IEEE P802.11
Wireless LANs

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| CRs for 20 MHz-only STA – Part 1 |
| Date: 2017-03-07 |
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Abstract

* The submission provides resolutions to comment related to a 20 MHz-only non-AP HE STA and the rule a non-AP STA with 20 MHz operating channel width.
* This document contains comment resolutions for 37 CIDs:
	+ CID 8809, 9154, 8360, 8813
	+ CID 9795, 8614, 7506, 9796, 7508, 8615, 9799, 9800, 8798, 9766, 8799, 8800, 8801, 8802, 8803, 8804, 8805, 5250, 8807
	+ CID 10089, 9797, 9798, 4973, 10090, 9151, 10091, 10092, 9152, 6826, 6827, 6828, 6829, 6830
* The proposed changes are based on **P802.11ax D1.1**.

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 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.***

* Technical comments for 28.3.3.6 of P802.11ax D1.0

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| **CID** | **Page** | **Clause Number** | **Comment** | **Proposed Change** | **Resolution** |
| 8809 | 238.01 | 28.3.3.6 | It seems more logical to have current section 28.3.3.6 before 28.3.3.5 | Swap sections | **Revised**Agreed, and swap the section 28.3.3.5 and 28.3.3.6 of P802.11ax D1.1*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 9154 | 238.01 | 28.3.3.6 | 20 MHz-only STA is only for non-AP HE STA, so for the clarification, 20 MHz-only non-AP HE STA would be more appropriate | Change the title as 20 MHz-only non-AP HE STAs | **Revised**Agree in principal, and unify the terminology as ‘20MHz-only non-AP HE STA’ *TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8360 | 238.07 | 28.3.3.6 | The statement "Only a non-AP HE STA can be a 20 MHz-only STA." is redundant. This draft standard is for HE devices, there is no need to add this trivial statement. | Remove "Only a non-AP HE STA can be a 20 MHz-only STA." | **Revised**Clarify the terminology as 20 MHz-only non-AP HE STA to describe the STA type and remove the redundant statement. *TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8813 | 238.13 | 28.3.3.6 | Add references to Table 28-3 to 28-5 for clarity | See comment | **Accepted***TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |

* Technical comments for 28.3.3.5 of P802.11ax D1.0

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| **CID** | **Page** | **Clause Number** | **Comment** | **Proposed Change** | **Resolution** |
| 9795 | 236.16 | 28.3.3.5 | "when operating 20 MHz" is awkward | Update the section title of 28.3.3.5 to be more readable. | **Revised**Agree in principal for the clarification, and use the terminology ‘20MHz operating channel width’ referring D1.0 28.3.3.6*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8614 | 237.16 | 28.3.3.5 | "when operating 20 MHz". Improve wording | Change to e.g. "when operating in 20 MHz-only mode" | **Revised** The same proposed change as CID 9795.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 7506 | 237.18 | 28.3.3.5 | The reference is incorrect. The 20MHz-only HE STA is described in 28.3.3.6, not 28.3.9 | Please fix it. | **Revised**Fix the reference*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 9796 | 237.18 | 28.3.3.5 | What does "operate with 20 MHz" mean? | Change "STA can operate with 20 MHz" to "STA may operate in 20 MHz channel width mode". | **Revised**RU restriction rule applies to a STA with 20 MHz operating channel width, and the STA includes both 20MHz-only non-AP STA as well as 80MHz capable non-AP STA with OMI to reduce the operating channel width to 20MHz. *TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 7508 | 237.19 | 28.3.3.5 | "ROM" should be changed to "OMI" | As per comment | **Accepted***TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8615 | 237.21 | 28.3.3.5 | "a 20 MHz operating non-AP STA". What is the correct term for this type of STA? 20 MHz-only STA? | Settle on a term to describe this kind of STA and use the terminology consistently. | **Revised**Introduce the terminology ‘20MHz-only non-AP HE STA’ for referring the non-AP STA which only supports 20 MHz operating channel width for the transmission and reception of 20/40/80/160/80+80 MHz HE PPDU *TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 9799 | 237.21 | 28.3.3.5 | "20 MHz operating non-AP STA" is not defined. | Define "20 MHz operating non-AP STA". | **Revised**Delete the corresponding text, so it is not required to define the terminology. Instead, 20MHz operating bandwidth terminology is used to describe the RU restriction rules. *TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 9800 | 237.21 | 28.3.3.5 | It is not necessary to explain why we are restricting the RU locations for 20 MHz operating STAs participating in wider BW OFDMA packets in the standard. Besides the current explanation is probably not quite clear enough for first time readers anyway (e.g. why is there performance penalty?). | Delete "When a 20 MHz operating ... OFDMA operation." (L21~L28) | **Revised**Agree in principal, but the first paragraph is informative to describe the tone-mapping misalignment. Therefore, remove the sentence for describing the performance degration.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8798 | 237.26 | 28.3.3.5 | Improve wording "some RUs in 20 MHz operating STAs are restricted to be used in 40, 80, 80+80 or 160 MHz OFDMA operation." | Change to e.g. "the use of some RUs in the presence of 20 MHz operating STAs is not allowed in 40, 80, 80+80 or 160 MHz OFDMA transmissions." | **Revised**Agree in principal the statement is ambiguous. At the same time, the statement is redundant, so delete the paragraph.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 9766 | 237.32 | 28.3.3.5 | It is not clear to readers why "[Table 28-4 and Table 28-5]" are written on L32. It is probably there to specify what, say, "RU 5" is, but it is not clearly written. Next, DL/UL OFDMA is not a valid PPDU type. Also, phrases like "(2 26-tone RUs are restricted)" do not seem necessary in the standard (probably was needed during discussion phase). | Delete "[Table 28-4 (Subcarrier indices for RUs in a 40 MHz HE PPDU) and Table 28-5(Subcarrier indices for RUs in an 80 MHz HE PPDU)]" on P237L32. On P237L34, change "RU 5 and 14 in 40 MHz DL/UL OFDMA (2 26-tone Rus are restricted)" to "RU #5 and #14 in 40 MHz HE MU or HE trigger based PPDUs". Similar changes throughout P237L35~L52. | **Revised**Agree in principal for clarification, but it is better to explicitly describe the RU index per PPDU, so update the text by explicitly indicating RU type and PPDU type. *TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8799 | 237.34 | 28.3.3.5 | Delete "(2 26-tone RUs are restricted)". This adds no useful information. | See comment | **Accepted***TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8800 | 237.36 | 28.3.3.5 | Delete "(7 26-tone RUs are restricted)". This adds no useful information. | See comment | **Accepted***TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8801 | 237.38 | 28.3.3.5 | Delete "(14 26-tone RUs are restricted)". This adds no useful information. | See comment | **Accepted***TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8802 | 237.42 | 28.3.3.5 | Delete "(2 of 52-tone RUs are restricted)". This adds no useful information. | See comment | **Accepted***TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8803 | 237.44 | 28.3.3.5 | Delete "(4 of 52-tone RUs are restricted)". This adds no useful information. | See comment | **Accepted***TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8804 | 237.49 | 28.3.3.5 | Delete "(2 of 106-tone RUs are restricted)". This adds no useful information. | See comment | **Accepted***TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8805 | 237.50 | 28.3.3.5 | Delete "(4 of 106-tone RUs are restricted)". This adds no useful information. | See comment | **Accepted***TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 5250 | 237.55 | 28.3.3.5 | Just to be clear "recipients of 40/80/160/80+80 OFDMA" means DL OFDMA? If so change accordingly. | as in comment | **Revised**Agree in principal the clarification is required. Text is changed as “recipients of 40 MHz, 80 MHz, 160 MHz, 80+80 MHz HE MU PPDU”.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 8807 | 237.57 | 28.3.3.5 | "It is optional ...". Support for an option should be indicated in e.g. Capabilities. How is support for this option communicated? | Clarify | **Revised**Add the description for the subfield of the HE Capability element to incidate 242-tone RU support capability.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |

* Editorial comments for 28.3.3.5 and 28.3.3.6 of P802.11ax D1.0

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| **CID** | **Page** | **Clause Number** | **Comment** | **Proposed Change** | **Resolution** |
| 10089 | 237.18 | 28.3.3.5 | wrong reference. 28.3.9 needs to be modified to 28.3.3.6 20 MHz only HE STAs | As in the comment. | **Revised**Fix the reference.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 9797 | 237.18 | 28.3.3.5 | "20 MHz-only HE device" is used only here. | Change "20 MHz-only HE device" to "20 MHz-only non-AP STA". | **Revised**Agree in principal and clarify the terminology as 20 MHz-only non-AP HE STA to describe the STA type. *TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 9798 | 237.19 | 28.3.3.5 | ROM is a part of OMI. | Change "to 20 MHz by ROM" to "to 20 MHz using OMI". | **Revised**Agree in principal and update the text as ’20 MHz by OMI’. *TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 4973 | 237.22 | 28.3.3.5 | "DL-OFDMA" is a modifier for a noun but the noun is missing | DL-OFDMA PPDU. Ditto UL-OFDMA PPDU | **Revised**Change DL-OFDMA to HE MU PPDU and UL-OFDMA to HE trigger-based PPDU. *TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 10090 | 237.34 | 28.3.3.5 | "2 26-tone RUs" should be modified with "2 of 26-tone RUs" in order to be consistent with description of 52- and 106-tone RUs such as "2 of 52-tone RUs are restricted" | As in the comment. | **Revised**With the clarification on RU index restriction, this part is redundant with no additional info, so instead of updating the text, simply delete the text.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 9151 | 237.35 | 28.3.3.5 | It is better not to use arabic numerals to describe the number of RUs since 26/52/106-tone RUs also starts with arabic numerals so that text can bring some confusion | (2 26-tone RUs) -> (two 26-tone RUs)(7 26-tone RUs) -> (seven 26-tone RUs)(14 26-tone RUs) -> (fourteen 26-tone RUs)(2 of 52-tone RUs) -> (two 52-tone RUs)(4 of 52-tone RUs) -> (four 52-tone RUs)(2 of 106-tone RUs) -> (two 106-tone RUs)(4 of 106-tone RUs) -> (four 106-tone RUs) | **Revised**With the clarification on RU index restriction, this part is redundant with no additional info, so instead of updating the text, simply delete the text.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 10091 | 237.35 | 28.3.3.5 | "7 26-tone RUs" should be modified with "7 of 26-tone RUs" in order to be consistent with description of 52- and 106-tone RUs such as "2 of 52-tone RUs are restricted" | As in the comment. | **Revised**With the clarification on RU index restriction, this part is redundant with no additional info, so instead of updating the text, simply delete the text.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 10092 | 237.38 | 28.3.3.5 | "14 26-tone RUs" should be modified with "14 of 26-tone RUs" in order to be consistent with description of 52- and 106-tone RUs such as "2 of 52-tone RUs are restricted" | As in the comment. | **Revised**With the clarification on RU index restriction, this part is redundant with no additional info, so instead of updating the text, simply delete the text.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 9152 | 238.01 | 28.3.3.6 | 20 MHz only and 20 MHz-only are mixed over the spec, and it is required to have the consistent expression for a non-AP STA which operates 20 MHz channel only. | Unify 20 MHz only and 20 MHz-only descriptions to represent a non-AP HE STA which operates 20 MHz channel width only. | **Revised**Unify the terminology as 20MHz-only non-AP HE STA to describe the non-AP STA which can operate only with 20 MHz operating channel width.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 6826 | 238.07 | 28.3.3.6 | Inconsistent usage: here we have "non-AP HE STA", whereas almost everywhere else in the draft we have "HE non-AP STA". | Change to "HE non-AP STA". | **Rejected**Through 802.11-2016 and P802.11ax D1.0 description, ‘non-AP’ is used as a prefix to specify STA type, e.g., non-AP VHT STA, non-AP HT STA, non-AP HE STA. Therefore, non-AP HE STA is the right terminaloty to use. |
| 6827 | 238.07 | 28.3.3.6 | "Only a non-AP HE STA can be a 20 MHz only STA": this is clumsily worded and confusing. Clearly 11a, 11g, and 11n STAs can (may?) be 20 MHz only STAs. It would be simpler and better to reword to exclude HE APs. | Change to "HE APs may not be 20 MHz only STAs". | **Revised**Specify the STA as ‘20MHz-only non-AP HE STAs’ such that it only applies to non-AP HE STA excluding HE AP. In addition, delete this sentence since it does not provide additional info.*TGax Editor*: make changes as in **doc.: IEEE 802.11-17/0400r0** |
| 6828 | 238.10 | 28.3.3.6 | Inconsistent usage: here we have "non-AP HE STA", whereas almost everywhere else in the draft we have "HE non-AP STA". | Change to "HE non-AP STA". | **Rejected**Through 802.11-2016 and P802.11ax D1.0 description, ‘non-AP’ is used as a prefix to specify STA type, e.g., non-AP VHT STA, non-AP HT STA, non-AP HE STA. Therefore, non-AP HE STA is the right terminaloty to use. |
| 6829 | 238.11 | 28.3.3.6 | Inconsistent usage: here we have "non-AP HE STA", whereas almost everywhere else in the draft we have "HE non-AP STA". | Change to "HE non-AP STA". | **Rejected**Through 802.11-2016 and P802.11ax D1.0 description, ‘non-AP’ is used as a prefix to specify STA type, e.g., non-AP VHT STA, non-AP HT STA, non-AP HE STA. Therefore, non-AP HE STA is the right terminaloty to use. |
| 6830 | 238.13 | 28.3.3.6 | Inconsistent usage: here we have "non-AP HE STA", whereas almost everywhere else in the draft we have "HE non-AP STA". | Change to "HE non-AP STA". | **Rejected**Through 802.11-2016 and P802.11ax D1.0 description, ‘non-AP’ is used as a prefix to specify STA type, e.g., non-AP VHT STA, non-AP HT STA, non-AP HE STA. Therefore, non-AP HE STA is the right terminaloty to use. |

**Discussion**

The modification resolves the CIDs

**Changes on Section 28.3.3.6**

***To TGax editor:*** ***P246L01 of P802.11ax D1.1*** *swap the section between 28.3.3.5 and 28.3.3.6 and replace the current text with the proposed changes below.*

***------------- Begin Text Changes ---------------***

28.3.3.5 20 MHz-only non-AP HE STAs(#8809)(#9154)(#8615)(#9152)

A 20 MHz-only non-AP HE STA operates with 20 MHz operating channel width only, in frequency bands between 1 GHz and 6 GHz(#8615)(#9796). A 20 MHz-only non-AP HE STA operates in the primary 20 MHz channel as a mandatory mode(#8615). The supported channel bandwidth is indicated in the Channel Width Set subfield in the HE PHY Capabilities Information field(#Ed) in the HE Capabilities element(see 9.4.2.218.3 (HE PHY Capabilities Information field)).(#8360)(#6827)

An HE AP in 5 GHz shall be 80 MHz capable and operate for both 80 MHz capable non-AP HE STAs and 20 MHz-only non-AP HE STAs.(#8615)

A 20 MHz only non-AP HE STA shall support tone mapping of 26-tone RU, 52-tone RU, 106-tone RU and 242-tone RU, for 20 MHz HE PPDU (Table 28-3 (Subcarrier indices for RUs in a 20 MHz HE PPDU)) in 2.4 GHz and 5GHz frequency band.

A 20 MHz only non-AP HE STA shall support tone mapping of 26-tone RU, 52-tone RU, 106-tone RU, for 40 MHz HE PPDU (Table 28-4 (Subcarrier indices for RUs in a 40 MHz HE PPDU))(#8813) in 2.4 GHz and 5 GHz frequency band, and for 80 MHz, 80+80 MHz and 160 MHz HE PPDU(Table 28-5 (Subcarrier indices for RUs in an 80 MHz HE PPDU))(#8813) in 5 GHz frequency band, with the exception of RUs which are restricted from operation as specified in 28.3.3.6 (RU restriction rules for a non-AP STA with 20 MHz operating channel width)).

A 20 MHz only non-AP HE STA may support tone mapping of 242-tone RU, for the reception of 40 MHz HE MU PPDU (Table 28-4 (Subcarrier indices for RUs in a 40 MHz HE PPDU))(#8813) in 2.4 GHz and 5 GHz frequency band, and 80 MHz, 80+80 MHz and 160 MHz HE MU PPDU(Table 28-5 (Subcarrier indices for RUs in an 80 MHz HE PPDU))(#8813) in 5 GHz frequency band.

***------------- End Text Changes ---------------***

**Changes on Section 28.3.3.5**

***To TGax editor:*** ***P245L16 of P802.11ax D1.1*** *swap the section between 28.3.3.5 and 28.3.3.6 and replace the current text with the proposed changes below.*

***------------- Begin Text Changes ---------------***

28.3.3.6 RU restriction rules for a non-AP STA with 20 MHz operating channel width(#8809)(#9795)(#9796)(#8614)

A non-AP STA may operate with 20 MHz operating channel width (#9796), because either it is a 20 MHz-only non-AP HE STA(#9797) (see 28.3.3.5 20 MHz-only non-AP HE STAs (#7506)(#10089)), or it reduces operating channel width to 20 MHz by OMI (#7508)(#9798) (see 27.8 (Operating mode indication)). When a non-AP STA with 20 MHz operating channel width is either a recipient of 40, 80, 80+80 or 160 MHz HE MU PPDU(#4973), or one of transmitters of 40, 80, 80+80 or 160 MHz HE trigger-based PPDU(#4973), RU tone mapping in 20 MHz is not aligned with 40, 80, 80+80 or 160 MHz RU tone mapping (see 28.3.3.2 (Resource unit, guard and DC subcarriers))(#9799)(#9800)(#8798).

An AP shall not assign the following RUs to a STA with 20 MHz operating channel width

* 26-tone RU 5 and 26-tone RU 14 in a 40 MHz HE MU PPDU or 40 MHz HE trigger-based PPDU (#9766)(#8799)(#9151)(#10090)
* 26-tone RU *n*, *n* = 5, 10, 14, 19, 24, 28, 33 in an 80 MHz HE MU PPDU or 80 MHz HE trigger-based PPDU (#9766)(#8800)(#9151)(#10091)
* 26-tone RU *n*, *n* = 5, 10, 14, 19, 24, 28, 33 in a lower 80 MHz, upper 80 MHz, 80+80 MHz, and 160MHz HE MU PPDU (#9766)(#8801)(#9151)(#10092)
* 26-tone RU *n*, *n* = 5, 10, 14, 19, 24, 28, 33 in a lower 80 MHz, upper 80 MHz, 80+80 MHz, and 160MHz HE trigger-based PPDU (#9766)(#8801)(#9151)
* 52-tone RU 5 and 52-tone RU 12 in an 80 MHz HE MU PPDU or 80 MHz HE trigger-based PPDU (#9766)(#8802)(#9151)
* 52-tone RU 5 and 52-tone RU 12 in a lower 80 MHz, upper 80 MHz, 80+80 MHz, and 160MHz HE MU PPDU (#9766)(#8803)(#9151)
* 52-tone RU 5 and 52-tone RU 12 in a lower 80 MHz, upper 80 MHz, 80+80 MHz, and 160MHz HE trigger-based PPDU (#9766)(#8803)(#9151)
* 106-tone RU 3 and 106-tone RU 6 in an 80 MHz HE MU PPDU or 80 MHz HE trigger-based PPDU (#9766)(#8804)(#9151)
* 106-tone RU 3 and 106-tone RU 6 in a lower 80 MHz, upper 80 MHz, 80+80 MHz, and 160MHz HE MU PPDU (#9766)(#8805)(#9151)
* 106-tone RU 3 and 106-tone RU 6 in a lower 80 MHz, upper 80 MHz, 80+80 MHz, and 160MHz HE trigger-based PPDU (#9766)(#8805)(#9151)

Center 26-tone RU in primary 20 MHz channel shall not be assigned to any non-AP STAs where non-AP STAs with 20 MHz operating channel width are recipients of 40 MHz, 80 MHz, 160 MHz, 80+80 MHz HE MU PPDU(#5250).

It is optional whether all 242-tone RUs of non-AP STAs with 20 MHz operating channel width to be supported in 40 MHz, 80 MHz, 160 MHz, 80+80 MHz HE MU PPDU(#4973), and it is indicated in the Channel Width Set subfield in the HE PHY Capabilities Information field (see 9.4.2.218.3 (HE PHY Capabilities Information field))(#8807). If supported, there is no restriction on 242-tone RUs. A 242-tone RU shall not be allocated to non-AP STAs with 20 MHz operating channel width in 40 MHz, 80 MHz, 160 MHz, 80+80 MHzHE trigger-based PPDU(#4973).

***------------- End Text Changes ---------------***