IEEE P802.11  
Wireless LANs

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| Comment resolutions for HE BSS operation – part 2 | | | | |
| Date: 2019-06-01 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Alfred Asterjadhi | Qualcomm Inc. | 5775 Morehouse Dr, San Diego, CA 92109 | +1-858-658-5302 | aasterja@qti.qualcomm.com |
| Abhishek Patil | Qualcomm Inc. |  |  |  |
| George Cherian | Qualcomm Inc. |  |  |  |

Abstract

This submission proposes resolutions for multiple comments related to TGax D4.0 with the following CIDs (8 CIDs):

* 20240, 20456, 21269, 21270, 21272, 21275, 21277, 21279

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Amended CID 21269 to harmonize the language across different paragraphs. And incorporated changes that were received during the presentation at the ad-hoc meeting. And sent e-mail to Mark Hamilton for CID 20456 to confirm he is fine with the resolution. Changes in green.
* Rev 2: Generalized the terminology of channel width rules to cover both STA and AP. Instead of saying e.g., “HE Operation element received” the use is “HE Operation element exchanged” to address Yongho’s comment. Changes hightlighted in this color.

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 20240 | Huizhao Wang | 429.20 | 160MHz MCS + NSS capabilities for VHT may not be the same as in HE | Remove the statements  "If a STA supports 160 MHz, the Maximum NSS defined by its Rx VHTMCS Map field and Extended NSS BW Support field in the VHT Capabilities element at 160 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map For 160 MHz field in the HE Capabilities element at 160 MHz. If a STA supports 80+80 MHz, the maximum NSS defined by its Rx VHT-MCS Map field and Extended NSS BW Support field in the VHT Capabilities element at 80+80 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map For 80+80 MHz field in the HE Capabilities element at 80+80 MHz. " | Rejected –  The CRC disagrees with the comment that the capabilities may not be the same.  Please note that the capabilities of a device are the same independently of the amendment. Once the STA associates with or operates as a VHT/HE device then the STA can lower or increase its operating parameters. This is inline with the PAR requirement that an HE STA is a VHT STA. |
| 20456 | Mark Hamilton | 427.06 | Setting dot11VeryHighThroughputOptionImplemented and dot11HighThroughputOptionImplemented to false in 6 GHz has a LOT of ripple effect. Of course, there are no HTOperation element, no HTCapabilities element, or the VHT equivalents. But, also Transmit Power Envelpope is not in the Beacon (per Table 9-34). The 7th paragraph of 10.12 needs to be fixed. 11.22.16.2, 4th paragraph needs to be fixed (if we want DMS). And 11.22.16.3.1, 2nd paragraph, if want weGCR. Etc. Every reference to these MIB attributes needs to be checked. | Confirm each use of these 4 MIB attributes in the baseline, and that 6 GHz HE STAs don't need any of the related facilities, ever. | Revised –  Agree in principle with the comment. It is impractical to investigate and confirm the use of each of the MIB attributes in the baseline and predict that the STA will not ever use certain facilities ever. An HE STA is a VHT and an HT STA afterall. Proposed resolution is to clarify that the STA maintains the setting of these two MIB variables to true, as per PAR, and specify that the HE STA operates as a VHT STA except that the STA does not follow VHT functionalities and/or requirements that are superseded by equivalent HE functionalities and/or requirements and that the STA uses HE format instead of the VHT, HT format for PPDUs transmitted in the 6 GHz band. We also provide a reference to the subclause that defines the additional rules for the 6 GHz band only.  TGax editor to make the changes shown in 11-19/0963r2 under all headings that include CID 20456. |
| 21269 | Robert Stacey | 426.59 | It is not clear what "shall not attempt to join (MLME-JOIN.request)" means. In the 802.11 architecture, the SME issues the MLME-JOIN.request to get the STA to synchronize with the AP or the other STAs that are part of BSS. Previously (HT, VHT), an MLME-JOIN.request was rejected (MLME-JOIN.confirm with ResultCode not SUCCESS) if the MCS set was not supported This indicated to the SME that it could not synchronize ("join" the IBSS). Why do we need to change this behavior for HE STAs? | Remove this statement and the note. Add a statement to 6.3.4.2.4 similar to statements for HT and VHT STAs. | Revised –  Please note that the behavior between HE STAs and VHT STAs and HT STAs is identical (below taking as an example the VHT case).  In REVmd D2.0 the following can be found:  “*If the MLME of a VHT STA receives an MLME-JOIN.request primitive with a SelectedBSS parameter containing a Basic VHT-MCS And NSS Set field in the VHT Operation parameter that contains any unsupported <VHT-MCS, NSS> tuple, the MLME response in the resulting MLME-JOIN.confirm primitive shall contain a ResultCode parameter that is not set to the value SUCCESS.*”  In IEEE802.11ax D4.0 the following can be found:  “*If the MLME of an HE STA receives an MLME-JOIN.request primitive with a SelectedBSS parameter con-taining a Basic HE-MCS And NSS Set field in the HE Operation parameter that contains any unsupported <HE-MCS, NSS> tuple, then the MLME response in the resulting MLME-JOIN.confirm primitive shall not contain a ResultCode parameter that is set to SUCCESS.*”  In REVmd D2.0 the following can be found:  “*A VHT STA shall not attempt to join (MLME-JOIN.request primitive) a BSS unless it supports (i.e., is able to both transmit and receive using) all of the <VHT-MCS, NSS> tuples in the basic VHT-MCS and NSS set.*”  Which is equivalent to the sentence in question:  ”*An HE STA shall not attempt to join (MLME-JOIN.request primitive) a BSS unless it supports (i.e., is able to both transmit and receive using) all of the <HE-MCS, NSS> tuples in the basic HE-MCS and NSS set*.”  TGax editor: Please replace: “*If the MLME of an HE STA receives an MLME-JOIN.request primitive with a SelectedBSS parameter con-taining a Basic HE-MCS And NSS Set field in the HE Operation parameter that contains any unsupported <HE-MCS, NSS> tuple, then the MLME response in the resulting MLME-JOIN.confirm primitive shall not contain a ResultCode parameter that is set to SUCCESS.” with “If the MLME of an HE STA receives an MLME-JOIN.request primitive with a SelectedBSS parameter con-taining a Basic HE-MCS And NSS Set field in the HE Operation parameter that contains any unsupported <HE-MCS, NSS> tuple, then the MLME response in the resulting MLME-JOIN.confirm primitive shall contain a ResultCode parameter that is not set to the value SUCCESS.”* |
| 21270 | Robert Stacey | 426.45 | This statement is just complicated way of putting a restrinction on the content of the HE Operation element. Why does it matter if the STA is starting a BSS? Surely the requirement applies throughout the lifetime of the BSS. | Change to "An HE STA shall not transmit an HE Operation element with a Basic HE-MCS And NSS Set field unless it supports the reception and transmission of all the indicated <HE-MCS, NSS> tuples." and move the statement out of this paragraph. The paragraph should just be a statement about the purpose of the Basic HE-MCS And NSS Set field. | Revised –  Generally, agree with the comment that the requirement applies throughout the lifetime of the BSS. Hence replacing “starting” with “operating. Also split the sentence so that it is a separate paragraph. However, the language is kept as is since it is almost identical to other normative language that we have in the baseline and it covers not only the HE operation element signaling but also the HE Capabilities parameter. Please refer to language in subclauses 11.39.1 for example:  “A STA that is starting a VHT BSS shall be able to receive and transmit at each of the <VHT-MCS, NSS>  tuple values indicated by the Basic VHT-MCS And NSS Set field of the VHT Operation parameter of the  MLME-START.request primitive and shall be able to receive at each of the <VHT-MCS, NSS> tuple values indicated by the Supported VHT-MCS and NSS Set field of the VHT Capabilities parameter of the MLMESTART.request primitive.” In addition, added a continuation statement in the same sentence for the BSS bandwidth declaration in the same sentence even though not strictly required since it it already mentioned in the subsequent subclauses.  TGax editor to make the changes shown in 11-19/0963r2 under all headings that include CID 21270. |
| 21272 | Robert Stacey | 427.10 | "channel width capability" is vague and most STAs are capable of operating with more than one channel width. Also, the location of the declaration can be more specific. | Change "its channel width capability" to "the channel widths at which it is capable of operating". Change "in the HE Capabilities element" to "in the Supported Channel Width Set field in the PHY Capabiltiies Information field in the HE Capabilities element" | Revised –  Agree in principle with the comment. Proposed resolution accounts for the suggested changes, with minor editorial modifications, and specifying general that the information is provided in the PHY Capabilities Information field rather than that particular subfield only.  TGax editor to make the changes shown in 11-19/0963r2 under all headings that include CID 21272. |
| 21275 | Robert Stacey | 428.43 | "using a bandwidth" is vague (could mean PPDU bandwidth or operating channel width of transmitter, i.e., spectral mask applied). Also, it is not the capabilities that are relavant; it is the operating mode that is relavant (as indicated In OM Control and HE Operation element) since the requirements here are ALWAYS tighter than the capabilities. | Change to "An HE STA shall not transmit an HE PPDU to a recipient STA with a PPDU bandwidth that is greater than the operating channel width of the recipient STA as indicated in the last received OM Control field or HE Operation element from the recipient STA." | Revised –  Agree in principle with the comment that the term “bandwidth is vague. Proposed resolution is to use the term “channel width” which is currently used in the definitions of the Supported Channel Width Set field of the HE Capabilities element. In addition, we add another sentence for the case of the HE/VHT/HT Operation element for the missing case of HE Ops. As for the OM Control field, please note that the normative behavior for this case is explicitly mentioned in 26.9 (operating mode indication).  TGax editor to make the changes shown in 11-19/0963r2 under all headings that include CID 21275. |
| 21277 | Robert Stacey | 429.01 | Is this true even for an HE STA that is not a VHT STA? The statement is either redundant (since the HE STA is a VHT STA and thus follows rules that apply to VHT STAs) or it applies VHT rules to non-VHT STAs. | Remove the first sentence of this paragraph. | Revised –  An HE STA that operates in the 5 GHz band is a VHT STA. The statement is indeed tailored as a normative requirement, making it somewhat redundant. Proposed resolution is to convert it to a declarative statement, inline with the new editorial styleguide. Additionally clarified that these rules are also valid for the 6 GHz band, because the subsequent sentence specifies that the HE STA follows additional rules for the scanning and operation in the 6 GHz band.  TGax editor to make the changes shown in 11-19/0963r2 under all headings that include CID 21277. |
| 21279 | Robert Stacey | 429.12 | Not responding is bad behavior. By not responding the STA is left without information on why there was no response and will probably retry assuming reception failure. In the case of Association Request frame (which is directed) does this mean no Ack frame is sent? Or no Association Response frame is sent? Either way, almost always better to respond with an appropriate response (e.g., Disassociate or Probe Response with capability indication) than to not respond at all. At a minimum, this needs to align with the procedures in 11.3.5. | Remove this statement. | Revised –  There are two cases under consideration in this rule. The first one is for non-HE STAs, which will not be able to determine that the AP will be there in the first place since the beacons are generated in HE ER SU PPDU. The other case is some HE STAs, also will not be able to determine that the AP will be there since the beacons are generated in HE ER SU PPDU with 106-tone RU. But STAs can send wildcard probe requests asking all APs in the surrounding to respond (but a response from an ER AP is useless since these STAs cannot even operate under its rule). Hence the rule. Proposed resolution is though to clarify that the rule applies to non-responses with the respective management frames not the acknowledgments.  TGax editor to make the changes shown in 11-19/0963r2 under all headings that include CID 21279. |

**Discussion: *None***

* HE BSS operation
* Basic HE BSS operation(#Ed)

The Beacon frames generated within an HE BSS contain an HE Operation element. (#16690)

An HE STA has dot11HEOptionImplemented equal to true.

**TGax Editor: *Change the paragraph below of this subclause as follows [including the paragraph split] (#CID 21270):***

A STA that is operating in an HE BSS shall be able to receive and transmit at each of the <HE-MCS, NSS> tuple values indicated by the Basic HE-MCS And NSS Set field of the HE Operation parameter of the MLME-START.request primitive and shall be able to receive at each of the <HE-MCS, NSS> tuple values indicated by the Supported HE-MCS and NSS Set field of the HE Capabilities parameter of the MLME-START.request primitive.*(#21270)*

The basic HE-MCS and NSS set is the set of <HE-MCS, NSS> tuples that are supported by all HE STAs that are members of an HE BSS. It is established by the STA that starts the HE BSS, indicated by the Basic HE-MCS And NSS Set field of the HE Operation parameter in the MLME-START.request primitive. Other HE STAs determine the basic HE-MCS and NSS set from the Basic HE-MCS And NSS Set field of the HE Operation element in the BSSDescription derived through the scan mechanism (see 11.1.4.1 (General)).

An HE STA shall not attempt to join (MLME-JOIN.request primitive) a BSS unless it supports (i.e., is able to both transmit and receive using) all of the <HE-MCS, NSS> tuples in the basic HE-MCS and NSS set.

NOTE—An HE STA does not attempt to (re)associate with an HE AP unless the STA supports (i.e., is able to both transmit and receive using) all of the <HE-MCS, NSS> tuples in the Basic HE-MCS And NSS Set field in the HE Operation element transmitted by the AP because the MLME-JOIN.request primitive is a necessary precursor to (re)association.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 20456):***

A STA operating in the 2.4 GHz band that sets dot11HEOptionImplemented to true shall set dot11HighThroughputOptionImplemented to true. A STA operating in the 5 GHz and 6 GHz band that sets dot11HEOptionImplemented to true shall set both dot11VHTOptionImplemented and dot11HighThroughputOptionImplemented to true. A non-AP STA that sets dot11HEOptionImplemented to true shall set dot11MultiBSSIDImplemented to true.

An HE STA operating in the 6 GHz band shall inherit the functionalities of a VHT STA except that it is exempt from following VHT and HT functionalities and/or requirements that are unavailable or superseded by equivalent HE functionalities and/or requirements (see Clauses 26 (High Efficiency (HE) MAC specification) and 27 (High Efficiency (HE) PHY specification)), and that it shall use the HE format instead of the VHT, HT\_GF, or HT\_MF format for PPDUs transmitted in the 6 GHz band. Additional HE functionalities and/or requirements for the 6 GHz band are defined in 26.17.2 (HE BSS operation in the 6 GHz band).*(#20456)* (#16446, #15824)

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21272):***

A STA that is an HE AP or an HE mesh STA declares the channel widths at which it is capable of operating in the PHY Capabilities Information field of the HE Capabilities element that it transmits (see Table 9-321b (Subfields of the HE PHY Capabilities Information field)).*(#21272)*

An HE AP operating in the 5 GHz or 6 GHz bands shall set B1 in the Supported Channel Width Set field in the PHY Capabilities Information field in the HE Capabilities element to indicate support for 40 MHz and 80 MHz channel width and may set B2 and B3 in the Supported Channel Width Set field to indicate support for either 160 MHz channel width or 160/80+80 MHz channel width or both.

A STA transmitting an HT Capabilities element and HE Capabilities element shall set the Supported Channel Width Set subfield of the HT Capabilities element to 1 if(#Ed) either B0 or B1 of the Supported Channel Width Set subfield of the HE Capabilities element is set to 1(#15414) unless(#Ed) the STA is a 20 MHz-only non-AP HE STA, in which case the Supported Channel Width Set subfield of the HT Capabilities element is set to 0(#15415).

A STA transmitting a VHT Capabilities element and HE Capabilities element shall set the Supported Channel Width Set subfield of the VHT Capabilities element to indicate the same channel width as indicated(#Ed) in the HE Capabilities element unless(#15416) the STA is a 20 MHz-only non-AP HE STA, in which case the Supported Channel Width Set subfield of the VHT Capabilities element is reserved.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21270):***

At a minimum, an HE STA sets the Rx MCS Bitmask subfield of the Supported MCS Set field of its HT Capabilities element according to the setting of each Rx HE-MCS Map *b* subfield, *b*  { 80 MHz, 160 MHz, 80+80 MHz}, of the Supported HE-MCS And NSS Set field of its HE Capabilities element as follows: for each Max HE-MCS For *n* SS subfield, 1  *n*  4, of each Rx HE-MCS Map *b* subfield, *b*  { 80 MHz, 160 MHz, 80+80 MHz}, with a value other than 3 (no support for that number of spatial streams), the STA shall indicate support for HT MCSs 8× (*n*– 1) to 8× (*n*– 1) + 7(#16039) in the Rx MCS Bitmask subfield, where *n* is the number of spatial streams, except for those MCSs marked as unsupported as described in 26.15.4.3 (Additional rate selection constraints for HE PPDUs).*(#21270)*

An HE AP or an HE mesh STA shall set the VHT Operation Information Present field in the HE Operation element to 0 if a VHT Operation element is present in the frame that carries the HE Operation element or if the frame that carries the HE Operation element is sent in the 2.4 GHz band. An HE AP or HE mesh STA shall set the VHT Operation Information Present field in the HE Operation element to 1 if a VHT Operation element is not present in the frame that carries the HE Operation element and the frame is sent in the 5 GHz band. (#17090, #16227)

An HE AP or an HE mesh STA that transmits an HE Operation element that has the VHT Operation Information Present field set to 1 shall do one of the following to set the BSS operating channel:

* Set the STA Channel Width subfield and Channel Center Frequency Segment 2 subfield in the HT Operation Information field in the HT Operation element, the Channel Width subfield in the VHT Operation Information field in the HE Operation element, the Channel Center Frequency Segment 0 and Channel Center Frequency Segment 1 subfields in the VHT Operation Information field in the HE Operation element to indicate the BSS bandwidth as defined in Table 11-24 (VHT BSS bandwidth) and Table 11-26 (Extended NSS channel width) respectively based on the Extended NSS BW Support and Supported Channel Width Set fields.
* Set the STA Channel Width subfield and Channel Center Frequency Segment 2 subfield in the HT Operation Information field in the HT Operation element, the Channel Width subfield in the VHT Operation Information field in the HE Operation element, the Channel Center Frequency Segment 0 and Channel Center Frequency Segment 1 subfields in the VHT Operation Information field in the HE Operation element to indicate the BSS bandwidth as defined in Table 11-24 (VHT BSS bandwidth) and Table 11-26 (Extended NSS channel width) respectively based on the Rx HE-MCS Map  80 MHz, Rx HE-MCS Map 160 MHz, and Rx HE-MCS Map 80+80 MHz fields.

NOTE 1—The Channel Center Frequency Segment 2 is 0 if Table 11-24 (VHT BSS bandwidth) is applied.

NOTE 2—These two methods give the same result.

The setting of the Channel Center Frequency Segment 0, Channel Center Frequency Segment 1 and Channel Center Frequency Segment 2 subfields is defined in Table 11-25 (Setting of Channel Center Frequency Segment 0, Channel Center Frequency Segment 1 and Channel Center Frequency Segment 2 subfields), except that the Max NSS support is provided by the HE STA in frames that contain an HE Capabilities element (see 9.4.2.242 (HE Capabilities element)) and an Operating Mode field (see 9.2.4.6.4.3 (Operating Mode) and 9.4.1.53 (Operating Mode field)), where in the table the Max NSS support refers to the HE Max NSS support instead of the VHT Max NSS support for an HE STA.

An HE STA shall determine the channelization using the information in the Primary Channel field of the HT Operation element when operating in 2.4 GHz and the combination of the information in the Primary Channel field in the HT Operation element and the Channel Center Frequency Segment 0 and Channel Center Frequency Segment 1 subfields in the VHT Operation Information field in the VHT Operation element if operating in the 5 GHz band (see 21.3.14 (Channelization)). An HE STA determines the channelization as defined in 26.17.2 (HE BSS operation in the 6 GHz band) if operating in the 6 GHz band.(#16446, #15824)

An HE AP or an HE mesh STA shall set the Secondary Channel Offset subfield in the HT Operation Information field in the HT Operation element to indicate the secondary 20 MHz channel as defined in Table 9-168 (HT Operation element fields and subfields), if the BSS bandwidth is more than 20 MHz.

An HE STA that is a member of an HE BSS shall follow the rules in 11.40.1 (Basic VHT BSS functionality) when transmitting a 20 MHz, 40 MHz, 80 MHz, 160 MHz or 80+80 MHz HE PPDUs with the following exceptions:

* An HE TB PPDU sent in response to a triggering frame follows the rules defined in 26.5.3.3 (Non-AP STA behavior for UL MU operation).
* An 80 MHz, 160 MHz or 80+80 MHz DL HE MU PPDU with preamble puncturing may be transmitted if the primary 20 MHz or the primary 40 MHz are occupied by the transmission and certain 20 MHz subchannels of the secondary channel are idle (see Table 27-20 (HE-SIG-A field of an HE MU PPDU) and 10.22.2.5 (EDCA channel access in VHT, HE, or TVHT BSS)).

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21275):***

An HE STA shall not transmit to a recipient HE STA using a channel width that is not indicated as supported in the Supported Channel Width Set subfield in the HE Capabilities element received from that HE STA.

An HE STA shall not transmit to a recipient HE STA using a channel width that exceeds the BSS channel width in the Channel Width field that is contained in:

* The HE Operation element most recently exchanged with the recipient STA, if any, and if the Channel Width field is present
* Otherwise, the VHT Operation element most recently exchanged with the recipient STA, if any
* Otherwise, the HT Operation element most recently exchanged with the recipient STA, if any.*(#21275)*

A STA shall not transmit an HE PPDU to a recipient STA that carries a frame that is not an HE Compressed Beamforming/CQI frame (see 26.7.3 (Rules for HE sounding protocol sequences)) and that exceeds the maximum MPDU length capability indicated in the VHT Capabilities element last received from the recipient STA in the 2.4 GHz or 5 GHz band or, if a VHT Capabilities element has not been received from the recipient STA, that exceeds the maximum A-MSDU length indicated in the HT Capabilities element last received from the recipient STA in the 2.4 GHz or 5 GHz band. (#16251)

A STA shall not transmit an HE PPDU to a recipient STA that carries a frame that is not an HE Compressed Beamforming/CQI frame (see 26.7.3 (Rules for HE sounding protocol sequences)) and that exceeds the maximum MPDU length capability indicated in the HE Extended Capabilities element last received from the recipient STA in the 6 GHz band.

An HE AP shall set the RIFS Mode field in the HT Operation element to 0.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21277):***

An HE STA follows the rules in 11.40 (VHT BSS operation) for channel selection, determining scanning requirements, channel switching, NAV assertion and antenna indication when operating in the 5 GHz and 6 GHz band unless explicitly stated otherwise in Clause 26. An HE STA shall additionally follow the rules in 26.17.2 (HE BSS operation in the 6 GHz band) for scanning and operation in the 6 GHz band.*(#21277)*

An HE STA shall follow the rules in 11.16 (20/40 MHz BSS operation) for channel selection, determining scanning requirements, channel switching, NAV assertion when operating in 2.4 GHz unless explicitly stated otherwise in Clause 26.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21279):***

The AP of an ER BSS shall not respond with a Probe Response or (Re)Association Response frame to a Probe Request or (Re)Association Request frame, respectively, sent from a non-HT STA, or an HE STA that does not support Partial Band Extended Range capability if the HE AP transmits ER Beacon in HE ER SU PPDU with 106-tone RU. An HE AP that is not operating an ER BSS may set the ER SU Disable subfield in the HE Operation element it transmits to 1.*(#21279)*

A STA shall have the same value of maximum VHT NSS defined by its Rx HE-MCS Map  80 MHz subfield in the HE Capabilities element as the maximum NSS value indicated by its Rx VHT-MCS Map field in the VHT Capabilities element. If a STA supports 160 MHz, the Maximum NSS defined by its Rx VHT-MCS Map field and Extended NSS BW Support field in the VHT Capabilities element at 160 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map 160 MHz subfield in the HE Capabilities element at 160 MHz. If a STA supports 80+80 MHz, the maximum NSS defined by its Rx VHT-MCS Map field and Extended NSS BW Support field in the VHT Capabilities element at 80+80 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map 80+80 MHz subfield in the HE Capabilities element at 80+80 MHz. For every NSS in VHT Capabilities elements and HE Capabilities elements transmitted by a STA, if the maximum HE-MCS is 9 or more, the maximal VHT-MCS shall be 9. Otherwise the maximal VHT-MCS shall be the same as the HE-MCS. An HE STA shall not transmit a VHT Capabilities element with the Supported Channel Width Set field equal to 1 and the Extended NSS BW Support field equal to 3 or with the Supported Channel Width Set field equal to 2 and the Extended NSS BW Support field equal to 3.

If an HE STA supports 160 MHz, the maximum NSS defined by its Rx HE-MCS Map 160 MHz subfield for an HE-MCS in the HE Capabilities element at 160 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map ≤ 80 MHz subfield for the HE-MCS in the HE Capabilities element at 80 MHz.

If an HE STA supports 80+80 MHz, the maximum NSS defined by its Rx HE-MCS Map field for an HE-MCS 80+80 MHz subfield in the HE Capabilities element at 80+80 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map ≤ 80 MHz subfield for the HE-MCS in the HE Capabilities element at 80 MHz.

**26.15.3 MCS, NSS, BW and DCM selection**

**TGax Editor: *Insert the paragraph below in this subclause as follows (#CID 21275):***

An HE STA shall follow the rules defined in 10.7 (Multirate support) and 26.15.4 (Rate selection constraints for HE STAs) for selecting the rate, MCS, NSS, and the rules defined in 10.3.2.6 (VHT RTS procedure), 10.3.2.7 (CTS and DMG CTS procedure), 10.7.6.6 (Channel Width selection for Control frames) and 10.7.11 (Channel Width in non-HT and non-HT duplicate PPDUs) for selecting the channel width (BW) of transmitted PPDUs with the following exceptions:

* MCS, NSS, and BW selection for an HE TB PPDU are defined in 26.5.3.3 (Non-AP STA behavior for UL MU operation).
* Rate and BW selection for a CTS sent in response to an MU-RTS Trigger frame are defined in 26.2.6 (MU-RTS Trigger/CTS frame exchange procedure).
* A STA that transmits a Control frame carried in a non-HT PPDU that is a response to a frame received in an HE ER SU PPDU shall set the rate of the non-HT PPDU to 6 Mb/s.
* A STA that transmits a Control frame that is an S-MPDU carried in an HE ER SU PPDU and that is a response to a frame received in an HE ER SU PPDU shall use the <HE-MCS, NSS> tuple <MCS 0, 1>.
* NSS and BW selection is further constrained as defined in 26.9 (Operating mode indication), 11.42 (Notification of operating mode changes), 26.15.2 (PPDU format selection), 26.17 (HE BSS operation) and in the remaining subclauses of 26.15 (PPDU format, BW, MCS, NSS, and DCM selection rules).*(#21275)*