IEEE P802.11  
Wireless LANs

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| **CIDs for: Section 25.5.2.4**  **UL MU CS CCA & CS Required Bit** |
| **Date:** 2016-07-26 |

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Abstract

This submission proposes resolutions for multiple comments related to TGax D0.1 with the following CIDs (10 **CIDs**):

* Provided the resolutions for CID768, 829, 978, 1546, 1295, 2710, 2709, 2187, 2647, 2266

Revisions:

- Rev 0: Initial version of the document.

- Rev 1: Some editorial improvement

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.***

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| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 768 | Jarkko Kneckt | 59.17 | The energy detection when CS Required is set to 1 is not described in details. What channels are sensed and how to signal the capabilities to sense only larger channels is not defined | Define the details of ED when CS Required is set to 1. | Revised.  Agree in principle with the comment.  ED based CCA is described in 21.3.18 VHT receiver specification.  TGax editor to make the changes shown in 11-16/876r0 under all headings that include CID 768. |
| 829 | Jinsoo Ahn | 59.37 | Trigger CS mechanism on Protection case needs to be considered | AP STA shall not set CS required bit to 0 for the condition that the TXOP is protected by NAV setting.  In other words, Protected TXOP case shall not be one of other TBD conditions for 0 CS Required bit case. | Rejected.  Upon receiving a Trigger frame, 3rd party STAs update their NAV regardless of the value of the CS Required bit in the Trigger frame. In addition to that, the default value of the CS Required bit is 1. No reason to describe all the conditions to set the CS Required bit to 1. |
| 979 | kaiying Lv | 59.29 | If there is no CS Required subfield,for example,the trigger information is in HE variant HT Control field of the MAC header,whether CS is required before UL MU transmission? | Please clarify it. | Revised.  Agree in principle with the comment.  According to the condition of CS Required unsetting “trigger frame soliciting ACK/BA and the length of HE trigger-based PPDU below the threshold”, CS Required of the trigger information in HE variant HT Control field shall be 0.  TGax editor to make the changes shown in 11-16/876r0 under all headings that include CID 979. |
| 978 | kaiying Lv | 58.53 | Reference is missing | Please clarify "ED-based CCA is described in XXX and virtual CS is defined in 10.3.2.1 (CS mechanism)." | Revised.  Agree in principle with the comment.  ED based CCA is described in 21.3.18 VHT receiver specification, specifically in 21.3.18.5.2 (CCA sensitivity for operating classes requiring CCA-ED).  TGax editor to make the changes shown in 11-16/876r0 under all headings that include CID 978. |
| 1546 | Mark RISON | 59.34 | "the Trigger frame containing ACK/BA" -- a TF cannot contain either an Ack frame or a BlockAck frame | Reword | Revised.  Agree in principle with the comment.  TGax editor to make the changes shown in 11-16/876r0 under all headings that include CID 1546. |
| 1295 | Mark RISON | 59 | There are 3 references to "UL RU" on this page, but the concept is not defined. How does an "UL RU" differ from other RUs? | Change each to "RU" | Revised.  Agree in principle with the comment.  TGax editor to make the changes shown in 11-16/876r0 under all headings that include CID 1295. |
| 2710 | Yuichi Morioka | 59.26 | "the STA shall not transmit anything in the allocated UL RUs" This is way too restrictive.  STAs should be allowed transmit in subset of UL RUs that are idle | Replace text, "then the STA shall not transmit anything in the allocated UL RUs" to "then the STA shall only transmit in channels that are idle" | Rejected.  There is no SIG-B in the HE trigger-based PPDU, so an AP cannot decode it successfully if a STA sends an HE trigger-based PPDU using the partial RU allocated in a Trigger frame. |
| 2709 | Yuichi Morioka | 59.22 | For improved spectral efficiency, ED should only be conducted for allocated UL RUs. For example 10MHz subchannel is allocated, ED should be conducted in the 10MHz subchannel. | Replace text, "either a single 20MHz channel or multiple of 20MHz channels" with "frequency resource allocated as UL RUs" | Rejected.  In the current spec, CCA-ED is conducted per 20MHz. |
| 2187 | Tomoko Adachi | 59.17 | As aSIFSTime is defined in 10.3.7 as  aSIFSTime = aRxPHYDelay + aMACProcessingDelay +aTxPHYDelay + aRxTxSwitchTime + aTxRampOnTime  and it doesn't include aCCATime (8.3.5.12), in the original 802.11 SIFS, STAs don't have a time to sense the medium during SIFS from the definition point of view. This is because in the original SIFS, STAs don't need to perform CCA.  Now a STA will (conditonally) have to perform ED-based CCA during SIFS after it receives a trigger frame.  The definition of SIFS for 11ax should include such time. | Redefine SIFS for 11ax to include ED-based CCA time (at least when it is required to do so).  Define in section 26 the duration for the minimum required time to perform ED-based CCA within SIFS. | Rejected.  SIFS after a Trigger frame may be interpreted differently (e.g. aRxPHYDelay and aMACProcessingDelay may not be needed within the SIFS if MAC padding is included in a Trigger frame, and those can be used for ED-based CCA time). |
| 2647 | Young Hoon Kwon | 58.54 | In subclause 10.3.2.1 of REVmc\_D5.2, there's description on ED-based CCA. Instead it says "The details of physical CS are provided in the individual PHY specifications." Also, there's no ED-based CCA described in chapter 26 of the draft spec. Therefore, there's no description on ED-based CCA to be used for HE STA. | Clarify ED-based CCA mechanism to be used in UL MU CS mechanism. | Revised.  Agree in principle with the comment.  ED based CCA is described in 21.3.18 VHT receiver specification, specifically in 21.3.18.5.2 (CCA sensitivity for operating classes requiring CCA-ED).  TGax editor to make the changes shown in 11-16/876r0 under all headings that include CID 2647. |
| 2266 | Woojin Ahn | 41.30 | When a UL STA whose assigned RU is placed in secondary 40 carries out ED after MU-RTS, signals from OBSS with low received power may not be sensed appropriately. If the signals from OBSS occupy the assigned RU of the UL STA, the UL STA may interrupt the ongoing transmission of the OBSS. In order to prevent this, additional CS for the assigned RU must be carried out by the UL STA after it receives subsequent trigger frame. | Insert the following at 10.3.2.8a.2 line 61  "In UL MU procedure, AP shall set the CS required subfield of the subsequent Trigger Frame to 1" | Rejected.  The default value of the CS Required bit is 1. No reason to describe all the conditions to set the CS Required bit to 1. |

**Discussion:** *None.*

**Propose:**

Revised for CID 978, 2647 per discussion and editing instructions in 11-16/876r0.

***TGax editor: Modify the sentence on page 58 line 53 as the following:***

The ED-based CCA and virtual CS functions are used to determine the state of the medium if CS is required before responding to a received Trigger frame. ED-based CCA for UL MU CS follows the same procedure as defined in VHT receiver specification(#978)(#2647). ED-based CCA is described in 21.3.18.5.2 (CCA sensitivity for operating classes requiring CCA-ED)(#978)(#2647) and virtual CS is defined in 10.3.2.1 (CS mechanism).

**Propose:**

Revised for CID 768, 1295 per discussion and editing instructions in 11-16/876r0.

***TGax editor: Modify the sentence on page 59 line 17 as the following:***

If the CS Required subfield in a Trigger frame is set to 1, the STA shall consider the status of the CCA (using Energy Detect defined in 21.3.18.5.2 CCA sensitivity for operating classes requiring CCA-ED)(#768) and the virtual carrier sense (NAV) before UL MU transmission in response to the Trigger Frame. In this case, the STA shall sense the medium using energy-detect (ED) after receiving the PPDU that contains the Trigger frame (i.e. during the SIFS time), and it shall perform the energy-detect (ED) at least in the subchannel that contains the STA’s UL allocation, where the sensed subchannel consists of either a single 20 MHz channel or multiple of 20 MHz channels. The STA may transmit an HE trigger-based PPDU when the 20 MHz channels containing the allocated ~~UL~~ RU~~s~~(#1295) in the Trigger frame are considered idle; if the STA detects that the 20 MHz channels containing the allocated ~~UL~~ RU~~s~~(#1295) are not all idle, then the STA shall not transmit anything in the allocated ~~UL~~ RU~~s~~(#1295).

**Propose:**

Revised for CID 979 per discussion and editing instructions in 11-16/876r0.

***TGax editor: Modify the sentence on page 59 line 29 as the following:***

If the CS Required subfield in a Trigger frame is set to 0 or a UL MU response scheduling A-Control field is included in the received (A-)MPDU that solicits a response(#979), the STA may respond with ~~transmit~~ an HE trigger-based PPDU without ~~the carrier sense~~ regard to the busy/idle state of the medium(#979).

**Propose:**

Revised for CID 1546 per discussion and editing instructions in 11-16/876r0.

***TGax editor: Modify the sentence on page 59 line 34 as the following:***

The AP shall set the CS Required subfield to 1 in the Trigger frame(#1546) except under the following conditions:

* All solicited(#1546) HE trigger-based PPDU(s) ~~solicited by the Trigger frame containing ACK/BA~~ contain an ACK frame, a BlockAck frame or a Multi-STA BlockAck frame,(#1546) and the ~~length~~ duration(#1546) of the HE trigger-based PPDU is below a TBD threshold.