### IEEE P802.11Wireless LANs

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| 11ax D2.0 MAC Comment Resolution for NAV Part II |
| Date: 2018-01-10 |
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Abstract

This submission proposes resolutions for comments of TGax Draft 2.0 with the following CIDs:

11076, 11077, 11260, 11949, 12079, 12165, 11916, 13333, 12229, 12284, 12461, 13060, 13061, 13657, 13658, 13720, 13825, 14105, 14106, 14107, 14108, 13076

Revisions:

* Rev 0: Initial version of the document.

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 D2.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D2.0 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** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 11076 | Adrian Stephens | 225.46 | 27.2.5.1 | The figure 27-1 shows an "Other" NAV (CTS). This imples that 3rd parties have decoded the MU CTS response to the AP.In the general case, I don't believe that third parties will be able to receive uplink MU packets, and thereby will be unable to decode the CTS duration. | Remove the NAV(CTS) box, or add note about decodability of the uplink MU CTS. | Rejected –CTS response to MU-RTS is sent with non-HT PPDU format rather than HE TB PPD format. Further, rules have been designed to make sure that CTS responses to MU-RTS from different STAs have the same scrambling seed and MAC format. Hence, the CTS response to MU-RTS can be decoded by the 3rd party STAs. As a result, the NAV (CTS) box for other is required in Figure 27-1. |
| 11077 | Adrian Stephens | 227.35 | 27.2.5.3 | "The subfields of the FrameControl field of a Control frame are set as illustrated in Figure 9-19. The More Data subfield is set to 0 in a CTS frame (see 9.2.4.1.8 (More Data subfield))."This is true, but it is unnecessary to state it here. It sounds like education rather than explaining the consequences of the previous material. | Remove NOTE. | Accepted –  |
| 11260 | Alfred Asterjadhi | 226.64 | 27.2.5.3 | STA is not required to respond to MU RTS Trigger if it has set the UL MU Disable bit to 1. See 27.8. | Add the following item:"The STA has not disabled UL MU operation (see 27.8.3)." | Revised – Agree in principle with the commenter. Currently in the Trigger frame setting, AP is required not to set the value to something that STA does not support, and we then do not need to add additional requirement for Trigger response on the STA side. We think UL MU disable signalling should follow the same logic, and we only need to mandate AP not to schedule Trigger frame when UL MU is disabled.TGax editor to make the changes shown in 11-17/1878r0 under all headings that include CID 11260. |
| 11949 | James Lepp | 96.20 | 9.3.1.23.4 | Change "BW field" to "BW subfield" to match the rest of this clause. | Change "BW field" to "BW subfield" | Accepted -  |
| 12079 | Jinjing Jiang | 227.32 | 27.2.5.3 | why need to set PM bit in CTS response? PM bit is useful only when it is sent from the initiator. | Delete "The Power Management subfield in a CTS frame sent in response to an MU-RTS Trigger frame shall be set to 0." | Rejected – PM bit setting in the CTS frame needs to be the same to make sure that the simultaneous CTS responses can be decoded by the 3rd party STA. According to Figure 9-19 (Frame Control field subfield values within Control frames), PM bit is not reserved in control frame. It is true that the spec says that the STA shall inform the AP of a power management modechange via a frame exchange that includes an acknowledgment from the AP. However, texts in 9.3.1.3 (CTS frame format), 9.2.4.1.7 (Power Management subfield), and 11.2.3 (Power management in a non-DMG infrastructure network) do not mandate the PM bit setting to be 0 in a CTS frame. Hence, we add the sentence here to make sure that the PM bit is always set to 0 in CTS response to MU-RTS. |
| 12165 | kaiying Lv | 95.54 | 9.3.1.23.4 | For 160 MHz and 80+80 MHz indication, B12 of the RU Allocation subfield is set to 1 or 0. Change "1" to "1 or 0" | as comment | Revised –We note that the following texts in 9.3.1.23 (Trigger frame format) of document 1264r2, which is approved in TGax, is not officially incorporated in D2.0. *B12 is set to 1 to indicate 2´996-tone RU. (#3117, 3164, 5757)*The setting of B12 of the RU Allocation subfield for MU-RTS shall align with the original agreement. Hence, we add the missing texts in 9.3.1.23 (Trigger frame format).TGax editor to make the changes shown in 11-17/1878r0 under all headings that include CID 12165. |
| 11916 | Huizhao Wang | 91.13 | 9.3.1.23 | Please define how to set bit 12 for RU size of 2x996 tones in RU Allocation field | Please add "set bit 12 to 0" | Revised –We note that the following texts in 9.3.1.23 (Trigger frame format) of document 1264r2, which is approved in TGax, is not officially incorporated in D2.0. *B12 is set to 1 to indicate 2´996-tone RU. (#3117, 3164, 5757)*We add the missing texts in 9.3.1.23 (Trigger frame format).TGax editor to make the changes shown in 11-17/1878r0 under all headings that include CID 12165. |
| 13333 | ron porat | 90.19 | 9.3.1.23 | Missing explicit specification for bit 12 in case of RU 2x996 | Add "and is set to 1 when the allocated RU is a 2x996-tone RU." | Revised –We note that the following texts in 9.3.1.23 (Trigger frame format) of document 1264r2, which is approved in TGax, is not officially incorporated in D2.0. *B12 is set to 1 to indicate 2´996-tone RU. (#3117, 3164, 5757)*We add the missing texts in 9.3.1.23 (Trigger frame format).TGax editor to make the changes shown in 11-17/1878r0 under all headings that include CID 12165. |
| 12229 | kaiying Lv | 95.54 | 9.3.1.23.4 | For 160 MHz and 80+80 MHz indication, B12 of the RU Allocation subfield is set to 1 or 0. Change "1" to "1 or 0" | as comment | Revised –We note that the following texts in 9.3.1.23 (Trigger frame format) of document 1264r2, which is approved in TGax, is not officially incorporated in D2.0. *B12 is set to 1 to indicate 2´996-tone RU. (#3117, 3164, 5757)*The setting of B12 of the RU Allocation subfield for MU-RTS shall align with the original agreement. Hence, We add the missing texts in 9.3.1.23 (Trigger frame format).TGax editor to make the changes shown in 11-17/1878r0 under all headings that include CID 12165. |
| 12284 | Kazuyuki Sakoda | 225.14 | 27.2.5 | MU-RTS/CTS procuedre should be useful for a frame exchange sequence initiated by non-AP STA, i.e., STAs in IBSS or in MBSS. However, the current spec only assumes that the MU-RTS is transmitted by APs. The spec should allow more flexible utilization of MU-RTS/CTS. | Please consider to allow use of MU-RTS/CTS proceudre for STAs in IBSS and in MBSS. | Rejected - In the current spec, any variants of Trigger frame can only be transmitted by the AP because the STA info field requires assignment of AID to identify the STA that is solicited for responses. The texts that limiting Trigger frame to be sent by AP is described in P245L53. 11ax task group has agreed on this limitation, and spec texts are already written to align with this limitation. Enabling Trigger frame to be sent by non-AP STA at this stage requires a huge amount of spec work, and 11ax development will be delayed. Hence, we reject this comment.    |
| 12461 | Liwen Chu | 227.31 | 27.2.5.3 | The paragraph should be removed since the Power Management field addressed to AP is always ignored.See P1999 L45 in 11md D0.3 "NOTE 2--The Power Management subfield is ignored in frame exchanges initiated by the AP." | As in comment | Rejected – We note that the cited texts by the commenter only specifies that the power management bit is ignored in the CTS frame to AP. However, it does not specify the value that has to be set in the CTS frame to AP. According to Figure 9-19 (Frame Control field subfield values within Control frames), PM bit is not reserved in control frame. Texts in 9.3.1.3 (CTS frame format), 9.2.4.1.7 (Power Management subfield), and 11.2.3 (Power management in a non-DMG infrastructure network) also do not mandate the PM bit setting in a CTS frame. Since the CTS resposnes to MU-RTS from different STAs shall have the same content, it is then necessary to mandate the setting. Note that setting the value to 0 is the same as the setting mandated for a reserved field. |
| 13060 | Osama Aboulmagd | 228.08 | 27.2.5.3 | Figure 27-3 is confusing. The description says that "MU-RTS trigger frame is transmitted in a 40 MHz non-HT duplicate PPDU". Non-HT means legacy which is cannot be transmitted on 40 MHz. Duplicate means there is another PPDU (the duplicate) one. The Figure doesn't show any of this. The Figure also shows multiple primary channels which is very confusing. | improve the quality of the Figure | Revised – We note that “40 MHz non-HT duplicate PPDU” is an official term defined in 3.1 (Definitions). As for the primary channel, we note that “primary 20 MHz channel” or “primary 40 MHz channel” are official terms defined in 3.1 (Definitions) as well. However, the figure only primary 20 MHz and primary 40 MHz without the term channel. We revise the figure by adding the “channel” in the figure.TGax editor to make the changes shown in 11-17/1878r0 under all headings that include CID 13060. |
| 13061 | Osama Aboulmagd | 227.39 | 27.2.5.2 | what if CTS frames are received from only some STAs and not all of them. Does the AP enter retransmission in this case. Need to make it clear. | as in comment. Perhaps using BSSID in the MAC header. | Rejected – We assume that the commenter comments on the paragraph on P226L39.We note that all the CTS response to a MU-RTS Trigger frame has the same MAC content and PHY format. Hence, AP can not distinguish the source of the CTS frames. Due to this reason, the description of paragraph in P226L39 is sufficient. |
| 13657 | Tomoko Adachi | 225.51 | 27.2.5.1 | Figure 27-1 needs to be updated considering two NAVs operation. | As in comment. | Rejected – Figure 27-1 simply describes the NAV duration set from MU-RTS and CTS. Hence, there is no need to further describe if the 3rd party STA has two NAV timers or one NAV timer. |
| 13658 | Tomoko Adachi | 226.26 | 27.2.5.1 | Figure 27-2 needs to be updated considering two NAVs operation. | As in comment. | Rejected – Figure 27-2 simply describes the NAV duration set from MU-RTS and CTS. Hence, there is no need to further describe if the 3rd party STA has two NAV timers or one NAV timer. |
| 13720 | Vincent Knowles IV Jones | 226.33 | 27.2.5.2 | A transmitter isn't mandated to do this | change "MU-RTS trigger frame shall request" to "MU-RTS trigger frame requests" | Rejected –We note that similar rule for Trigger frame is defined in 27.5.3.2.3 (Allowed settings of the Trigger frame fields and UMRS Control field). Please see P247L27. MU-RTS is a variant of Trigger frame, and similar rule is added for that reason. |
| 13825 | Yasuhiko Inoue | 225.31 | 27.2.5.1 | "DL MU PPDU to STA1 and STA2" in figure 27-1 should be "HE MU PPDU to STA1 and STA2" to explicitly show that this frame sequence is for the HE STAs. | As in the comment. | Accepted - |
| 14105 | Yuichi Morioka | 226.55 | 27.2.5.2 | Why is the MU-RTS trigger frame restricted not to be sent in VHT/HE MU PPDU? Should it be restricted to be sent in non-HT PPDU to provide protection? | Remove sentence and add "An MU-RTS Trigger frame shall be carried in non-HT PPDU" | Rejected –MU-RTS Trigger frame is restricted not to be sent in VHT/HE MU PPDU due to the following reasons. First, sending MU-RTS Trigger frame with VHT PPDU or HE SU PPDU already provides the VHT or HE benefits for sending the MU-RTS Trigger frame, and allowing MU-RTS Trigger frame to be sent in VHT/HE MU PPDU do not provide additional benefits. Further, allowing the MU-RTS Trigger frame to be sent with VHT/MU PPDU will then require the coordination among multiple PPDUs to guarantee the same CTS responses for MU-RTS, which requires a lot of spec works that do not provide additional benefits. We do not restrict MU-RTS Trigger frame to be sent only in non-HT PPDU because the transmitter can decide whether to do it or not. Transmitter can also send CTS-to-self frame with non-HT PPDU to provide protection and send MU-RTS Trigger frame with HE SU PPDU to reduce overhead. |
| 14106 | Yuichi Morioka | 227.19 | 27.2.5.3 | "...non-HT duplicate PPDU." Is there a definition of non-HT PDDUs that are sent across 80, 80+80, 160MHz channels? | Clarify that a non-HT duplicate PPDU can be sent across channels wider than 40MHz. | Rejected –We note that “non-HT duplicate” is deifned officially in 3.1 Definitions as shown below.***non-high-throughput (non-HT) duplicate:*** *A transmission format of the physical layer (PHY) thatduplicates a 20 MHz non-HT transmission in two or more 20 MHz channels and allows a station (STA) in a non-HT basic service set (BSS) on any one of the 20 MHz channels to receive the transmission. A non-HT duplicate format is one of the following:a) 40 MHz non-HT duplicate: A transmission format of the PHY that replicates a 20 MHz non-HTtransmission in two adjacent 20 MHz channels.b) 80 MHz non-HT duplicate: A transmission format of the PHY that replicates a 20 MHz non-HTtransmission in four adjacent 20 MHz channels.c) 160 MHz non-HT duplicate: A transmission format of the PHY that replicates a 20 MHz non-HTtransmission in eight adjacent 20 MHz channels.d) 80+80 MHz non-HT duplicate: A transmission format of the PHY that replicates a 20 MHz non-HTtransmission in two frequency segments of four adjacent 20 MHz channels where the two frequencysegments of channels are not adjacent.* |
| 14107 | Yuichi Morioka | 227.28 | 27.2.5.3 | The spec should allow for HE STAs to send the CTS frame in subset of channels that are not busy to the HE STA of the channels indicated in the RU allocation subfield, because a) the HE AP will not know which channels were responded anyway b) the HE STA will be able to provide protection at least in channels that are not busy to the HE STA. | Allow the option for HE STA to send the CTS frame in subset of the channels indicated in the RU Allocation subfield of the trigger frame. | Rejected – We reject this comment based on the following reasons. First, responding to bandwidth allocated by AP is the requirement for other variatns of Trigger frame as well. To unify the implementation requirement, MU-RTS should follow the same rule. Second, response on a subset of allocated channels opens the possibility of non-contiguous non-HT responses, which is not even supported by the baseline non-HT duplicate PPDU transmission.  |
| 14108 | Yuichi Morioka | 227.42 | 27.2.5.3 | Why would the HE AP require STA1 to send CTS only in primary 20MHz? | Add description as to why the AP requested for CTS transmission in only primary 20MHz to STA1. | Rejected – AP can do RU allocation in MU-RTS for CTS responses for any implementation specific reasons. One reason can be that STA1 is a 20 MHz only STA. Another reason can be that AP will only allocate primary 20 MHz channel for STA1 in the following MU transmission. In the example, we do not need to add reasons why AP request STA to only transmit on primary 20 MHz channel, which is out of the scope of the spec. |
| 13076 | Pascal VIGER | 225.16 | 27.2.5 | Please clarify (and state it explicitly in the specification) if MU-RTS/CTS is compliant with the dynamic bandwidth operation supported by VHT STAs.(e.g. can MU-RTS contain or not a bandwidth signalling TA ?, sensing periods are not the same : SIFS after MU-RTS, compared to PIFS before MU-RTS...) | as per comment | Rejected –MU-RTS is defined a variant of Trigger frame as described in 9.3.1.23.4 (MU-RTS variant) to ultilize the simultaneous solicited transmission capability defined by Trigger frame. Hence, MU-RTS is not designed to follow the rules of VHT RTS frame. Instead, MU-RTS is designed to align the design principle of Trigger frame. The TA of Trigger frame is the address of the STA transmitting the Trigger frame as described in 9.3.1.23 (Trigger frame format), which does not have bandwidth signalling TA. Note that bandwidth signalling in the scrambling seed is also not requied because Trigger frame already has bandwidth signlaing in Common Info field as described in 9.3.1.23 (Trigger frame format).The sensing rule of Trigger frame is defined to be SIFS after the Trigger frame because Trigger frame maybe carried in the long PPDU. To unify the rule, all the Trigger frame then have the same sensing rule. For details, please see 11-16/1301r0.Finally, the spec only requires to describe the operation, and there is no need to have comparison among features. |

**Discussion:** *None.*

**Propose:** Revised for CID 11949, 12165 per discussion and editing instructions in 11-17/1878r0.

***TGax editor: Change 9.3.1.23.4 MU-RTS variant*** ***as the following: (Track change on)***

* Trigger frame format

**(…existing texts…)**

* For an 80 MHz, 160 MHz and 80+80 MHz PPDU, the mapping of B19-B13 to RU allocation follows the RU index in Table 28-8 (Data and pilot subcarrier indices for RUs in an 80 MHz HE PPDU) in increasing order(#6329).
* The value 0 indicates 26-tone RU1 [499: 474], and the value 36 indicates 26-tone RU37 [474: 499].
* The value 37 indicates 52-tone RU1 [499: 448], and the value 52 indicates 52-tone RU16 [448: 499].
* A similar ordering is followed for 106-tone RU, 242-tone RU, 484-tone RU and 996-tone RU.
* For a 160 MHz and 80+80 MHz PPDU, B19-B13 are 1000100 indicates 2996-tone RU and B12 is set to 1 to indicate 2996-tone RU.(#12165)

**(…existing texts…)**

**9.3.1.23.4 MU-RTS variant**

**(…existing texts…)**

If the BW subfield(#11949)(#7274) indicates 80+80 MHz or 160 MHz, then the primary and secondary 80 MHz is indicated by setting B19-B13 of the RU Allocation subfield to 68(#3117).(#8117)(#8396)

**Propose:** Revised for CID 11077, 11260, 13060, 13825 per discussion and editing instructions in 11-17/1878r0.

* *TGax editor: Change 27.8.3 Rules for transmit operating mode (TOM) indication and 27.2.5 MU-RTS/CTS procedure as the following: (Track change on)*
* Rules for transmit operating mode (TOM) indication(#7115)

**(…existing texts…)**

The AP OMI responder shall not send any Trigger frame variants or frames carrying UMRS Control fields(#6190) to the non-AP STA OMI initiator for subsequent TXOPs (see 27.5.3 (UL MU operation)) when the UL MU Disable subfield is 1 in the most recently received OM Control subfield sent by the STA(#7507)(#7051).(#11260)

**(…existing texts…)**

* MU-RTS/CTS procedure(#9274)
* General

The MU-RTS/CTS procedure allows an AP to initiate a TXOP and protect the TXOP(#Ed) frame exchanges(#7140). An HE AP may transmit an MU-RTS Trigger frame(#9481) to solicit simultaneous CTS responses from one or more HE STAs.

Figure 27-1 (Example of MU-RTS/CTS/DL MU PPDU/Acknowledgement Response and NAV setting) shows an example of the exchange of MU-RTS and simultaneous CTS responses to protect the DL MU PPDU and the(#9275) acknowledgement responses.

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| (#13825) |
| (#13825) |
| * Example of MU-RTS/CTS/DL MU PPDU/Acknowledgement Response and NAV setting(#5561)
 |

**(…existing texts…)**

* CTS response to MU-RTS

If an HE STA receives an MU-RTS Trigger frame(#9481), the HE STA shall commence the transmission of a CTS frame response at the SIFS time boundary after the end of a received PPDU when all the following conditions are met:

* The MU-RTS Trigger frame(#9481) 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(#9476) AID of the STA and the MU-RTS Trigger frame is sent by the AP with which the STA is associated with or by the AP corresponding to the transmitted BSSID if 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).(#7569)
* The UL MU CS condition indicates that the medium is idle (see 27.5.3.5 (UL MU CS mechanism)).
* The RU Allocation subfield in the User Info field addressed to the STA indicates primary 20 MHz channel, primary 40 MHz channel, primary 80 MHz channel,160 MHz channel, or 80+80 MHz channel.(#9476)

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

(#9850, #8411, #7569)

NOTE—The ED-based CCA during the SIFS after receiving an MU-RTS Trigger frame and virtual CS functions are used to determine the state of the medium to respond to an MU-RTS Trigger frame. See 27.5.2.4 (UL MU CS mechanism) for details.(#8411)

The CTS frame sent in response to an MU-RTS Trigger frame(#9481) shall be carried in a non-HT or non-HT duplicate PPDU (see Clause 17)(#5934).

A non-AP HE STA(#6256) transmitting a CTS frame in response to an MU-RTS Trigger frame(#9481) shall set the TXVECTOR parameter SCRAMBLER\_INITIAL\_STATE to the same value as the RXVECTOR parameter SCRAMBLER\_INITIAL\_STATE of the received MU-RTS Trigger frame(#9481). The data rate to be used for the non-HT or non-HT duplicate PPDU(#5761) response shall be 6 Mb/s.(#5934)

A CTS frame sent in response to an MU-RTS Trigger frame(#9481) shall be transmitted on the 20 MHz channels indicated in the RU Allocation subfield of the User Info field of the MU-RTS Trigger frame(#9481).(#8256)

(#9476)The Power Management subfield in a CTS frame sent in response to an MU-RTS Trigger frame shall be set to 0.

(#11077)Figure 27-3 (An example of an MU-RTS Trigger frame soliciting CTS frame responses on the primary 40 MHz channel) shows an example of the exchange of MU-RTS and simultaneous CTS frame responses on the primary 40 MHz channel. In this example, MU-RTS Trigger frame(#9481) is transmitted in a 40 MHz non-HT duplicate PPDU on the primary 40 MHz channel. Further, the MU-RTS Trigger frame(#9481) requests STA1 to transmit a CTS frame response in a non-HT PPDU on the primary 20 MHz channel and STA2 to transmit a CTS frame response in a 40 MHz non-HT duplicate PPDU on the primary 40 MHz channel.

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| (#13060) (#13060) |
| * An example of an MU-RTS Trigger frame(#9481) soliciting CTS frame responses on the primary 40 MHz channel
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A STA that transmits a CTS frame in response to an MU-RTS Trigger frame(#9481) shall follow the synchronization requirement (#6501)defined in 17.3.9.10 (Pre-correction accuracy requirements).