IEEE P802.11  
Wireless LANs

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| LB225 11ax D1.0 Comment Resolution OMI and Operating Mode | | | | |
| Date: 2017-07-10 | | | | |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs :

* 7617.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: 1), Add 20 MHz-only device in VHT BSS and HT BSS; 2), Change the NSS calculation formula; 3), Add more explanation text

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** | **PP** | **LL** | **Comment** | **Proposed Change** | **Resolution** |
| 7617 | 188 | 17 | NSS behavior is not harmonized with HE Capabilities element. | Change the nomative behavior to make them consistent. | **Revised**  **Generally agree with the commenter.**  **TGax editor makes changes as shown in 11-17/1067r2 under 7617.** |

**Discussion:**

In 201707 F2F meeting, it was calrified that 20 MHz-only HE STA is VHT STA and the behavior of an HE AP with associated 20 MHz-only HE STAs is defined. However the behavior of 20 MHz-ony HE STAs associated with VHT AP or HT AP is missing. This contribution adds the related behavior.

In 802.11mc, the implementation of VHT introduces the feature that the NSS support at 160/80+80 MHz is less the the NSS support at 20/40/80 MHz.

Supported VHT-MCS and NSS Set field in VHT Capabilities Information field is defined as:



Where VHT-MCS Map is defined as:

****

The NSS support of a VHT STA is defined in:

****

A VHT AP/STA can announce different NSS support at 160/80+80 MHz from NSS support at 20/40/80 MHz in VHT Capabilities element, i.e. NSS aupport at 160/80+80 MHz is ½ or ¾ of NSS support at 20/40/80 MHz. A VHT STA/AP can also announce smaller NSS for power save by unicast/broadcast Operating Mode field:

. 

With Such announcement, NSS at 20/40/80 MHz and 160/80+80 MHz are updated. The new NSS at 160/80+80 MHz is still ½ or3/4 of the new NSS at 20/40/80 MHz.



The Supported HE-MCS and NSS Set field in HE Capabilities element is defined as:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Rx HE-MCS Map  For <= 80 MHz | (#5879) (#7576)Tx HE-MCS Map For <= 80 MHz | Rx HE-MCS Map For 160 MHz | (#5879) (#7576)Tx HE-MCS Map  For 160 Mhz | Rx HE-MCS Map For 80+80 MHz | (#5879) (#7576)Tx HE-MCS Map  For 80+80 Mhz |
| Octets: | 2 | 2 | 0 or 2 | 0 or 2 | 0 or 2 | 0 or 2 |

A HE AP/STA can announce different NSS support at 160/80+80 MHz from NSS support at 20/40/80 MHz in the VHT Capabilities element. With additional HE MCS-NSS fields for 160/80+80 MHz, HE NSS at 160/80+80 MHz can be flexibly defined.

An HE STA/AP can announce smaller NSS for power save by unicast Operating Mode Control field:



Similar to VHT spec when the Operating Mode (OM) Control subfield is received, the new Rx NSS support at 160/80+80 MHz of the STA which transmits OM Control subfield should be figured out per the received Rx NSS value.

OM Control subfield and Operating Mode field are separately defined by 802.11ax and 802.11ac. Operating Mode field can be in Beacon, Operating Mode Notification frame, etc. OM Control subfield can be in MAC header of QoS data, QoS Null, Management frame. It seems that HE NSS and VHT NSS should be changed at the same time for power save.

Option 1 is that when Operating Mode field is transmitted by HE STA1 to HE STA2(s), both HE STA1’s HE Rx NSS and VHT Rx NSS are changed, and when OM Control subfield is transmitted by HE STA1 to HE STA2, both HE STA1’s HE Rx NSS and VHT Rx NSS are changed. Under such option, another possibility (possibility 1) is that VHT NSS at 160 MHz/80+80 MHz is defined by a table which is similar to Table 9-75 in IEEE 802.11-2016 and HE NSS at 160 MHz/80+80 MHz are defined by a new formula, another possibility (possibility 2) is that HE NSS and VHT NSS at 160 MHz/80+80 MHz are defined by same formula.

Option 2 is the HE Operating Mode field, HE Operation Notification element, HE Operation Notification frame are defined. OMI Control, HE Operating Mode field are used for HE NSS, BW notification. Operating Mode field is used for VHT NSS, BW notification. With option 2, one NSS change operation may require multiple frame exchanges for VHT NSS change and HE NSS change.

The following text is based on possibility 1 under option 1.

**27.16 HE BSS operation**

**27.16.1 Basic HE BSS functionality**

*TGax editor: change 7th paragraph in subclause 27.16.1 as follows (CID 7617):*

A STA shall set the Supported Channel Width Set subfield of VHT Capabilities and HT Capabilities element it transmits to a value that indicates the same channel width capability as the channel width capability provided in the HE Capabilities element it transmits. A STA shall have the same value of maximum VHT NSS defined by its Rx HE-MCS Map For <=80 MHz field in the HE Capabilities element as the maximum NSS value defined 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 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. For every NSS in VHT Capabilities elements and HE Capabilities elements transmited 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. A 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.

**9.4.1.53 Operating Mode field**

***TGax editor: change Table 9-74 as follows (CID 7617):***

**Table 9-74 Subfield values of the Operating Mode field**

|  |  |
| --- | --- |
| Subfield | Description |
| Channel Width | If the Rx NSS Type subfield is 0, indicates the supported channel width:  In a VHT STA, see Table 9-75 (Setting of the Channel Width subfield and 160/80+80 BW subfield at a VHT STA transmitting the Operating Mode field)  In a TVHT STA:  Set to 0 for TVHT\_W  Set to 1 for TVHT\_2W and TVHT\_W+W  Set to 2 for TVHT\_4W and TVHT\_2W+2W  The value of 3 is reserved.  Reserved if the Rx NSS Type subfield is 1. |
| 160/80+80 BW | This subfield, combined with the Channel Width subfield, the Supported Channel Width Set subfield and the Supported VHT-MCS and NSS Set subfield indicates whether 80+80 MHz and 160 MHz operation is supported.  In a VHT STA, see Table 9-75 (Setting of the Channel Width subfield and 160/80+80 BW subfield at a VHT STA transmitting the Operating Mode field).  In a TVHT STA, this field is reserved.  In a STA with dot11VHTExtendedNSSBWCapable either equal to false or not present, this field is set to 0. |
| No LDPC | Set to 1 to indicate that the STA transmitting this field prefers not to receive LDPC-encoded PPDUs; set to 0 otherwise. |
| Rx NSS | When the STA (STA1) which transmits the Operating Control field and the receiver (STA2) of the Operating Control field are not both HE STAs, if the Rx NSS Type subfield is 0, the value of this field, combined with other information described in 9.4.2.158.3 (Supported VHT-MCS and NSS Set field), indicates the maximum number of spatial streams that STA1 can receive.  When the STA (STA1) which transmits the Operating Control field and the receiver (STA2) of the Operating Control field are both HE STAs, if the Rx NSS Type subfield is 0,   * the value of this field, combined with other information described in 9.4.2.158.3 (Supported VHT-MCS and NSS Set field), indicates the maximum number of spatial streams that the HE STA can receive in a VHT PPDU * the value of this field, combined with other information described in 9.4.2.237.4 (**Supported HE-MCS and NSS Set field**), indicates the maximum number of spatial streams that STA1 can receive in an HE PPDU.   If the Rx NSS Type subfield is 1, the value of this field, indicates the maximum number of spatial streams that the STA can receive as a beamformee in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA.  Set to 0 for *NSS* = 1  Set to 1 for *NSS* = 2  …  Set to 7 for *NSS* = 8  NOTE—In a STA with dot11VHTExtendedNSSBWCapable equal to true, NSS might be further modified for VHT PPDUs per Table 9-75 (Setting of the Channel Width subfield and 160/80+80 BW subfield at a VHT STA transmitting the Operating Mode field). In a HE STA with dot11VHTExtendedNSSBWCapable equal to true, NSS might be further modified for HE PPDUs per Equation (9-xxxa). |
| Rx NSS Type | Set to 0 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive in any PPDU.  Set to 1 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive as a beamformee in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with the Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA.  NOTE—An AP always sets this field to 0. |

*TGax editor: add the following paragraph in subclause 9.4.1.53 (CID 7617):*

The Rx NSS support as a function of the received HE PPDU bandwidth BW at an HE STA transmitting an Operating Mode field is defined as

Floor (Rx-NSS-from-OMF × (HE-NSS-at-BW / Max-HE-NSS-at-80) ) (9-xxxa)

where

Rx-NSS-from-OMF Rx NSS from the Operating Mode field transmitted by the STA

HE-NSS-at-BW HE NSS at BW MHz from the Supported HE-MCS and NSS Set field transmitted by the STA

Max-HE-NSS-at-80 Maximum HE NSS from the Supported HE-MCS and NSS Set field transmitted by the STA

**9.2.4.6.4.3 Operating mode (OM) Control(#4727)**

*TGax editor: change subclause 9.2.4.6.4.3 as follows (CID 7617):*

If the Control ID subfield is 1, the Control Information subfield contains information related to the operating mode change of the STA transmitting the frame containing this information (see 27.8 (Operating mode indi-cation)). The format of the subfield is shown in Figure 9-15d (Control Information subfield format when Control ID subfield is 1).(#4740)



**Figure 9-15d—Control Information subfield format when Control ID subfield is 1**

The Rx NSS subfield indicates the maximum number of spatial streams, *NSS*, that the STA supports in reception(#7716, #5052) and is set to *NSS* – 1.

The Channel Width subfield indicates the operating channel width supported by the STA in reception, and is set to 0 for primary 20 MHz, 1 for primary 40 MHz, 2 for primary 80 MHz, and 3 for primary 160 MHz and primary 80+80 MHz.(#6017)(#9939)

The Rx NSS support as a function of the received HE PPDU bandwidth BW at an HE STA transmitting an OM Control subfield is defined as

Floor(Rx-NSS-from-OMI × (HE-NSS-at-BW / Max-HE-NSS-at-80) ) (9-xxxb)

where

Rx-NSS-from-OMI Rx NSS from the OM Control subfield transmitted by the STA

HE-NSS-at-BW HE NSS at BW MHz from the Supported HE-MCS and NSS Set field transmitted by the STA

Max-HE-NSS-at-80 Maximum HE NSS from the Supported HE-MCS and NSS Set field transmitted by the STA

The VHT channel width and the VHT NSS allowed at an HE STA transmitting an OM Control subfield are defined in Table 9-xxx.

Table 9-xxx Setting of the VHT Channel Width and VHT NSS at a HE STA transmitting the OM Control subfield

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Transmitted OM Control subfield | VHT Capabilities of STA transmitting the OM Control subfield | | VHT NSS Support of STA transmitting the OM Control subfield as a function of the PPDU bandwidth (×Max VHT NSS) (see requirements R1 and R2) | | | | | Location of 160 MHz center frequency if BSS bandwidth is 160 MHz | Location of secondary 80 MHz center frequency if BSS bandwidth is 80+80 MHz |
| Channel Width | Supported Channel Width Set | Extended NSS BW Support | 20 MHz | 40 MHz | 80 MHz | 160 MHz | 80  +80 MHz |  |  |
| 0 | 0-2 | 0-3 | 1 |  |  |  |  |  |  |
| 1 | 0-2 | 0-3 | 1 | 1 |  |  |  |  |  |
| 2 | 0-2 | 0-3 | 1 | 1 | 1 |  |  |  |  |
| 3 | 0 | 1 | 1 | 1 | 1 | 1/2 |  | CCFS2 |  |
| 3 | 0 | 2 | 1 | 1 | 1 | 1/2 | 1/2 | CCFS2 | CCFS2 |
| 3 | 0 | 3 | 1 | 1 | 1 | 3/4 | 3/4 | CCFS2 | CCFS2 |
| 3 | 1 | 0 | 1 | 1 | 1 | 1 |  | CCFS1 |  |
| 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1/2 | CCFS1 | CCFS2 |
| 3 | 1 | 2 | 1 | 1 | 1 | 1 | 3/4 | CCFS1 | CCFS2 |
| 3 | 1 | 3 | 2 | 2 | 2 | 2 | 1 | CCFS1 | CCFS1 |
| 3 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | CCFS1 | CCFS1 |
| 3 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | CCFS1 | CCFS1 |
| R1: NSS support shall be rounded down to the nearest integer.  R2: The maximum NSS support shall be 8. | | | | | | | | | |
| NOTE 1—Max VHT NSS as indicated by the value of the Rx NSS field. The Rx NSS field indicates the same Max HE NSS and Max VHT NSS. Max VHT NSS is at the BW indicated by VHT Capabilities element, for all allowed MCS values the Max VHT NSS values are same, but the supported NSS can be different. | | | | | | | | | |
| NOTE 2—1/2× or 3/4× Max VHT NSS support might end up being 0, indicating no support. | | | | | | | | | |
| NOTE 3—Any other combination than the ones listed in this table is reserved. | | | | | | | | | |
| NOTE 4—CCFS1 refers to the value of the Channel Center Frequency Segment 1 field of the most recently transmitted VHT Operation element. | | | | | | | | | |
| NOTE 5—CCFS2 refers to the value of the Channel Center Frequency Segment 2 field of the most recently transmitted HT Operation element. | | | | | | | | | |
| NOTE 6—CCFS1 is nonzero when the current BSS bandwidth is 160 MHz or 80+80 MHz and the NSS support is at least Max VHT NSS. CCFS2 is zero in this case. | | | | | | | | | |
| NOTE 7—CCFS2 is nonzero when the current BSS bandwidth is 160 MHz or 80+80 MHz and the NSS support is less than Max VHT NSS. CCFS1 is zero in this case. | | | | | | | | | |
| NOTE 8—At most one of CCFS1 and CCFS2 is nonzero. | | | | | | | | | |
| NOTE 9—A supported multiple of Max VHT NSS applies to both transmit and receive. A supported multiple of Max HE NSS applies to receive | | | | | | | | | |
| NOTE 10—Some combinations of Supported Channel Width Set and Extended NSS BW support might not occur in practice. | | | | | | | | | |
| ~~NOTE 11—2× Max VHT NSS support might be used for HT PPDUs (at 20 or 40 MHz PPDU bandwidth).~~ | | | | | | | | | |

The UL MU Disable subfield indicates whether UL MU operation is suspended or resumed by a(#6260) non-AP STA. The UL MU Disable subfield is set to 1 to indicate that UL MU operation is suspended; other-wise it is set to 0 to indicate that UL MU operation is resumed. An AP sets the UL MU Disable subfield to 0.

The Tx NSTS subfield indicates the maximum number of space time streams, *NSTS*, that the STA supports in transmission(#7717) and is set to *NSTS* – 1.(#4733, #9804)

**9.4.2.158 VHT Capabilities element**

**9.4.2.158.3 Supported VHT-MCS and NSS Set field**

*TGax editor: add the following paragraph at the end of subclause 9.4.2.158.3 (CID 7617):*

The value of Max VHT NSS for a given MCS is equal to the smaller of:

— the maximum value of *n* for which the Max VHT-MCS for *n* SS has a value that indicates support for that MAC (0, 1 or 2 for MCS 0-7, 1 or 2 for MCS 8, 2 for MCS 9)

— the maximum supported NSS as indicated in by the value of the Rx NSS field of the OM Control subfield (and further defined in the Table 9-xxx (Setting of the VHT Channel Width and VHT NSS at a HE STA transmitting the OM Control subfield NSS field))

NOTE—A VHT-MCS indicated as supported in the VHT-MCS Map fields for a particular number of spatial streams

might not be valid at all bandwidths (see 21.5 (Parameters for VHT-MCSs)), might be limited by the declaration of Tx

Highest Supported Long GI Data Rates and Rx Highest Supported Long GI Data Rates, and might be affected by

10.7.12.3 (Additional rate selection constraints for VHT PPDUs) and the value of the Extended NSS BW Support field

of the VHT Capabilities Information field in 9.4.2.158.2 (VHT Capabilities Information field) and the 160/80+80 BW

subfield of the Operating Mode field in 9.4.1.53 (Operating Mode field).

**10.7.12 Rate selection constraints for VHT STAs**

**10.7.12.1 Rx Supported VHT-MCS and NSS Set**

*TGax editor: change subclause 10.7.12.1 as follows (CID 7617):*

The Rx Supported VHT-MCS and NSS Set of a first VHT STA is determined by a second VHT STA for each <VHT-MCS, NSS> tuple NSS = 1, …, 8 and bandwidth (20 MHz, 40 MHz, 80 MHz, and 160 MHz or 80+80 MHz) from the Supported VHT-MCS and NSS Set field received from the first STA as follows:

* If support for the VHT-MCS for NSS spatial streams at that bandwidth is mandatory (see 21.5 (Parameters for VHT-MCSs)), then the <VHT-MCS, NSS> tuple at that bandwidth is supported by the first STA on receive.
* Otherwise, if the Max VHT-MCS For *n* SS subfield (*n* = NSS) in the Rx VHT-MCS Map subfield indicates support and the Rx Highest Supported Long GI Data Rate subfield is equal to 0, then
* the <VHT-MCS, NSS*>* tuple at that bandwidth is supported by the first STA on receive, except that if dot11VHTExtendedNSSBWCapable of the second STA is true, the supported bandwidth values and NSS values of each <VHT-MCS, NSS> tuple are updated according to Table 9-250 (Setting of the Supported Channel Width Set subfield and Extended NSS BW Support subfield at a STA transmitting the VHT Capabilities Information field) if neither OMN nor OMI has been received from the first STA, otherwise,
* according to 9.4.2.158.3 (**Supported VHT-MCS and NSS Set field**) and Table 9-75 (Setting of the Channel Width subfield and 160/80+80 BW subfield at a VHT STA transmitting the Operating Mode field), wherein the VHT Capabilities Information field and the Operating Mode field received from the first STA,
* when both the first STA and the second STA are HE STAs, according to 9.4.2.237.4 (**Supported HE-MCS and NSS Set field**) and Table 9-xxx (Setting of the VHT Channel Width and VHT NSS at a HE STA transmitting the OM Control subfield), wherein the OM Control field and the HE Capabilities element has been received from the first STA.
* Otherwise, if the Max VHT-MCS For *n* SS subfield (*n* = NSS) in the Rx VHT-MCS Map subfield indicates support and the data rate for long GI of the MCS for NSS spatial streams at that bandwidth (expressed as the largest integer in Mb/s that is less than or equal to the data rate) is less than or equal to the rate represented by the Rx Highest Supported Long GI Data Rate subfield, then
* the <VHT-MCS, NSS> tuple at that bandwidth is supported by the first STA on receive, except that if dot11VHTExtendedNSSBWCapable of the second STA is true, the supported bandwidth values and NSS values of each <VHT-MCS, NSS> tuple are updated according to Table 9-250 (Setting of the Supported Channel Width Set subfield and Extended NSS BW Support subfield at a STA transmitting the VHT Capabilities Information field) if neigher OMN nor OMI has been received from the first STA, otherwise,
* according to 9.4.2.158.3 (**Supported VHT-MCS and NSS Set field**) and Table 9-75 (Setting of the Channel Width subfield and 160/80+80 BW subfield at a VHT STA transmitting the Operating Mode field), wherein the VHT Capabilities Information field and the Operating Mode field have been received from the first STA,
* when both the first STA and the second STA are HE STAs, according to 9.4.2.237.4 (**Supported HE-MCS and NSS Set field**) and Table 9-xxx (Setting of the VHT Channel Width and VHT NSS at a HE STA transmitting the OM Control subfield), wherein the OM Control subfield and the HE Capabilities element has been received from the first STA.
* Otherwise, the <VHT-MCS, NSS> tuple at that bandwidth is not supported by the first STA on receive.

The <VHT-MCS, NSS> tuples excluded by 10.7.12.3 (Additional rate selection constraints for VHT PPDUs) are also eliminated from the Rx Supported VHT-MCS and NSS Set.

A VHT STA shall not, unless explicitly stated otherwise, transmit a VHT PPDU unless the <VHT-MCS, NSS> tuple and bandwidth used are in the Rx Supported VHT-MCS and NSS Set of the receiving STA(s).

NOTE 1—Support for a <VHT-MCS, NSS> tuple at a given bandwidth implies support for both long GI and short GI on receive, if short GI is supported at that bandwidth.

NOTE 2—A STA can determine the expected interpretation of its Supported Channel Width Set and Channel Width and 160/80+80 BW and Extended NSS BW Support fields at a recipient by examining the VHT Extended NSS BW Capable field value in the Supported VHT-MCS and NSS Set field of the recipient.

NOTE 3----When the second STA receives both Operating Mode field and OM Control subfield from the first STA, the rules in 27.8.1 (General) applies.

**27.15.4 Rate selection constraints for HE STAs**

**27.15.4.1 Rx Supported HE-MCS and NSS Set**

*TGax editor: change subclause 27.15.4.1 as follows (CID 7617):*

The Rx Supported HE-MCS and NSS Set of a first HE STA is determined by a second HE STA for each <HE-MCS, NSS> tuple NSS = 1, …, 8 and bandwidth (20 MHz, 40 MHz, 80 MHz, and 160 MHz or 80+80 MHz) from the Supported HE-MCS and NSS Set field of the HE Capabilities element(#7587) received from the first STA as follows:

* If support for the HE-MCS for NSS spatial streams at that bandwidth is mandatory (see 28.5 (Parameters for HE-MCSs)(#5111)), then the <HE-MCS, NSS> tuple at that bandwidth is supported by the first STA on receive.
* Otherwise, if the Max HE-MCS For n SS subfield (n = NSS) in the Rx HE-MCS Map subfield indicates support and neither the Operating Mode field nor the OM Control subfield is received from the first HE STA, then
* The <HE-MCS, NSS> tuple at that bandwidth is supported by the first STA on receive as defined in 9.4.2.237.4 (Supported HE-MCS and NSS Set field(#5518))(#3526, #3354, #3461, #3775, #3858, #4301).
* Otherwise,
* if the Operating Mode field is received from the first HE STA, the <HE-MCS, NSS> tuple at that bandwidth is supported by the first STA on receive as defined 9.4.2.237.4 (**Supported HE-MCS and NSS Set field**) and by 9-xxxa.
* if the OM Control subfield is received from the first HE STA, The <HE-MCS, NSS> tuple at that bandwidth is supported by the first STA on receive as defined 9.4.2.237.4 (**Supported HE-MCS and NSS Set field**) and by 9-xxxb.
* Otherwise, the <HE-MCS, NSS> tuple at that bandwidth is not supported by the first STA on receive.

The <HE-MCS, NSS> tuples excluded by 27.15.4.3 (Additional rate selection constraints for HE PPDUs) can also be eliminated from the Rx Supported HE-MCS and NSS Set.

An HE STA shall not, unless explicitly stated otherwise, transmit a HE PPDU unless the <HE-MCS, NSS> tuple and bandwidth used are in the Rx Supported HE-MCS and NSS Set of the receiving STA(s).

NOTE----When the second STA receives both Operating Mode field and OM Control subfield from the first STA, the rules in 27.8.1 (General) applies.

**11.16 20/40 MHz BSS operation**

**11.16.1 Rules for operation in 20/40 MHz BSS**

*TGax editor: add the following paragraph at the end of 11.16.1:*

When associated with a HT AP, a 20 MHz-only non-AP HE STA shall set the Supported Channel Width Set subfield in its HT Capabilities element HT Capability Information field to 0, indicating that only 20 MHz operation is supported.

**11.40 VHT BSS operation**

**11.40.1 Basic VHT BSS functionality**

*TGax editor: change the 5th paragraph in 11.40.1 as follows:*

A VHT STA that is not a 20 MHz-only non-AP HE STA shall set the Supported Channel Width Set subfield in its HT Capabilities element HT Capability Information field to 1, indicating that both 20 MHz operation and 40 MHz operation are supported. When associated with VHT AP, a 20 MHz-only non-AP HE STA shall set the Supported Channel Width Set subfield in its HT Capabilities element HT Capability Information field to 1, indicating that both 20 MHz operation and 40 MHz operation are supported.

*TGax editor: add the following paragraph at the end of 11.40.1:*

When transmitting a (Re)Association Request frame to a VHT AP, a 20 MHz-only non-AP HE STA shall include the Operating Mode Notification element with the Channel width subfield being 0 in the (Re-)Association Request frame to indicate 20 MHz operating channel width. After associated with a VHT AP, a 20 MHz-only non-AP HE STA may transmit an Operating Mode Notification frame with the Channel Width field being 0 to indicate 20 MHz operating channel width.