionImlemented set to true is not able to determine the channel width information from the received PPDU, OBSS\_BW shall be set to a value equal to the STA’s operating channel width.

A non-AP HE STA with dot11Per20MHzVirtualCSOptionImlemented set to true shall set OBSS\_BW to 0 when the basic NAV is reset or when the basic NAV counts down to 0.

The encoding of OBSS\_BW is implementation dependent except that a value of 0 indicates that OBSS\_BW is not set.

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For a non-AP HE STA with dot11Per20MHzVirtualCSOptionImlemented set to true, virtual CS during UL MU CS is indicated per 20 MHz channel. If any of the 20 MHz channels containing the STA’s allocated RU for UL MU is within the channels indicated by OBSS\_BW, the 20 MHz channel is indicated as busy by the virtual CS, otherwise the 20 MHz channel is indicated as idle.

***TGax editor: Insert the following MIB variable to the dot11HEStationConfigTable TABLE in Annex C as the follows:***

dot11Per20MHzVirtualCSOptionImlemented OBJECT-TYPE

 SYNTAX TruthValue

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

 "This is a capability variable. Its value is determined by device

 capabilities.

 This attribute, when true, indicates that the STA implementation is

 capable of Per-20 MHz Virtual CS operation. The attribute may be set to true only by STAs operating in the 5 GHz band. The capability is

 disabled, otherwise"

 DEFVAL { false }

::= { dot11HEStationConfigEntry 18}

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-- \* End of dot11HEStationConfigTable TABLE

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