### IEEE P802.11 Wireless LANs

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| 11ax D1.0 MAC Comment Resolution for 10.3.2.8a | | | | |
| Date: 2017-02-15 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Po-Kai Huang | Intel Corporation | 2200 Mission College Blvd, Santa Clara, CA 950542200 |  | po-kai.huang@intel.com |
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Abstract

This submission proposes resolutions for comments of TGax Draft 1.0 with the following CIDs:

5075, 5076, 5561, 9481, 5562, 5563, 9274, 7140, 9423, 5044, 9425, 8095, 8096, 5045, 9427, 7975, 5932, 7976, 9424, 9426, 9557, 9681, 9850, 5933, 8411, 9515, 7569, 8410, 5795, 7137, 5761, 9682, 8256, 8257, 9428, 4835, 5934, 9851

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Editorial revision based on the comments from Alfred

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 D1.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D1.0 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** |
| 5075 | Der-Zheng Liu | 117.42 | 10.3.2.8a | For the example of Figure 10-9a, if only one of STA1 and STA2 respones a valid CTS frame, AP should recognite as successful respone. But if STA1 is busy, AP would still sent DL MU PPDU, and STA1 would be not protected by this MU-RTS/CTS procedure. | The MU-RTS/CTS procedure allows an AP to protect an MU transmission. An HE AP may transmit an MU-RTS frame to solicit simultaneous CTS responses from one or more HE STAs.  Need to find out a better solution for some hidden node issue caused by the simultaneous CTS responses. | Rejected –  AP is allowed to use BSRP or BQRP to check if station is busy on the allocated channel and adjust the following DL MU transmission accordingly. Hence, there are exisitngs schemes, and there is no need for additional solution. |
| 5076 | Der-Zheng Liu | 117.42 | 10.3.2.8a | For the example of Figure 10-9c, STA1 should sent a CTS frame response on primary 20MHz channel indicated by MU-RTS, if the primary 20MHz is idle. However, if there is a hidden node for AP and STA2, which interferes STA1 on secondary 20 MHz channel, STA1 still would sent the CTS frame response. Right? In this case, AP sent a DL MU PPDU to STA1 and STA2, STA1 may be collided by this hidden node for AP. | A CTS frame sent in response to an MU-RTS frame shall be transmitted on the 20 MHz channels indicated in the RU Allocation subfield of the User Info field of the MU-RTS frame when the indicated 20 MHz channels are all idle. If any 20 MHz channel indicated in the RU Allocation subfield of the User Info field is busy, the CTS frame response shall not be transmitted.  1. Need to find out a better solution for some hidden node issue caused by the CTS frame response on a smaller BW channel indicated by MU-RTS. 2. Why not to limit the CTS frame response with the same full bandwith? | Rejected –  The reason for AP to allocate primary 20 MHz channel for STA1 to respond is that AP will only use prmary 20 MHz channel to transmit data to STA1 in the follow up frame excahgne. As a result, if AP allocates bandwidth larger than primary 20 MHz for STA1 to respond, there exists the issue of overprotection. Hence, limiting the CTS response to the same bandwidth prevents the possibility of resolving overprotection.  Note that it is up to AP to decide which level of protection should be used, AP is allowed to set the responding bandwidth from a STA equal to the transmission bandwidth of MU-RTS. |
| 5561 | Graham Smith | 116.07 | 10.3.2.8a | Figure 10-9a, Would STA1 and STA2 reply CTSs together? If so the AP may well not be able to hear them as they will interfere with each other. Same with the Acks. True CTS responds at SIFS but what happens in this case, is it such that the AP does not care? Should really add some text to explain the fighure. | Add text to explain that the CTS and Ack responses are ignored, if that is the case. | Revised -  We clarify that the CTS response from STA1 and STA2 do not collide with each other because the CTS frame is transmitted with the same scrambling seed, data rate, and frame format. As a result, the CTS response is not ignored.  The acknowledgement response from STA1 or STA 2 is carried in HE trigger-based PPDU. As a result, the acknowledgement response STA1 or STA2 do not collide with each other.  We revise the figure to clarify that the acknowledgement response is carried in HE trigger-based PPDU.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 5561. |
| 9481 | xun yang | 116.37 | 10.3.2.8a.1 | What is TB in Figure 10-9b? | Change to the name consitent with other parts of the draft. | Revised –  Agree in principle with the commenter. Change TB to trigger-based. We also revise “MU-RTS frame” with “MU-RTS Trigger frame” for consistent naming for different variants of Trigger frame.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 9481. |
| 5562 | Graham Smith | 116.33 | 10.3.2.8a | Figure 10-9b. As in Fig 10-9a the CTS and ACKs coincide ans hence may not be heard by the AP. Does this matter or is it simply ignoresd by the AP which is only interested in the Trigger frame and the Multi-STA Block Ack. If tyhis is so needs some explanatory words | Add text to explain that the CTS and Ack responses are ignored, if that is the case. | Revised -  We clarify that the CTS response from STA1 and STA2 do not collide with each other because the CTS frame is transmitted with the same scrambling seed, data rate, and frame format. As a result, the CTS response is not ignored.  Note that there is no Ack response from the STAs in Figure 10-9b, and we only clarify the meaning of “TB” in Figure 10-9b.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 9481. |
| 5563 | Graham Smith | 116.64 | 10.3.2.8a.2 | "If a PHY-RXSTART.indication primitive does not occur during the CTSTime-out interval, the STA shall conclude that the transmission of the MU-RTS frame has failed, and this STA shall invoke its backoff procedure upon expiration of the CTSTimeout interval." But the figures 10-9a and 9b show the CTS responses clashing and the CTS will not be received and the STA will retry with the same result. Will this ever work because the CTSs could clash forever. | Explain how the CTS s can be received and the MU-RTS not retried ad infinitum. | Rejected –  We clarify that the CTS response from STA1 and STA2 do not collide with each other because the CTS frame is transmitted with the same scrambling seed, data rate, and frame format. As a result, the CTS responses do not collide with each other. |
| 9274 | Tomoko Adachi | 115.57 | 10.3.2.8a | The MU-RTS/CTS procedure is limited among HE APs and HE STAs. Isn't it better to move under such as 27.5? | Move clause 10.3.2.8a and its subclauses between 27.5.2 and 27.5.3. Describe somewhere appropriate in 10.3.2 that the MU-RTS/CTS procedure is described in 27.5. | Revised –  Agree in principle with the commenter. Move the section of MU-RTS/CTS procedure form 10.3.2.8a to 27.4a.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 9274. |
| 7140 | kaiying Lv | 115.62 | 10.3.2.8a.1 | MU-RTS/CTS also allows an AP to protect a GCR transmission.Change to "The MU-RTS/CTS procedure allows an AP to protect an MU transmission or a GCR transmission." | As in comment | Revised –  Agree in principle with the commenter. In general, the MU-RTS/CTS procedure allows an AP to initiate a TXOP and protect the following frame exchanges exchange. We revise with the general description rather than specifying every possible protection sequence, which is meaningless for a general description.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 7140. |
| 9423 | Xiaofei Wang | 116.29 | 10.3.2.8a.1 | why is "scheduled" used in "scheduled HE trigger-based PPDU"? This "scheduled" seems to be unnecessary and should be removed. Especially since "scheduled" is not mentioned anywhere else in the figure or title. | remove "scheduled" | Aceepted –  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 9423. |
| 5044 | Chunyu Hu | 117.05 | 10.3.2.8a.2 | There might be more than one recipient of an MU-RTS. | Change "sent by the receipient of the MU-RTS frame" to "sent by any recipient of the MU-RTS frame" | Accepted –  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 5044. |
| 9425 | Xiaofei Wang | 117.05 | 10.3.2.8a.2 | It is unclear which STA "the recipient" is of the MU-RTS, it should be changed to "a recipient". | change "the recipient" to "a recipient" or to "one or more recipients" | Revised –  Agree in principle with the commenter. We revise “the recipient” with “any recipient.”  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 5044. |
| 8095 | Matthew Fischer | 117.05 | 10.3.2.8a.2 | There might be more than one recipient of an MU-RTS. | Change "sent by the receipient of the MU-RTS frame" to "sent by any recipient of the MU-RTS frame" | Accepted –  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 5044. |
| 8096 | Matthew Fischer | 117.10 | 10.3.2.8a.2 | Why is the MU-RTS not allowed to be sent in an HE PPDU? There is no sense to having such a restriction. | Remove the cited line which disallows MU-RTS from being sent using an HE PPDU format. | Rejected –  We note that the cited sentence only restricts MU-RTS transmission to be carried in HE MU PPDU rather than all HE PPDU format.  The reason for this rule is as follows.  First, if the MU-RTS frame is aggregated with other variants of Trigger frame, since MU-RTS solicits non-HT PPDU response, there will be HE trigger-based PPDU response and non-HT PPDU response simultaneously from the responding STA. As a result, the response just can not be decoded by AP. Second, if multiple MU-RTS is aggregated in HE MU PPDU, it is not more efficient, and we require the rule of same scrambling initialization state for different PPDUs. Hence, we conclude that there is no practical usefulness to carry MU-RTS in HE MU PPDU, and we simply prevent MU-RTS from being carried in HE MU PPDU. |
| 5045 | Chunyu Hu | 117.10 | 10.3.2.8a.2 | Why is the MU-RTS not allowed to be sent in an HE PPDU? There is no sense to having such a restriction. | Remove the cited line which disallows MU-RTS from being sent using an HE PPDU format. | Rejected –  We note that the cited sentence only restricts MU-RTS transmission to be carried in HE MU PPDU rather than all HE PPDU format.  The reason for this rule is as follows.  First, if the MU-RTS frame is aggregated with other variants of Trigger frame, since MU-RTS solicits non-HT PPDU response, there will be HE trigger-based PPDU response and non-HT PPDU response simultaneously from the responding STA. As a result, the response just can not be decoded by AP. Second, if multiple MU-RTS is aggregated in HE MU PPDU, it is not more efficient, and we require the rule of same scrambling initialization state for different PPDUs. Hence, we conclude that there is no practical usefulness to carry MU-RTS in HE MU PPDU, and we simply prevent MU-RTS from being carried in HE MU PPDU. |
| 9427 | Xiaofei Wang | 117.11 | 10.3.2.8a.2 | Would a MU-RTS be carried in HE Trigger-based PPDU? If not, it should be stated here together with HE MU PPDU. | add "or in an HE Trigger-Based PPDU" before the period if MU-RTS is also not carried in a HE Trigger-Based PPDU. | Rejected –  Trigger frame transmission is not supported by the non-AP STA. Hence, trigger frame will never be carried in HE trigger-based PPDU. Add the suggested texts has the implication that Trigger frame transmission is supported by the non-AP STA, which is not true. |
| 7975 | Mark RISON | 117.10 | 10.3.2.8a.2 | It is not clear whether an MU-RTS can be carried in a VHT MU PPDU | Add "VHT or" before "HE" at the cited location | Accepted –  Follow similar motivation to prevent MU-RTS from being carried in HE MU PPDU as described below.  First, if the MU-RTS frame is aggregated with other variants of Trigger frame, since MU-RTS solicits non-HT PPDU response, there will be HE trigger-based PPDU response and non-HT PPDU response simultaneously from the responding STA. As a result, the response just can not be decoded by AP. Second, if multiple MU-RTS is aggregated in HE MU PPDU, it is not more efficient, and we require the rule of same scrambling initialization state for different PPDUs.  Hence, we agree that the same restriction should be applied to VHT MU PPDU.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 7975. |
| 5932 | James Yee | 117.05 | 10.3.2.8a.2 | It is not clear that if MU-RTS is sent on multiple 20MHz channels but CTS is only received on serveral of them, can the transmitter of MU-RTS proceed with the frame exchange sequence on the channels without a corresponding CTS reception? | Suggest that those channels without CTS reception corresponding to the MU-RTS should not to be used for transmission during the NAV obtained. Otherwise, statements should be added in the spec to explicitly say the transmission of MU-RTS on those channel is still interpreted as successful. | Rejected–  Since the AP will only decode the primary channel, and the CTS response does not carry bandwidth information, AP does not know the channel that is occupied by the CTS response.  This topic also has been discussed in 11-16-1353r1, and the agreed rule is that AP can continue to transmit in the channel occupied by MU-RTS. The corresponding text also has been added in 11-16-1353r1. |
| 7976 | Mark RISON | 118.30 | 10.3.2.8a.3 | In the example shown in Figure 10-9c, if STA2 does not respond with a CTS, it is not clear whether the AP is permitted to transmit using both primary and secondary 20MHz channels | At the end of 10.3.2.8a.2 add a para "The transmitter of an MU-RTS frame shall not subsequently transmit during the TXOP in any 20 MHz channel for which it did not receive a CTS frame." | Rejected–  Since the AP will only decode the primary channel, and the CTS response does not carry bandwidth information, AP does not know the channel that is occupied by the CTS response.  This topic also has been discussed in 11-16-1353r1, and the agreed rule is that AP can continue to transmit in the channel occupied by MU-RTS. The corresponding text also has been added in 11-16-1353r1. |
| 9424 | Xiaofei Wang | 116.55 | 10.3.2.8a.2 | It is strange to start the MU-RTS procedure by stating what the MU-RTS should not request a STA to send a CTS frame in a 20 MHz channel not occupied by the PPDU. Such a ""not doing something" comment normally follows the positive normative behavior. Such a normative behavior should be added. | add description first on the normative procedure on MU-RTS should request responding CTS to transmit on certain resources at the beginning of the paragraph. Or alternatively, change the order of the two sentences of this paragraph. | Revised –  Agree in principle with the commenter. Change the order of the two sentences.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 9424. |
| 9426 | Xiaofei Wang | 117.06 | 10.3.2.8a.2 | A CTS is not a "successful response" to a MU-RTS, rather, it is a valid response, showing that the transmission of the MU-RTS has succeeded. This sentence needs revision to make it correct. | change the phrase "as successful response" into "as a valid response" | Revised –  Agree in principle with the commenter. Revise with “as success of MU-RTS transmission.”  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 9426. |
| 9557 | Yonggang Fang | 116.64 | 10.3.2.8a.2 | When a HE STA does not receive the simultaneous CTS response to the MU-RTS, it indicates the radio condition of MU-RTS receiving STAs does not allow those STAs to send CTS responses. Therefore the transmitting STA of MU-RTS may perform re-transmission of MU-RTS later or start a new transmisson to other STAs after backoff procedure. | change to "... and this STA shall invoke its backoff procedure upon expiration of the CTSTimeout interval to re-transmit the MU-RTS or start new transmissions to other STAs." | Rejected –  We note that the same text has been used in 10.3.2.7 CTS and DMG CTS procedure for the description of identifying success and failure of RTS transmission as shown below.  *If a PHY-RXSTART.indication primitive does not occur during the CTSTimeout interval, the STA shall conclude that the transmission of the RTS frame has failed, and this STA shall invoke its backoff procedure upon expiration of the CTSTimeout interval.*  Further, the spec has already allowed the STA to decide to retransmit MU-RTS or start new transmissions. If we start to list the possible cases, we will then need to specify all the possible allowed transmission, which will also include RTS transmission, trigger frame transmission, and so on. Specify all the possible cases is meaningless in this section. All we need to emphasize is that backoff procedure is required. |
| 9681 | Yongho Seok | 117.08 | 10.3.2.8a.2 | What is a procedure after a failure of the MU-RTS frame transmission? Add the following setence (same rule defined in 802.11 base spec): "In this instance, the STA shall invoke its backoff procedure at the PHY-RXEND.indication primitive and may process the received frame." | As per comment. | Revised –  Agree in principle with the commenter. Similar sentence has been added in Revmc for RTS as well.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 9681. |
| 9850 | Young Hoon Kwon | 117.25 | 10.3.2.8a.3 | As shown in 9.3.1.23.4, the RU Allocation subfield for MU-RTS frame is set to indicate P20/P40/P80/P160/80+80. In other words, once the MU-RTS is received correctly, there's no way that the RU Allocation is set to other values. In this sense, it is meaningless to add the third bullet. | Delete the third bullet. | Accetped –  Agree with the commenter.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 9850. |
| 5933 | James Yee | 117.25 | 10.3.2.8a.2 | The specs says a MU-RTS receiver shall only respond to a CTS frame if the RU allocation subfield in the User Info of the received MU-RTS is either the primary 20 MHz channel, primary 40 MHz channel, primary 80 MHz channel, 160 MHz channel, or 80+80 MHz channel of the MU-RTS receiver. But such requirement does not exist for the MU-RTS transmitter in 10.3.2.8a.2. It is also not clear if such a requirement implies the secondary channel (or any RU on the secondary channl) of a MU-RTS receiver is never used during the MU-RTS reservation. | Either remove this requirement on the receiver side or add corresponding requirerment on the transmiiter side. | Revised –  Agree in principle with the commenter. The allowed setting of RU Allocation field is already described in 9.3.1.23.4. Hence, we remove the bullet for the rule on the receiver side.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 9850. |
| 8411 | Po-Kai Huang | 117.21 | 10.3.2.8a.3 | The description of ED-based CCA and virtual CS in the second bullet of the condition for responding to MU-RTS seems to be redundant because the UL MU CS section has already included ED-based CCA and virtual CS. | Remove the description of ED-based CCA and virtual CS or turn the description of ED-based CCA and virtual CS to a note. | Accepted –  Agree with the commenter.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 8411. |
| 9515 | Yasuhiko Inoue | 117.22 | 10.3.2.8a.3 | "The ED-based CCA during the SIFS after receiving an MU-RTS frame and ..."  The ED-based CCA should be defined. | As in the comment. | Revised –  Agree in principle with the commenter. The bullet has been revised, and a note has been added.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 8411. |
| 7569 | Liwen Chu | 117.29 | 10.3.2.8a.3 | "The MU-RTS frame is sent by the AP with which the STA is associated and the value of the basic NAV is 0"  carrier sensing bullet already cover the text after and. The text before and is not necessary since the MU-RTS is always from the associated STA. | Removing the bullet | Revised –  Agree in principle with the commenter. We delete the fourth bullet, revise the first bullet by following the description in 27.5.2.3 STA behaviour, and add the consideration for Multi-BSSID Trigger frame.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 7569. |
| 8410 | Po-Kai Huang | 117.29 | 10.3.2.8a.3 | The fourth bullet of the condition for responding to MU-RTS is covered by the second bullet. | Combine fourth bullet and second bullet. | Revised –  Agree in principle with the commenter. We delete the fourth bullet, revise the first bullet by following the description in 27.5.2.3 STA behaviour, and add the consideration for Multi-BSSID Trigger frame.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 7569. |
| 5795 | Huizhao Wang | 117.29 | 10.3.2.8a.3 | The 4th rule of responding to MU-RTS is not clear, it mentions a term "basic NAV" is 0, but no where in the text has description of "basic NAV" | Please add text to describe the term "basic NAV" | Revised –  Agree in principle with the commenter. We delete the fourth bullet, revise the first bullet by following the description in 27.5.2.3 STA behaviour, and add the consideration for Multi-BSSID Trigger frame.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 7569. |
| 7137 | kaiying Lv | 117.29 | 10.3.2.8a.3 | The MU-RTS frame can be sent to one or more STAs by the AP with which the STAs are associated or by the AP corresponding to the transmitted BSSID. | Please change the text as follows "The MU-RTS frame is sent by the AP with which the STA is associated or by the AP corresponding to the transmitted BSSID and the value of the basic NAV is 0." | Revised –  Agree in principle with the commenter. We delete the fourth bullet, revise the first bullet by following the description in 27.5.2.3 STA behaviour, and add the consideration for Multi-BSSID Trigger frame.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 7569. |
| 5761 | Guoqing Li | 117.39 | 10.3.2.8a.3 | missing "non-HT duplicate" | change to "The data rate to be used for the non-HT or non-HT duplicate..." | Accepted –  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 5761. |
| 9682 | Yongho Seok | 117.39 | 10.3.2.8a.3 | "The data rate to be used for the non-HT PPDU response shall be 6 Mb/s (see 17.1.1 General)." A non-HT duplicate PPDU is missing. Change it as the following: "The data rate to be used for the non-HT or non-HT duplicate PPDU response shall be 6 Mb/s (see 17.1.1 General)." | As per commnet. | Accepted –  Agree in principle with the commenter.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 5761. |
| 8256 | Pascal VIGER | 117.44 | 10.3.2.8a.3 | The MU-RTS acts as a protection mechanism for 20Mh, 40Mhz or 80Mhz primary band (see 9.3.1.23.4 MU-RTS variant). In section 10.3.2.8a.3 CTS response to MU-RTS, it is indicated that "If any 20 MHz channel indicated in the RU Allocation subfield of the User Info field is busy, the CTS frame response shall not be transmitted." Does this suppose that HE STA can transmit CTS frames in punctured/non-contiguous 20Mhz channels ? | - If yes, there is no more requirement to limit RU allocation to indicate only whether the CTS frame is transmitted on the primary 20 MHz channel, primary 40 MHz channel, primary 80 MHz channel, 160 MHz channel, or 80+80 MHz channel. Possibility should be offered to AP for allocating a given 20MHz RU (anywhere is its position among the BW) for a given STA for sending the CTS. - If no, please make the 2 texts aligned | Revised –  We clarify that HE STA can not transmit CTS frames in punctured/non-contiguous 20 MHz channels.  Specifically, the texts in 9.3.1.23.4 indicates that the allowed indication in RU allocation field is always contiguous. Further the texts in 10.3.2.8a.3 already describes the following.  *A CTS frame sent in response to an MU-RTS Trigger frame 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*  Hence, it is clear that transmitting CTS frames in punctured/non-contiguous 20 MHz channels is not allowed.  However, we note that the referred sentence about 20 MHz sensing is already described in 27.5.2.4 (UL MU CS mechanism) for determing if CTS should be responded. The condition to follow 27.5.2.4 is also described at the beginning of 10.3.2.8a.3.  Hence, we remove the referred sentence to avoid duplication  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 8256. |
| 8257 | Pascal VIGER | 117.22 | 10.3.2.8a.3 | "CTS response to MU-RTS" uses a different sensing period (ED-based CCA during the SIFS after receiving an MU-RTS frame) that "CTS after a RTS" (-║10.3.2.7 : CCA on all secondary channels has been idle for a PIFS prior to the start of the RTS frame). Is it normal ? what is the reason for ? Note: According to 10.22.2.5, HT/VHT/HE STAs use same CCA rules for determining channel width on secondary channels (e.g. PIFS interval for 5GHz) | as per comment | Rejected –  We clarify the reason why the sensing is done SIFS after the MU-RTS frame.  First, MU-RTS is a variant of Trigger frame because the requirement for response to MU-RTS is very similar to the requirement of responding to a basic variant Trigger frame.  Second, it is agreed that sensing for deciding response to Trigger frame is done SIFS after the Trigger frame. To align with the Trigger frame design, response for MU-RTS then follows similar sensing rule.  Third, unlike RTS, the size of MU-RTS may vary based on the number of User Info fields. If MU-RTS is long, then the PIFS sensing before the MU-RTS may not reflect the accurate CS results.  Due to these reasons, CS for response to MU-RTS is done SIFS after the MU-RTS Trigger frame. |
| 9428 | Xiaofei Wang | 117.25 | 10.3.2.8a.3 | If RU allocation in a MU-RTS to a STA is limited to only "primary 20 MHz channel, primary 40 MHz channel, primary 80 MHz channel, 160 MHz channel, or 80+80 MHz channel." and a STA is not allowed to transmit a CTS if any of the 20 MHz channel is busy, then how would punctured transmissions be supported? For example, when the secondary 20 MHz channel is not used in non-contiguous transmissions? | Allow STAs to transmit CTS in response to a MU-RTS on each of 20 MHz channels that is not busy. | Rejected –  Due to the corresponding complexity of implementing punctured mode, it has been agreed that the preamble punctured will exist only at the AP side. See the motion below and the discussion in 16/0059r1.  *The non-contiguous channel bonding will be supported in 802.11ax by:*   * *Transmitting using OFDMA PPDU format by nulling the tones of one or more secondary channels in 80 MHz and 160 (80+80) MHz;* * *Modes for non-contiguous channel bonding are TBD;* * *Non-contiguous channels within primary or secondary 80 MHz only exists at AP side.* |
| 4835 | Alfred Asterjadhi | 117.36 | 10.3.2.8a.3 | SCRAMBLER\_INITIAL\_STATE is not a defined RX/TX vector | define the tx/rx vector parameter | Rejected –  SCRAMBLER\_INTIAL\_STATE has been defined in Table 28-1—TXVECTOR and RXVECTOR parameters. |
| 5934 | James Yee | 117.39 | 10.3.2.8a.3 | The spec implies that the reason why the data rate used for the non-HT PPDU reposnse shall be 6Mb/s is provided in 17.1.1. But such explanation does not exist there. | Either remove the reference link or add corresponding explanation in 17.1.1. | Revised –  Agree in principle with the commenter. We remove the reference and add the reference for the non-HT or non-HT duplicate PPDU transmission to Section 17.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 5934. |
| 9851 | Young Hoon Kwon | 117.32 | 10.3.2.8a.3 | In 2.4GHz band, non-HT PPDU may indicate not only Clause 17 PPDU but also other PPDU formats (e.g., 802.11b). So, it's better to clearly mention that the non-HT PPDU here implies Clause 17 PPDU format. | As in the comment. | Revised –  Agree in principle with the commenter. We add a reference to Secion 17.  TGax editor to make the changes shown in 11-17/0264r1 under all headings that include CID 5934. |

**Discussion:** *None.*

**Propose:**

Revised for CID 5561, CID 9481, CID 9274, CID 7140, CID 9423, CID 5044, CID 7975, CID 9424, CID 9426, CID 9681, CID 9850, CID 7569, CID 5761, CID 5934, CID 8256 per discussion and editing instructions in 11-17/0264r1.

***TGax editor: Modify 10.3.2.8a as the following:***

~~10.3.2.8~~27.4a(#9274) MU-RTS/CTS procedure~~10.3.2.8~~27.4a.1(#9274) General

The MU-RTS/CTS procedure allows an AP to initiate a TXOP and protect the following frame exchanges~~protect an MU transmission~~.(#7140)

An HE AP may transmit an MU-RTS Trigger(#9481) frame to solicit simultaneous CTS responses from one or more HE STAs.

Figure 10-9a (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 DL MU PPDU  
and acknowledgement responses..

~~~~(#5561)

(#5561)

Figure 10-9a—Example of MU-RTS/CTS/DL MU PPDU/Acknowledgement Response andNAV setting

Figure 10-9b (Example of MU-RTS/CTS/Trigger/HE trigger-based PPDU/Multi-STA BlockAck and NAV  
setting) shows an example of the exchange of MU-RTS and simultaneous CTS responses to protect the  
~~scheduled~~(#9423) HE trigger-based PPDU and Multi-STA BlockAck frame.

~~~~(#9481)

(#9481)

Figure 10-9b—Example of MU-RTS/CTS/Trigger/HE trigger-based PPDU/Multi-STA BlockAckand NAV setting

~~10.3.2.8~~27.4a.2(#9274) MU-RTS procedure~~The transmitter of an MU-RTS frame shall not request a STA to send a CTS frame response in a 20 MHz channel that is not occupied by the PPDU that contains the MU-RTS frame.~~ (#9424) In each 20 MHz channel occupied by the PPDU that contains an MU-RTS Trigger(#9481) frame, the transmitter of the MU-RTS Trigger(#9481) frame shall request at least one STA to send a CTS frame response that occupies the 20 MHz channel. The transmitter of an MU-RTS Trigger frame shall not request a STA to send a CTS frame response in a 20 MHz channel that is not occupied by the PPDU that contains the MU-RTS Trigger frame.(#9424)

After transmitting an MU-RTS Trigger(#9481) frame, the STA shall wait for a CTSTimeout interval with a value of aSIFSTime + aSlotTime + aRxPHYStartDelay. This interval begins when the MAC receives a PHYTXEND.confirm primitive. If a PHY-RXSTART.indication primitive does not occur during the CTSTimeout interval, the STA shall conclude that the transmission of the MU-RTS Trigger(#9481) frame has failed, and this STA shall invoke its backoff procedure upon expiration of the CTSTimeout interval. If a PHY-RXSTART.indication primitive does occur during the CTSTimeout interval, the STA shall wait for the corresponding PHYRXEND.indication primitive to determine whether the MU-RTS Trigger(#9481) frame transmission was successful. The recognition of a valid CTS frame sent by ~~the~~any(#5044) recipient of the MU-RTS Trigger(#9481) frame, corresponding to this PHYRXEND.indication primitive, shall be interpreted as success of the MU-RTS Trigger frame transmission~~successful response~~(#9426), permitting the frame exchange sequence to continue. The recognition of anything else, including any other valid frame, shall be interpreted as failure of the MU-RTS Trigger(#9481) frame transmission. In this instance, the STA may process the received frame and shall invoke its backoff procedure at the PHY-RXEND.indication primitive. (#9681)

An MU-RTS Trigger(#9481) frame shall not be carried in an VHT MU PPDU or(#7975) HE MU PPDU.

~~10.3.2.8~~27.4a.3(#9274) CTS response to MU-RTSIf an HE STA receives an MU-RTS Trigger(#9481) frame, 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(#9481) 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 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 ~~described in 27.5.2.4 (UL MU CS mechanism)~~ indicates that the medium is idle (see 27.5.2.4 (UL MU CS mechanism)). (#8411)

— Otherwise, the STA shall not send a CTS frame response. (#8411) ~~The ED-~~

~~based CCA during the SIFS after receiving an MU-RTS frame and virtual CS functions are used to determine the~~

~~state of the medium to respond to an MU-RTS frame.~~(#8411) ~~— The RU Allocation subfield in the User Info field addressed to the STA indicates either the primary 20 MHz~~

~~channel, primary 40 MHz channel, primary 80 MHz channel, 160 MHz channel, or 80+80 MHz channel.~~(#9850)  
~~— The MU-RTS frame is sent by the AP with which the STA is associated and the value of the basic NAV is 0.~~(#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(#9481) frame shall be carried in a non-HT or non-HT duplicate PPDU (see 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification)).(#5934)

An HE non-AP STA transmitting a CTS frame in response to an MU-RTS Trigger(#9481) frame 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(#9481) frame. The data rate to be used for the non-HT or non-HT duplicate(#5761) PPDU response shall be 6 Mb/s ~~(see 17.1.1 General)~~. (#5934)

A CTS frame sent in response to an MU-RTS Trigger(#9481) frame shall be transmitted on the 20 MHz channels indicated in the RU Allocation subfield of the User Info field of the MU-RTS Trigger(#9481) frame~~when the indicated 20 MHz channels are all idle~~. ~~If any 20 MHz channel indicated in the RU Allocation subfield of the User Info field is busy, the CTS frame response shall not be transmitted.~~ (#8256)

Figure 10-9c (An example of an MU-RTS Trigger(#9481) 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 is transmitted in a 40 MHz non-HT duplicate PPDU on the primary 40 MHz channel. Further, the MU-RTS Trigger(#9481) frame 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.



**Figure 10-9c—An example of an MU-RTS frame soliciting CTS frame responses on the primary 40 MHz channel**

A STA that transmits a CTS frame in response to an MU-RTS Trigger(#9481) frame shall follow the synchronization requirement as defined in 17.3.9.10 (Pre-correction accuracy requirements).