IEEE P802.11
Wireless LANs

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| LB202 CID3297 NSS support partitioning |
| Date: 2014-07-03 |
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|  |  |  |  |  |

Abstract

This document proposes a resolution for CID 3297, CID 3298 of LB202, the comment on TGm Draft 3.0 suggesting the creation of additional partitioning of support indication for NSS values.

**REVISION NOTES:**

R0: initial

R1: R2: change table 8-251 references to 8-250, remove the word non-contiguous wherever it appeared

R3: changes to describe interaction between new 80+80 and 160 max nss subfields and basic VHT-MCS fields, modifications to indicate VHT-MCS supported set determination per operational bandwidth

R4: no conceptual changes - fix incorrect value indicated for determinant in the RX section of the determinant=1 case for both 80+80 and 160, and fix the phrase “one less than” to “two less than” in the description of the encoding for the value 2 in the Max NSS for 80+80 Adjustment and Max NSS for 160 Adjustment

R5: correct the value of Max VHT-MCS for n SS that is used to determine the maximum NSS for 80 MHz operation from a value of 0 to a value of 3

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 TGmc Draft. This introduction is not part of the adopted material.

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

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

**CID LIST:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3297 | Matthew Fischer | 1032.10 | 8.4.2.157.3 | The universally complete set of architectures of 80+80 receivers does not imply support for certain capabilities when operating in 160 MHz mode as is already suggested by the existence of the Highest Supported Long GI Data Rate fields. Some obvious combinations cannot currently be signaled. Also applies to TVHT (see, for example, 8.4.2.170) | Change the reserved field at bits 29-31 to become "Max NSS for 80+80 MHz" with the value in the field equal to nss supported for 80+80 MHz and a value of 0 to be used when 80+80 MHz is not supported. Change the reserved field at bits 61-63 to become "Max NSS for 160 MHz" with the value in the field equal to nss supported for 160 MHz and a value of 0 to be used when 160 MHz is not supported. Might also want to add a note saying that these values do not place an upper bound on the NSS supported for 20, 40, 80 MHz - those bounds are specified elsewhere. Note that similar changes should be executed for TVHT. | Revise - generally agree with commenter, TGmc editor to execute proposed changes from 11-14-0793r5 found under all headings which include CID3297 |
| 3298 | Matthew Fischer | 1032.10 | 8.4.2.157.3 | There is no text in this subclause to define the fields Rx Highest Supported Long GI Data Rate or Tx Highest Supported Long GI Data Rate. | Add a sentence or two indicating that the Rx Highest Supported Long GI Data Rate field and Tx Highest Supported Long GI Data Rate are defined in Table 8-251. | Revise - generally agree with commenter, TGmc editor to execute proposed changes from 11-14-0793r5 found under all headings which include CID3298 |

**Discussion:**

Implementations can benefit from subsets of functionality that have a finer resolution than the current capabilities fields allow.

**Proposed changes**

The proposed changes add a few new subfields to describe the partitioning of NSS support over a broader range of BW and MU/SU values than is currently describable.

**CID 3297, 3298**

***TGmc editor: modify Figure 8-555 Supported VHT-MCS and NSS Set field within subclause 8.4.2.157.3 Supported VHT-MCS and NSS Set field and some of the text in the subclause, as shown:***

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B15 | B16 B28 | B29 B30 | B31 | B32 B47 | B48 B60 | B61 B62 | B63 |
|  | Rx VHT-MCS Map | Rx Highest Supported Long GI Data Rate | Max NSS for 80+80 MHz Adjustment | Max VHT-MCS for 80+80 MHz Determinant | Tx VHT-MCS Map | Tx Highest Supported Long GI Data Rate | Max NSS for 160 MHz Adjustment | Max VHT-MCS for 160 MHz Determinant |
| Bits: | 16 | 13 | 2 | 1 | 16 | 13 | 2 | 1 |

The Supported VHT-MCS and NSS Set field’s subfields are defined in Table 8-250 (Supported VHT-MCS and NSS Set subfields).

The Rx VHT-MCS Map subfield and the Tx VHT-MCS Map subfield have the structure shown in Figure 8-556 (Rx VHT-MCS Map and Tx VHT-MCS Map subfields and Basic VHT-MCS and NSS Set field(11ac)). The Max VHT-MCS For *n* SS subfield (where *n* = 1, ..., 8) is encoded as follows:

— 0 indicates support for VHT-MCS 0-7 for *n* spatial streams

— 1 indicates support for VHT-MCS 0-8 for *n* spatial streams

— 2 indicates support for VHT-MCS 0-9 for *n* spatial streams

— 3 indicates that *n* spatial streams is not supported

The maximum supported NSS value for 20, 40 and 80 MHz transmit operation is equal to the highest value *n* of the set of Tx VHT-MCS for *n* SS subfields which has a value other than 3. The maximum supported NSS value for 20, 40 and 80 MHz receive operation is equal to the highest value *n* of the set of Rx VHT-MCS for *n* SS subfields which has a value other than 3.

The Max NSS for 80+80 MHz Adjustment subfield indicates the maximum supported NSS value for 80+80 MHz transmit and receive operation as encoded according to Table 8-250 - Supported VHT-MCS and NSS Set subfields.

The VHT-MCS values supported for 80+80 MHz operation are determined per NSS value as follows:

Let nss80tx\_max be equal to the maximum supported NSS value for 20, 40 and 80 MHz transmit operation as defined above. Let nss80rx\_max be equal to the maximum supported NSS value for 20, 40 and 80 MHz receive operation as defined above.

Let nss80+80tx\_max be equal to the maximum supported NSS value for 80+80 MHz transmit operation as defined above. Let nss80+80rx\_max be equal to the maximum supported NSS value for 80+80 MHz receive operation as defined above.

If the Max VHT-MCS for 80+80 MHz Determinant subfield has the value 0 and the value of Max NSS for 80+80 MHz Adjustment is not equal to 3, then the VHT-MCS set supported for 80+80 MHz transmit operation for nss80+80tx\_max minus y SS is equal to the VHT-MCS set supported for nss80+80tx\_max minus y SS in the Tx VHT-MCS map, where y is equal to a number in the range [0,nss80+80tx\_max - 1]. If the Max VHT-MCS for 80+80 MHz Determinant subfield has the value 0 and the value of Max NSS for 80+80 MHz Adjustment is not equal to 3, then the VHT-MCS supported for 80+80 MHz receive operation for nss80+80rx\_max minus y SS is equal to the VHT-MCS supported for nss80+80rx\_max minus y SS in the Rx VHT-MCS map, where y is equal to a number in the range [0,nss80+80rx\_max - 1].

If the Max VHT-MCS for 80+80 MHz Determinant subfield has the value 1 and the value of Max NSS for 80+80 MHz Adjustment is not equal to 3, then the VHT-MCS supported for 80+80 MHz transmit operation for nss80+80tx\_max minus y SS is equal to the VHT-MCS supported for nss80tx\_max minus y SS in the Tx VHT-MCS map, where y is equal to a number in the range [0,nss80+80tx\_max - 1]. If the Max VHT-MCS for 80+80 MHz Determinant subfield has the value 1 and the value of Max NSS for 80+80 MHz Adjustment is not equal to 3, then the VHT-MCS supported for 80+80 MHz receive operation for nss80+80rx\_max minus y SS is equal to the VHT-MCS supported for nss80rx\_max minus y SS in the Rx VHT-MCS map, where y is equal to a number in the range [0,nss80+80rx\_max - 1].

If the Max VHT-MCS for 80+80 MHz Determinant subfield has the value 0 and the value of Max NSS for 80+80 MHz Adjustment is equal to 3, then the VHT-MCS set supported for 80+80 MHz transmit operation for nss80+80tx\_max minus y SS is equal to the VHT-MCS set supported for nss80+80tx\_max minus y SS in the Tx VHT-MCS map, where y is equal to a number in the range [0,nss80+80tx\_max - 1]. If the Max VHT-MCS for 80+80 MHz Determinant subfield has the value 0 and the value of Max NSS for 80+80 MHz Adjustment is equal to 3, then the VHT-MCS supported for 80+80 MHz receive operation for nss80+80rx\_max minus y SS is equal to the VHT-MCS supported for nss80+80rx\_max minus y SS in the Rx VHT-MCS map, where y is equal to a number in the range [0,nss80+80rx\_max - 1].

If the Max VHT-MCS for 80+80 MHz Determinant subfield has the value 1 and the value of Max NSS for 80+80 MHz Adjustment is equal to 3, then the VHT-MCS supported for 80+80 MHz transmit operation for nss80+80tx\_max minus y SS is equal to the VHT-MCS supported for nss80tx\_max minus 2\*y SS in the Tx VHT-MCS map, where y is equal to a number in the range [0,nss80+80tx\_max - 1]. If the Max VHT-MCS for 80+80 MHz Determinant subfield has the value 1 and the value of Max NSS for 80+80 MHz Adjustment is equal to 3, then the VHT-MCS supported for 80+80 MHz receive operation for nss80+80rx\_max minus y SS is equal to the VHT-MCS supported for nss80rx\_max minus 2\*y SS in the Rx VHT-MCS map, where y is equal to a number in the range [0,nss80+80rx\_max - 1].

The Max NSS for 160 MHz Adjustment subfield indicates the maximum supported NSS value for 160 MHz transmit and receive operation as encoded according to Table 8-250 - Supported VHT-MCS and NSS Set subfields.

The VHT-MCS values supported for 160 MHz operation are determined per NSS value as follows:

Let nss80tx\_max be equal to the maximum supported NSS value for 20, 40 and 80 MHz transmit operation as defined above. Let nss80rx\_max be equal to the maximum supported NSS value for 20, 40 and 80 MHz receive operation as defined above.

Let nss160tx\_max be equal to the maximum supported NSS value for 160 MHz transmit operation as defined above. Let nss160rx\_max be equal to the maximum supported NSS value for 160 MHz receive operation as defined above.

If the Max VHT-MCS for 160 MHz Determinant subfield has the value 0 and the value of Max NSS for 160 MHz Adjustment is not equal to 3, then the VHT-MCS set supported for 160 MHz transmit operation for nss160tx\_max minus y SS is equal to the VHT-MCS set supported for nss160tx\_max minus y SS in the Tx VHT-MCS map, where y is equal to a number in the range [0,nss160tx\_max - 1]. If the Max VHT-MCS for 160 MHz Determinant subfield has the value 0 and the value of Max NSS for 160 MHz Adjustment is not equal to 3, then the VHT-MCS supported for 160 MHz receive operation for nss160rx\_max minus y SS is equal to the VHT-MCS supported for nss160rx\_max minus y SS in the Rx VHT-MCS map, where y is equal to a number in the range [0,nss160rx\_max - 1].

If the Max VHT-MCS for 160 MHz Determinant subfield has the value 1 and the value of Max NSS for 160 MHz Adjustment is not equal to 3, then the VHT-MCS supported for 160 MHz transmit operation for nss160tx\_max minus y SS is equal to the VHT-MCS supported for nss80tx\_max minus y SS in the Tx VHT-MCS map, where y is equal to a number in the range [0,nss160tx\_max - 1]. If the Max VHT-MCS for 160 MHz Determinant subfield has the value 1 and the value of Max NSS for 160 MHz Adjustment is not equal to 3, then the VHT-MCS supported for 160 MHz receive operation for nss160rx\_max minus y SS is equal to the VHT-MCS supported for nss80rx\_max minus y SS in the Rx VHT-MCS map, where y is equal to a number in the range [0,nss160rx\_max - 1].

If the Max VHT-MCS for 160 MHz Determinant subfield has the value 0 and the value of Max NSS for 160 MHz Adjustment is equal to 3, then the VHT-MCS set supported for 160 MHz transmit operation for nss160tx\_max minus y SS is equal to the VHT-MCS set supported for nss160tx\_max minus y SS in the Tx VHT-MCS map, where y is equal to a number in the range [0,nss160tx\_max - 1]. If the Max VHT-MCS for 160 MHz Determinant subfield has the value 0 and the value of Max NSS for 160 MHz Adjustment is equal to 3, then the VHT-MCS supported for 160 MHz receive operation for nss160rx\_max minus y SS is equal to the VHT-MCS supported for nss160rx\_max minus y SS in the Rx VHT-MCS map, where y is equal to a number in the range [0,nss160rx\_max - 1].

If the Max VHT-MCS for 160 MHz Determinant subfield has the value 1 and the value of Max NSS for 160 MHz Adjustment is equal to 3, then the VHT-MCS supported for 160 MHz transmit operation for nss160tx\_max minus y SS is equal to the VHT-MCS supported for nss80tx\_max minus 2\*y SS in the Tx VHT-MCS map, where y is equal to a number in the range [0,nss160tx\_max - 1]. If the Max VHT-MCS for 160 MHz Determinant subfield has the value 1 and the value of Max NSS for 160 MHz Adjustment is equal to 3, then the VHT-MCS supported for 160 MHz receive operation for nss160rx\_max minus y SS is equal to the VHT-MCS supported for nss80rx\_max minus 2\*y SS in the Rx VHT-MCS map, where y is equal to a number in the range [0,nss160rx\_max - 1].

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 22.5 (Parameters for VHT-MCSs)) and 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 9.7.12.3 (Additional rate selection constraints for VHT PPDUs(11ac)).

**8.4.2.158 VHT Operation element**

***TGmc editor: modify two rows of Table 8-250 Supported VHT-MCS and NSS Set subfields of the VHT Operation element within subclause 8.4.2.158 VHT Operation element as shown:***

**Table 8-250—Supported VHT-MCS and NSS Set subfields**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| Rx VHT-MCSMap | Indicates the maximum value of the RXVECTOR parameter MCS of a PPDU that can be received at all channel widths supported by this STA for each number of spatial streams. The maximum value of the RXVECTOR parameter MCS of a PPDU might be further limited for 80+80 MHz and 160 MHz channel widths per the combination of the values of the Max NSS for 80+80 MHz Adjustment subfield, Max NSS for 160 MHz Adjustment subfield, Max VHT-MCS for 80+80 MHz Determinant subfield, Max VHT-MCS for 160 MHz Determinant subfield and Rx VHT-MCS Map subfield as described in 8.4.2.157.3 (Supported VHT-MCS and NSS Set field). | The format and encoding of this subfield are defined in Figure 8-556 (Rx VHT-MCS Map and Tx VHT-MCS Map subfields and Basic VHT-MCS and NSS Set field(11ac)) and the associated description. |
| Tx VHT-MCSMap | Indicates the maximum value of the TXVECTOR parameter MCS of a PPDU that can be transmitted at all channel widths supported by this STA for each number of spatial streams. The maximum value of the TXVECTOR parameter MCS of a PPDU might be further limited for 80+80 MHz and 160 MHz channel widths per the combination of the values of the Max NSS for 80+80 MHz Adjustment subfield, Max NSS for 160 MHz Adjustment subfield, Max VHT-MCS for 80+80 MHz Determinant subfield, Max VHT-MCS for 160 MHz Determinant subfield and Tx VHT-MCS Map subfield as described in 8.4.2.157.3 (Supported VHT-MCS and NSS Set field). | The format and encoding of this subfield are defined in Figure 8-556 (Rx VHT-MCS Map and Tx VHT-MCS Map subfields and Basic VHT-MCS and NSS Set field(11ac)) and the associated description. |

***TGmc editor: add two new rows to Table 8-250 Supported VHT-MCS and NSS Set subfields of the VHT Operation element within subclause 8.4.2.158 VHT Operation element as shown:***

**Table 8-250—Supported VHT-MCS and NSS Set subfields**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| Max NSS for 80+80 MHz Adjustment | This field defines the maximum NSS that is supported by the STA for 80+80 MHz transmit and receive operation without limiting the maximum NSS for operation at other bandwidth values. | Set to 0 if the maximum supported NSS for 80+80 MHz transmit operation is the same as the maximum supported NSS for 20, 40 and 80 MHz transmit operation and the maximum supported NSS for 80+80 MHz receive operation is the same as the maximum supported NSS for 20, 40 and 80 MHz receive operation.Set to 1 if the maximum supported NSS for 80+80 MHz transmit and receive operation are one less than the maximum supported NSS for 20, 40 and 80 MHz operation transmit and receive operation, respectively.Set to 2 if the maximum supported NSS for 80+80 MHz transmit and receive operation are two less than the maximum supported NSS for 20, 40 and 80 MHz transmit and receive operation, respectively.Set to 3 if the maximum supported NSS for 80+80 MHz transmit and receive operation are one half of the maximum supported NSS for 20, 40 and 80 MHz transmit and receive operation, respectively. |
| Max NSS for 160 MHz Adjustment | This field defines the maximum NSS that is supported by the STA for 160 MHz transmit and receive operation without limiting the maximum NSS for operation at other bandwidth values. | Set to 0 if the maximum supported NSS for 160 MHz transmit operation is the same as the maximum supported NSS for 20, 40 and 80 MHz transmit operation and the maximum supported NSS for 160 MHz receive operation is the same as the maximum supported NSS for 20, 40 and 80 MHz receive operation.Set to 1 if the maximum supported NSS for 160 MHz transmit and receive operation are one less than the maximum supported NSS for 20, 40 and 80 MHz operation transmit and receive operation, respectively.Set to 2 if the maximum supported NSS for 160 MHz transmit and receive operation are two less than the maximum supported NSS for 20, 40 and 80 MHz transmit and receive operation, respectively.Set to 3 if the maximum supported NSS for 160 MHz transmit and receive operation are one half of the maximum supported NSS for 20, 40 and 80 MHz transmit and receive operation, respectively. |

***TGmc editor: modify the text of the last paragraph of subclause 8.4.2.158 VHT Operation element as shown:***

The Basic VHT-MCS and NSS Set field indicates the VHT-MCSs for each number of spatial streams in VHT PPDUs that are supported by all VHT STAs in the BSS (including IBSS and MBSS) for 20 MHz operation, 40 MHz operation and 80 MHz operation. The Basic VHTMCS and NSS Set field is a bitmap of size 16 bits; each 2 bits indicates the supported VHT-MCS set for *NSS* from 1 to 8. The Basic VHT-MCS and NSS Set field is defined in Figure 8-556 (Rx VHT-MCS Map and Tx VHT-MCS Map subfields and Basic VHT-MCS and NSS Set field(11ac)).

***TGmc editor: modify the text of subclause 10.40.7 BSS basic VHT-MCS and NSS set operation (11ac) as shown:***

**10.40.7 BSS basic VHT-MCS and NSS set operation(11ac)**

The BSS basic VHT-MCS and NSS set is the set of <VHT-MCS, NSS> tuples that are supported by all VHT STAs that are members of a VHT BSS. It is established by the STA that starts the VHT BSS, indicated by the Basic VHT-MCS and NSS Set field of the VHT Operation element in the MLME-START.request primitive. Other VHT STAs determine the BSS basic VHT-MCS and NSS set from the Basic VHT-MCS and NSS Set field of the VHT Operation element in the BSSDescription derived through the scan mechanism (see 10.1.4.1 (General)).

A VHT STA shall not attempt to join (MLME-JOIN.request (MDR)primitive) a BSS unless it supports (i.e., is able to both transmit and receive using) all of(#3530) the <VHT-MCS, NSS> tuples in the BSS basic VHT-MCS and NSS set for 20 MHz operation, 40 MHz operation and 80 MHz operation.

A VHT STA shall not attempt to (re)associate (MLME-ASSOCIATE.request (MDR)primitive and MLMEREASSOCIATE.request (MDR)primitive) with a VHT AP unless the STA supports (i.e., is able to both transmit and receive using) all of(#3530) the <VHT-MCS, NSS> tuples in the Basic VHT-MCS and NSS Set field in the VHT Operation element transmitted by the AP, for 20 MHz operation, 40 MHz operation and 80 MHz operation.**References:**