IEEE P802.11  
Wireless LANs

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| Proposed resolution for comments related to  Section 4.3.14a (HE STA) | | | | |
| Date: 2017-07-09 | | | | |
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Abstract

This submission proposes resolutions for comments related to TGax D1.0 section 4.3.14a.

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** | **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 7698 | 12 | Why say HE works between 1 GHz and 6 GHz, and then only describe 5 GHz and 2.4 GHz operation, and relation to VHT and HT? If HE only works in those bands, just say so. | Change "frequency bands between 1 GHz and 6 GHz" to "the 2.4 GHz and 5 GHz frequency bands". | Rejected.  Since the HEW PAR is defined for bands below 6GHz, and hence this paragraph is consistent with the HEW PAR. Please note that VHT PAR is defined in the same way: “The IEEE Std 802.11 VHT STA operates in frequency bands below 6 GHz excluding the 2.4 GHz band” |
| 5091 | 18 | Why talk about 40MHz, 80MHz, etc., if an HE non-AP STA can only support 20MHz as stated in line 21? | Make consistant. | Revised.  Agree in principle and clarified in the proposed text.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5091. |
| 5116 | 18 | Regarding, "An HE non-AP STA supporting 20 MHz, 40 MHz, 80 MHz, 160 MHz and 80+80 MHz is also a VHT non-AP STA", an HE non-AP STA supporting 20 MHz, 40 MHz and 80 MHz should also be an VHT non-AP STA | correct the statement | Revised.  The revised text is below:   * An HE AP is also a VHT AP * An HE non-AP STA ~~that supportsing 20 MHz, 40 MHz, 80 MHz, 160 MHz and 80+80 MHz~~ is also a VHT non-AP STA except when the non-AP STA declares that it only supports 20 MHz channel bandwidth. * It is mandatory for an HE non-AP STA to support operation in 20 MHz channel bandwidth * It is mandatory for an HE non-AP STA to support operation in 40 MHz, and 80 MHz channel bandwidth except when the STA declares only supporting 20MHz channel bandwidth. * It is optional for an HE non-AP STA to support operation in 160 MHz and 80+80 MHz channel bandwidth   TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5116. |
| 5423 | 18 | "- An HE non-AP STA supporting 20 MHz, 40 MHz, 80 MHz, 160 MHz and 80+80 MHz is also a VHT non-AP STA -- An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" First cited bullet says an HE non-AP STA supports 20, 40, 80, 160 and 80+80. But the second cited bullet says an HE non-AP STA shall only support 20. Is it trying to say that 20MHz is mandatory? Is so, say so. Or is thhis just a copy from the 2.4GHz band case and if so should not be here at all? What is it? | Delete "only" or delete bullet. | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5423. |
| 6927 | 18 | Aren't all HE non-AP STAs VHT non-AP STAs? Why must a HE non-AP STA support all VHT operating bands be and VHT non-AP STA? Wouldn't an HE non-AP STA that only supports 20, 40 and 80 MHz bandwidth also be a VHT non-AP STA? Please correct or clarify the meaning of this phrase. | Change the text to read: "An HE non-AP STA is also a VHT non-AP STA" | Revised.  Not all HE non-AP STAs are VHT non-AP STAs. The spec defines 20MHz-only non-AP STA that is not VHT STA. Please see section 28.3.3.6 for the definition of such STA. The proposed text has clarified this point.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 6927. |
| 7699 | 18 | A VHT STA only optionally supports 160 MHz or 80+80 MHz. Likewise for HE. So, an HE non-AP STA that does not support 160 MHz or does not support 80+80 MHz, is not "also a VHT non-AP STA"? | Reword to relfect intent. Since the requiremnent for bandwidth operation seem to be the same for HE and VHT, perhaps just leave this list of operating modes as "when not operating in 20 MHz-only bandwidth" | Revised.  Agree in principle. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7699. |
| 8641 | 18 | Requirement not clear: "An HE non-AP STA supporting 20 MHz, 40 MHz, 80 MHz, 160 MHz and 80+80 MHz is also a VHT non-AP STA". Does this mean that the HE non-AP STA has to support all listed BW's before it is required to be a VHT non-AP STA? | Clarify. A HE STA should be a VHT STA, regardless of whether it supports 160/80+80. | Revised.  Not all HE non-AP STAs are VHT non-AP STAs. The spec defines 20MHz-only non-AP STA that is not VHT STA. Please see section 28.3.3.6 for the definition of such STA. The proposed text has clarified this point.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 8641. |
| 8173 | 19 | Support of 160 and 80+80 MHz is not required for the an HE non-AP STA to be a VHT STA since they are optional features. | delete 160 MHz and 80+80 MHz. Add a line to include the optional support for 160 and 80+80 MHz. | Agreed  Revised the text to reflect the optional support for 160MHz and 80+80MHz.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 8173. |
| 7697 | 20 | Combination of "shall support operation ... only" is confusing. It shall only support such operation? | Reword to clarify the relation of "shall support" and "only". Suggest something like "shall support operation in a mode with only 20 MHz channel bandwidth". (If this use of "mode" isn't yet another problem.) | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7697. |
| 3000 | 21 | Restructure the following sentence: "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" | "An HE non-AP STA shall support 20 MHz channel bandwidth only operation" | Revised.  Changed the text to to clarify:   * … * It is mandatory for an HE non-AP STA to support operation in 20 MHz channel bandwidth * It is mandatory for an HE non-AP STA to support operation in 40 MHz, and 80 MHz channel bandwidth except when the STA declares only supporting 20MHz channel bandwidth. * It is optional for an HE non-AP STA to support operation in 160 MHz and 80+80 MHz channel bandwidth   TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 3000. |
| 3101 | 21 | "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" -- only does not live at the end of a sentence. Its intent is ambiguous.  Ditto at line 27. | Move or delete the only. For example, move it to after the "support" verb. | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 3101. |
| 5039 | 21 | The text "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" seems to imply that 40 MHz and wider bandwidths are not allowed. | I assume that 20 MHz is mandatory but wider bandwiths are optional. Suggest using this language (or similar) instead. | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5039. |
| 5117 | 21 | Regarding, "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only", am I interpreting this correctly that an HE non-AP STA will only operate in 20 MHz?  I'm guessing that tne intent is we want all HE non-AP STAs to support 20 MHz-only operation. If so, change the sentence to "An HE non-AP STA shall support 20 MHz-only operation" | As in comment | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5117. |
| 6928 | 21 | The phrase: "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" does not seem to make sense as it seems to require that an HE non-AP STA is only allowed to support 20 MHz channel bandwidth, while the phrase directly above states the multiple bandwidths are allowed. | Delegate the phrase: "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" or clarify what is intended by the phrase is to support | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 6928. |
| 6929 | 21 | If the intent of the phrase: "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" is to say that a mode of operation of all HE non-AP STAs is to be able to operate as a 20 MHz only HE STA, then the phase should state that, | Replace the phrase with: All HE non-AP STAs will support operation as 20 MHz only HE STAs. | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 6929. |
| 7007 | 21 | Use of "shall" in Clause 4 (General description) seems to be inconsistent with existing Clause 4 text and also most of the new text added in P802.11ax/D1.0. Isn't this supposed to be descriptive clause where "STA shall support" would more likely be written "STA supports"?  Furthermore, what exactly is "shall support operation in 20 MHz channel bandwidth only" supposed to say? That the STA is not allowed to use any other channel bandwidth than 20 MHz (e.g., neither 40 MHz nor 10 MHz or smaller)? That does not sound likely, but this could be interpreted as saying so.. Or is this saying that STA shall support operation at least in a 20 MHz channel? Or something else? It would be good to be more specific on what the exact mandatory behavior is for an HE non-AP STA.  This applies to both lines 20 (5 GHz band) and 26 (2.4 GHz band). | At least replace "shall support" with "supports" (or something similar) on both lines and ideally, rewrite these to clarify the intent of this description of a mandatory functionality. | Revised.  Agree in principle. The proposed text uses “It is optional/mandatory…”  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7007. |
| 7290 | 21 | Chapter 4 provides a general description of the wireless system.. It should be written in a declarative but not normative language. Thus, "shall" should not be appeared in the sentence. | Replace "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" with "Mandatory support for operation in 20 MHz channel bandwidth only by an HE non-AP STA". | Revised.  Agree in principle. The proposed text now uses “It is mandatory/optional…”  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7290. |
| 8536 | 21 | non-AP STA mentioned here should be 20 MHz only non-AP STA instead? | Change "non-AP STA" to "20 MHz only non-AP STA" | Revised.  80MHz-capable STA also supports 20MHz operation, so all non-AP HE STAs support 20MHz operation. This has been clarified in the proposed text.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 8536. |
| 7013 | 24 | The way an HE STA is being conditionally described as a VHT/HT STA based on band and whether it is a non-AP STA seems to imply that an HE AP in 2.4 GHz band is not necessarily an HT AP. If that were the case, there would be need to describe some HT STA requirements for HE AP, e.g., as far as not allowing WEP or TKIP to be used as pairwise cipher. However, based on the PICS item CFHT change (add CFHEW:M to Status), it looks like an HE AP is actually mandated to be an HT AP in the 2.4 GHz band (similarly to how an HE AP in the 5 GHz band is also a VHT AP). | Add the following item into the "In the 2.4 GHz band" list: "An HE AP is also an HT AP". | Revised.  In 2.4GHz, an HE STA is also an HT STA. This has been clarified in the text.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7013. |
| 7700 | 24 | An HE AP in 2.4 GHz should also be an HT AP | Add "An HE AP is also an HT AP" | Revised.  Agree in principle. In 2.4GHz, an HE STA is also an HT STA. This has been clarified in the text.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7700. |
| 8014 | 25 | I would have thought that in the 2.4GHz band an HE AP would also be an HT AP for at least two reasons 1) backward compatibility reason dictated by the PAR, 2) since an HE non-AP STA is also an HT non-AP STA. | Please replace "- An HE non-AP STA is also an HT non-AP STA" with "- An HE STA is also an HT STA". | Agreed.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 8014. |
| 3001 | 26 | Restructure the following sentence: "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" | "An HE non-AP STA shall support 20 MHz channel bandwidth only operation" | Revised.  Agree in principle. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 3001. |
| 5884 | 26 | There are inconsistent statements about 40 MHz operation in the 2.4 GHz band. 4.3.14a: "In the 2.4 GHz band, ... An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" 8.1.1: "An HE AP may support ... 40 MHz channel width in the 2.4 GHz band" | Decide on whether 40MHz channel width is supported in 2.4 GHz band for HE STA and make that consistent throughout the amendment. | Revised.  It is clarified in the text that in 2.4GHz, 20MHz operation is mandatory and 40MHz operation is optional.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5884. |
| 6930 | 26 | If the intent of the phrase: "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" is to say that a mode of operation of all HE non-AP STAs is to be able to operate as a 20 MHz only HE STA, then the phase should state that, | Replace the phrase with: All HE non-AP STAs will support operation as 20 MHz only HE STAs. | Revised.  It is clarified in the text that in 2.4GHz, 20MHz operation is mandatory and 40MHz operation is optional.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 6930. |
| 7291 | 26 | Chapter 4 provides a general description of the wireless system.. It should be written in a declarative but not normative language. Thus, "shall" should not be appeared in the sentence. | Replace "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only" with "Mandatory support for operation in 20 MHz channel bandwidth only by an HE non-AP STA". | Revised.  Agree in principle. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7291. |
| 8537 | 26 | non-AP STA mentioned here should be 20 MHz only non-AP STA instead? | Change "non-AP STA" to "20 MHz only non-AP STA" | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 8537. |
| 5118 | 27 | Regarding, "An HE non-AP STA shall support operation in 20 MHz channel bandwidth only", am I interpreting this correctly that an HE non-AP STA will only operate in 20 MHz?  I'm guessing that tne intent is we want all HE non-AP STAs to support 20 MHz-only operation. If so, change the sentence to "An HE non-AP STA shall support 20 MHz-only operation" | As in comment | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5118. |
| 3150 | 29 | There are other features not listed here, such as: optional support of preamble-puncturing, optional support of spatial reuse methods, ... | Add the additional listed features | Agreed.  Added the features to the list. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 3150. |
| 5119 | 29 | UL MU-MIMO a main PHY feature, and needs to be added to this list. | As in comment | Agreed.  Added the feature to the list. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5119. |
| 5687 | 29 | The mandatory support on tone more than 242 do not apply to 20MHz only devices. Though obvious this needs to be clarified. | Clarify that the RU tone more than 242 are not mandatory for 20MHz only device. | Revised.  Removed the text on the specific RU support for different channel BW because 1) RU support is not considered feature and 2) we would need more text to clarify how it applies to 20MHz-only non-AP STA, so it is better to remove the text here. The detailed requirements are described in section 28.3.3.5.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5687. |
| 7701 | 29 | These features are not present in an HT AP, either. | Delete "non-AP". Same thing on P9L48. | Agreed.    Deleted “non-AP”.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7701. |
| 10183 | 29 | The Mandatory/optional feature for UL MU-MIMO function should be clarified in the normative text. | As in comment. | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 10183. |
| 10338 | 32 | Mandatory support for DL and UL OFDMA: does this mean automatic support for UL MU MIMO ? | Add: "Mandatory support for DL and UL OFDMA and UL MU MIMO" or "optional support for UL MU MIMO". Need to be clear. | Revised.  Added “optional support for UL MU-MIMO”.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 10338. |
| 3293 | 33 | "RU" not defined | Add definition for "RU" in clause 3.4 Definitions, acronyms, and abbreviations | Reject.  Already defined in D1.2. |
| 3343 | 33 | "RU" not defined | Add definition for "RU" in clause 3.4 Definitions, acronyms, and abbreviations | Reject.  Already defined in D1.2. |
| 3579 | 33 | "RU" not defined | Add definition for "RU" in clause 3.4 Definitions, acronyms, and abbreviations | Reject.  Already defined in D1.2. |
| 3660 | 33 | "RU" not defined | Add definition for "RU" in clause 3.4 Definitions, acronyms, and abbreviations | Reject.  Already defined in D1.2. |
| 4009 | 33 | "RU" not defined | Add definition for "RU" in clause 3.4 Definitions, acronyms, and abbreviations | Reject.  Already defined in D1.2. |
| 4096 | 33 | "RU" not defined | Add definition for "RU" in clause 3.4 Definitions, acronyms, and abbreviations | Reject.  Already defined in D1.2. |
| 7378 | 33 | the list of PHY and MAC features is incomplete | add the complete list of features | Revised.  Added features suggested by other comments. Please see doc#11-17-xx-CR-4.3.14a. |
| 5729 | 35 | I don't think 40MHz is mandatory at 2.4GHz, so this sentence is not accurate. | Clarify | Agreed.  Agree that 40MHz is optional for 2.4Hz. The proposed text has clarified this point.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5729. |
| 5424 | 38 | Here at L38 we see that there is mandatory support required for 160MHz but the features for an VHT STA, as refered to in line 29 have 160 as optional. Is 160 mandatory for HE? If so need to state such. If not then this needs to be optional. Which is it? | Sort it out as per comment | Revised.  160Mhz is optional. This is clarified in the proposed text.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5424. |
| 5730 | 38 | Missing 80+80 in this sentece. | add "/80+80MHz" after "160MHz". | Agreed.  Added “80+80MHz” in the proposed text.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5730. |
| 7464 | 38 | "80+80MHz channel" is missing. | Change "Mandatory support for 26-, 52-, 106-, 242-, 484-, 996- and 2x996-tone RUs in a 160 MHz channel" to "Mandatory support for 26-, 52-, 106-, 242-, 484-, 996- and 2x996-tone RUs in a 80+80 MHz or 160 MHz channel" | Revised.  Added “/80+80” in the proposed text. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7464. |
| 10184 | 38 | The condition should also be applied to an 80+80 MHz channel. | "a 160 MHz channel" -> "a 160 MHz or 80+80 MHz channel" | Revised.  Added “/80+80” in the proposed text. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 10184. |
| 5815 | 39 | Missing mandagory support Rus for 80+80MHz channel | Add: "Mandatory support for 26-, 52-, 106-, 242-, 484-, 996- and 2x996-tone RUs in a 80+80 MHz channel" | Revised.  Added “/80+80” in the proposed text. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5815. |
| 5731 | 40 | I think DL MU-MIMO support is mandatory. However, this sentence reads like that DL MU-MIMO is only mandatory if the HE AP supports 4 or more spatial streams. | Change to "by an HE AP and the HE AP shall support 4 or more..." | Rejected.  DL MU-MIMO is conditional mandatory and the condition is the>=4 spatial streams. |
| 7465 | 42 | 1024 QAM is also applicable to 2\*996-tone RU. | Change "Optional support for 1024-QAM on 242-, 484- and 996-tone RUs" to "Optional support for 1024-QAM on 242-, 484-, 996- and 2\*996-tone RUs" | Revised.  Agreed in principle. Deleted this sentence since it’s covered by bullet.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7465. |
| 9613 | 42 | Remove the following: "Optional support for 1024-QAM on 242-, 484- and 996-tone RUs" Because it is a redundant sentence with the following: "Optional support for HE-MCSs 10 and 11" | Remove the following sentence, "Optional support for 1024-QAM on 242-, 484- and 996-tone RUs" | Agreed.  Deleted the sentence. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 9613. |
| 6071 | 43 | Optional support for 1024-QAM on 242-, 484- and 996-tone RUs seems to be part of Optional support for HE-MCSs 10 and 11 | Delete line 43 | Agreed.  Deleted the sentence. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 6071. |
| 8364 | 43 | The condition "Optional support for 1024-QAM on 242-, 484- and 996-tone Rus" seems to be covered by the condition "Optional support for HE-MCSs 10 and 11". The reason is that HE-MCSs 10 and 11 is basically 1024-QAM modulation based on the table in 28.5. | Replace the two sentences with "Optional support for 1024-QAM" | Revised.  Deleted the sentence. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 8364. |
| 10185 | 43 | According to the condition "Optional support for 1024-QAM on 242-, 484- and 996-tones RUs", the HE PHY spec does not allow to use 1024-QAM on a 2x996-tone RU. On the other hands, in P317L42, the text "LDPC is the only FEC coding scheme in the HE PPDU Data field for MCS10 and MCS11 in a 242-, 484-, 996- and 2x996-tone RU." suggests that 1024QAM may be used on a 2x996-tone RU. These two sentences contradicts with each other. | Fix it. | Revised.  Deleted this sentence. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 10185. |
| 4896 | 46 | Then sentences on Optional support of 1024QAM and HE-MCSs 10 and 11 are duplicated. Should be combined into one. Add optional support of UL MU MIMO | as in comment | Revised.  Deleted one sentence. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 4896. |
| 3149 | 48 | There are other MAC features not listed here, such as: optional support of multi-TID A-MPDU, optional support of Aggregated-Control in HTC field, ... | Add the additional listed features | Revised.  Added multi-TID AMPDU into the feature list. However A-control field mandatory/optional nature is not easy to cleanly described and its mandatory/optional status is depend on other conditions, so it’s not included in the list.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 3149. |
| 9616 | 48 | The other important HE MAC features are not included. For example, two NAV operation, Spatial reuse operation, Operating mode indication mechanism. | Please include other important HE MAC features. | Agreed.  Added these features to the listed feature. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 9616. |
| 5120 | 49 | There is entire MAC section called UL MU. This needs to be added to the list | As in comment | Rejected.    UL OFDMA and UL MU-MIMO have already been listed in the feature list. |
| 5121 | 49 | There is entire MAC section called Spatial Reuse. This needs to be added to the list | As in comment | Agreed  Added spatial reuse to the list. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5121. |
| 6233 | 51 | Is this "basic trigger" or "Basic Trigger"? The usage is inconsistent even on this page. In a list of what is mandatory it should be clear. | Change to "Basic Trigger". | Agreed.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 6233. |
| 8341 | 51 | There are other Trigger Frame variants that HE-STAs are required to support, such as MU-RTS, MU-BAR and BSRQ | Change the feature statement on line 51 of this subclause to "Mandatory support for basic, MU-RTS, MU-BAR and BSRQ trigger frames." | Agreed.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 8341. |
| 7702 | 52 | What is "dynamic fragmentation level 0"? (The PICS has no reference for it, either) | Clarify what is meant by "dynamic fragmentation level 0", probably in 27.3.2, and put in the reference in the PICS | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7702. |
| 7466 | 53 | Dynamic fragmentation level 0 means no support for dynamic fragmentation. It is not true to claim that VHT STAs do not support dynamic fragmentation level 0. | Change "Mandatory support for dynamic fragmentation level 0" to "Optional support for dynamic fragmentation levels 1, 2 and 3" | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7466. |
| 9614 | 53 | What does the dynamic fragmentation level 0 mean? I can't find any description about the dynamic fragmentation level 0. | Please clarify the dynamic fragmentation level 0. | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 9614. |
| 9248 | 54 | Multi-STA BlockAck is said to be optional here. However from p.l. 157.25 in clause 27.4.1, as UL OFDMA is mandatory, it is mandatory for HE STAs. | Change the item "Optional support for Multi-STA BlockAck" in clause 4.3.14a to "Mandatory support for Multi-STA BlockAck". | Revised.  Multi-STA BA is not a standalone Feature. It is used to acknowledge UL MU and also used to acknowledge multi-TID AMPDU. Since both UL MU and multi-TID AMPDU have been included in the feature list in this section, multi-STA BA is proposed to be removed.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 9428. |
| 9615 | 55 | From Annex B, Transmission of Multi-STA BlockAck is a mandatory feature on HE AP side. Receptation of Multi-STA BlockAck is a mandatory feature on HE non-AP side.  Please change it as the following: Mandatory support for Multi-STA BlockAck | As per comment. | Revised.  Multi-STA BA is not a standalone Feature. It is used to acknowledge UL MU and also used to acknowledge multi-TID AMPDU. Since both UL MU and multi-TID AMPDU have been included in the feature list in this section, multi-STA BA is proposed to be removed.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 9615. |
| 7467 | 56 | "target wake up time" should be changed to "target wake time" | As per comment | Agreed.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7467. |
| 3002 | 57 | Add BSS\_COLOR, Dual Beaconing and Spatial Reuse to the list. | As in the comment | Revised.  BSS\_color is not a feature. It is a supporting component for features such as spatial reuse. Since the proposed text has included added spatial reuse, BSS color is not included. Dual Beacon is now called ER beacon in D1.3, so added this feature as “ER Beacon”.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 3002. |
| 7468 | 58 | "OFDMA-based random access" should be changed to "UL OFDMA-based random access" | As per comment | Agreed.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 7468. |
| 4714 | 60 | This paragraph is very partial. Depending on the purpose of it, either expand it to cover the case being discussed correctly or remove it. | As in comment. | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 4714. |
| 10187 | 60 | "MU OFDMA" should be "OFDMA" because OFDMA is an MU transmission inherently. | As in comment. | Agreed.  Removed “MU”. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 10187. |
| 10188 | 62 | "transmission resource" should be "RUs". | As in comment. | Agreed.  Changed to “RUs”. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 10188. |
| 9249 | 63 | It says "Multi-STA BlockAck frames are used by the AP to acknowledge the transmissions from multiple non-AP STAs." But Multi-STA BlockAck can be also used by non-AP STAs. See 9.3.1.9.1 and 27.4.1 for example. I am not sure of the intention of this sentence, but assume it was written to describe the UL-MU sequence in accordance with the previous two sentences. And the AP can also acknowledge STAs with Compressed BlockAck frames using DL-MU transmission. | Change the sentence "Multi-STA BlockAck frames are used by the AP to acknowledge the transmissions from multiple non-AP STAs." to "Multi-STA BlockAck frames may be used by the AP to acknowledge the UL-MU transmissions. " Or delete this sentence. | Agreed.  Changed to "Multi-STA BlockAck frames can be used by the AP to acknowledge the UL-MU transmissions. ".  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 9249. |
| 5733 | 64 | "scheduled trigger frame are sent...", this sentece reads like such scheduled trigger frame is mandatory behavior. However, whether HE AP setups scheduled trigger frame is part of scheduling algorithm and shouldn't be mandated. | Chagne to soemthign like the following, "Schedueld trigger frame can be sent..." | Agreed.  Changed to “The schedule of these Trigger frames ~~schedule~~ ~~may~~ can be set up between the non-AP STA and the AP using TWT operation.”  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5733. |
| 6235 | 64 | "Scheduled Trigger frames are sent" is unclear in several ways. Is this intended to convey that Scheduled Trigger frames shall be transmitted by APs, or that they may be transmitted? | Rewrite the sentence so that it is clear whether the behavior described is optional or mandatory. | Revised.  Such behavior is not mandatory, so change to “Trigger frames ~~are~~ can be scheduled ~~sent~~ by the AP to allow ~~for~~ non-AP STAs to save power ~~save~~.”  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 6235. |
| 5425 | 65 | There is no mention of Spatial Reuse - true the spatial reuse schemes in the draft leave a lot to be desired but, who knows, maybe we will end up with something that actually will work (DSC for example). Considering that the original idea behind 11ax was for improving throughput across an area and that spatial reuse is, in fact, a very important part of that, it is amazing that it somehow got lost and we ended up with mostly go faster stripes (making it simply a straight follow on previous amendments rather than really looking at providing the means to improve area throughput by planning). | Add at leats a passing mention that spatial reuse scheme(s) are a component of HE. | Agreed.  Added spatial reuse to the list. TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 5425. |
| 6232 | 65 | "The Trigger frame schedule may be set" is unclear in multiple ways. Why the definite article? Is there only one possible schedule? The text also suggests that Trigger frames are usually scheduled (or always scheduled?). | Change to "Trigger frames may be scheduled ...". | Revised.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 6232. |
| 6234 | 65 | The sentence refers to "the" non-AP STA. This is very confusing. Which one? | Rewrite the sentence so that it makes sense. | Rejected.  It’s not clear what’s the confusion raised by the commenter. TWT is set up between non-AP STA and AP STA. |
| 7293 | 65 | Chapter 4 provides a general description of the wireless system.. It should be written in a declarative but not normative language. Thus, "may" should not be appeared in the sentence. | Replace "may be set" with "is allowed to set". | Revised.  Changed to “can” in the proposed text.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID7293. |
| 7703 | 65 | This statement is not intended to be normative, but a declaration that the normative capability is specified later in the text | Change "may" to "can" | Agreed.  Changed to “can” in the proposed text.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID7703. |
| 4713 |  | These items whether are main or not is subjective at this point and maybe not correct. E.g., dynamic fragmentation level 0 is actually no fragmentation (highly a new MAC feature). | As in comment. | Revised.  Dynamic fragmentation 0 is removed from the list since it is not a feature.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 4713. |
| 9246 |  | Optional support for UL-MU-MIMO should be mentioned here. | Add such description in clause 4.3.14a. | Agreed.  Added “UL MU-MIMO” to the list.  TGax Editor to make changes as shown in doc#11-17-xx-CR-4.3.14a under all headings that contain CID 9246. |

TGax Editor: Please modify this section as follows:

**4.13.4a** **High efficiency (HE) STA**

The IEEE 802.11 HE STA operates in frequency bands between 1 GHz and 6 GHz.

In the 5 GHz band, the following apply:

* An HE AP is also a VHT AP
* An HE non-AP STA ~~that supportsing 20 MHz, 40 MHz, 80 MHz, 160 MHz and 80+80 MHz~~ is also a VHT non-AP STA except when the non-AP STA declares that it only supports 20 MHz channel bandwidth.
* It is mandatory for an HE non-AP STA to support operation in 20 MHz channel bandwidth
* It is mandatory for an HE non-AP STA to support operation in 40 MHz, and 80 MHz channel bandwidth except when the STA declares only supporting 20MHz channel bandwidth. (#5423, 5116, 5423, 7699 ,5091, 6927, 7697, 3000, 3101, 5039, 5117, 6929, 7290, 3001, 6930, 7291, 8537)
* It is optional for an HE non-AP STA to support operation in 160 MHz and 80+80 MHz channel bandwidth (#8173)
* ~~An HE non-AP STA shall support operation in 20 MHz-channel bandwidth only~~)

In the 2.4 GHz band, the following apply:

* An HE ~~non-AP~~ STA is also an HT ~~non-AP~~ STA (#7013, #7700, 8014)
* It is mandatory for a~~A~~n HE non-AP STA to ~~shall~~ support operation in 20 MHz channel bandwidth ~~only~~ (#5423, 6927, 7697, 3000, 3101, 5039, 5117, 6929, 7290, 5118)
* It is optional for an HE non-AP STA to support operation in 40 MHz channel bandwidth. (#5884)

The main PHY features in an HE STA that are not present in VHT STA or HT ~~non-AP~~ (#7701)STA are the following:

* Mandatory support for DL and UL OFDMA
* ~~Mandatory support for 26-, 52-, 106-, 242-tone RUs in a 20 MHz channel~~
* ~~Mandatory support for 26-, 52-, 106-, 242- and 484-tone RUs in a 40 MHz channel~~
* ~~Mandatory support for 26-, 52-, 106-, 242-, 484- and 996-tone RUs in an 80 MHz channel~~
* ~~Mandatory support for 26-, 52-, 106-, 242-, 484-, 996- and 2x996-tone RUs in a 160/80+80 (#5730, 7464, 10184, 5815) MHz channel~~ (#5687)
* Mandatory support for DL MU-MIMO by an HE AP that supports 4 or more spatial streams when MU-MIMO is done on the entire PPDU bandwidth
* ~~Optional support for 1024-QAM on 242-, 484- and 996-tone RUs~~ (#7465, 9613, 6071, 8364, 10185, 4896)
* Optional support for the HE sounding protocol to support beamforming
* Optional support for HE-MCSs 10 and 11
* Optional support for UL MU-MIMO (#5119, 10183, 10338, 7378, 9246)
* Optional support for preamble puncturing (#3159, 7378)

The main MAC features in an HE STA that are not present in VHT STA or HT ~~non-AP~~ STA (#7701) are the following:

* Mandatory support for Basic, MU-RTS, MU-BAR and BSRP ~~the basic~~ trigger frames.(#8341,6233)
* ~~Mandatory support for dynamic fragmentation level 0~~(#7466, 7702, 7466, 9614)
* Optional support for all levels of dynamic fragmentation level 1, 2 and 3 (#7466, 7702, 7466, 9614, 4713)
* Mandatory support for an AP and optional support for a non-AP STA for operating mode Indication (#9616)
* Optional support for a non-AP STA and optional support for an AP for two NAV operation(#3149)
* ~~Optional support for Multi-STA BlockAck~~ (#9248, 9615)
* Optional support for a non-AP STA and mandatory support for an AP for target wake ~~up~~ time (TWT) operation
* Optional support for UL OFDMA-based random access
* Optional support for spatial reuse operation (#3150, 5425, 3002)
* Optional support for Multi-TID AMPDU operation (#3149)
* Mandatory support for Aggregated-Control in HTC field (#3149)
* Optional support for ER Beacon (#3002)

An HE AP ~~uses~~ sends a ~~the~~ Trigger frame to initiate ~~MU~~ OFDMA or MU-MIMO transmissions in the ~~UL~~ uplink direction(#10187). The Trigger frame identifies the non-AP STAs participating in the ~~MU~~ UL MU transmissions and assigns RUs for these STAs ~~transmission resources~~(#10188). Multi-STA BlockAck frames ~~are~~ can be used by the AP to acknowledge the transmissions from the multiple non-AP STAs (#9249). Trigger frames ~~are~~ can be scheduled ~~sent~~ by the AP to allow ~~for~~ non-AP STAs to save power ~~save~~.(#6235, 7293, 7703) The schedule of these Trigger frames ~~schedule~~ ~~may~~ can be set up between the non-AP STA and the AP using TWT operation (#5733, 7293, 7703).