IEEE P802.11
Wireless LANs

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| LB202 CID3297 NSS support partitioning |
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Abstract

This document proposes a resolution for CID 3297, 3298, 3300, 3486, 3489, 3487, 3491 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

R6: Limited NSS reduction to half only. Changed MCS support to same or twice the supported NSS.

R8: added more CIDs

R9: add MIB variable

 Add modifications to subclauses affected by the half NSS indication

 Add capability bits

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 11-14-0793r8 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 11-14-0793r8 found under all headings which include CID3298 |

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| --- | --- | --- | --- | --- | --- | --- |
| 3489 | Vinko Erceg | 1046.00 | 8.4.2.170 | For TVHT different number of segments supported may have different number of Nss supported. Allow for this flexibility. | As in comment. I will bring contribution. | Revise - generally agree with commenter, TGmc editor to execute proposed changes from 11-14-0793r8 found under all headings which include CID3489 |
| 3300 | Matthew Fischer | 1029.23 | 8.4.2.157.2 | The universally complete set of architectures of VHT receivers does not imply identical spatial stream support for SU and MU cases. I.e. the ability to differentiate spatial stream support values for MU vs SU is missing. This comment also applies to TVHT. | Change bits 30-31 of the VHT Capabilities Info field from reserved to "MU NSS Reduction" with a definition of the "The value of MU NSS Reduction field is an unsigned integer representing the reduction in the maximum number of spatial streams that is supported by the STA when receiving or transmitting an MU PPDU as compared to the maximum number of spatial streams that are supported by the STA when receiving or transmitting an SU PPDU. The maximum number of spatial streams that are supported by the STA when receiving or transmitting an SU PPDU is equal to the smaller of the maximum number of spatial streams supported by the STA when receiving an SU PPDU and the maximum number of spatial streams supported by the STA when transmitting an SU PPDU. The maximum number of spatial streams supported by the STA when receiving an SU PPDU is the highest number of spatial streams for which the RX VHT-MCS map subfield does not contain the value of 3. The maximum number of spatial streams supported by the STA when transmitting an SU PPDU is the highest number of spatial streams for which the TX VHT-MCS map subfield does not contain the value of 3. " As an alternative, even though it seems odd, one could place these new bits in some of the reserved bit locations of the HT Cap IE in the Extended capabilities subfield where there are lots of bits available. All VHT STA must transmit this IE anyway. If the bits were placed in the HT IE location, then the field could be extended by one bit, and possibly even duplicated to differentiate TX from RX. Make similar changes for TVHT, e.g. 8.4.2.170 | Revise - generally agree with commenter, TGmc editor to execute proposed changes from 11-14-0793r8 found under all headings which include CID3300 |
| 3486 | Vinko Erceg | 1029.00 | 8.4.2.157.2 | VHT capabilities for BW and Nss are coupled. However, same Nss does not have to apply for 80MHz, 160MHz and 80+80MHz BW. | Use B2-B3 bits to indicate if 80+80MHz or 160MHz BWs are used. | Revise - generally agree with commenter, TGmc editor to execute proposed changes from 11-14-0793r8 found under all headings which include CID3486 |
| 3487 | Vinko Erceg | 1032.00 | 8.4.2.157.3 | VHT capabilities for BW and Nss are coupled. However, same Nss does not have to apply for 80MHz, 160MHz and 80+80MHz BW. | Use reserved bits B29-B31 to indicate Max Nss for 80+80MHz BW (0 indicates that 80+80MHz BW is not supported). Use reserved bits B61-B63 to indicate Max Nss for 160MHz BW (0 indicates that 160MHz BW is not supported). | Revise - generally agree with commenter, TGmc editor to execute proposed changes from 11-14-0793r8 found under all headings which include CID3487 |
| 3491 | Tom Kolze | 1032.10 | 8.4.2.157.3 | Some obvious combinations of 80+80 receivers cannot currently be signaled. | Reserved field at bits 29-31 SHOULD BE: "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. The reserved field at bits 61-63 SHOULD BE: "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. Add note saying these values do not place an upper bound on the NSS supported for 20, 40, 80 MHz - those bounds are specified elsewhere. | Revise - generally agree with commenter, TGmc editor to execute proposed changes from 11-14-0793r8 found under all headings which include CID3491 |

**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, 3300, 3486, 3489, 3487, 3491**

***TGmc editor: modify Figure 8-240 Subfields of the VHT Capabilities Info field within subclause 8.4.2.157.2 VHT Capbilities Info field, as shown:***

**8.4.2.157.2 VHT Capabilities Info field**

|  |  |  |
| --- | --- | --- |
| Supported ChannelWidth Set | Indicates the channel widthssupported by the STA. See10.40 (VHT BSSoperation(11ac)). | For a non-TVHT STA:(#3005)Set to 0 if the STA does not support 160 at full NSSand does not support 80+80 MHz at full NSS.Set to 1 if the STA supports 160 MHz at full NSS.Set to 2 if the STA supports 160 MHz and 80+80 MHz at full NSS.The value 3 is reserved.***Editor’s Note: What is B2 and B3?***(#3005)For a TVHT STA, the field isstructured into subfields as defined in Figure 8-553a.For a TVHT STA, set the TVHT\_MODE\_2CSupport subfield to 1 if it supportsTVHT\_MODE\_2C; otherwise set the subfieldto 0.(11af)(#3005)For a TVHT STA, set the TVHT\_MODE\_2NSupport subfield to 1 if it supportsTVHT\_MODE\_2N; otherwise set the subfieldto 0.(11af)(#3005) |

**Table 8-240—Subfields of the VHT Capabilities Info field**

***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 | ~~B29-~~B30-B31 | B32 B47 | B48 B60 | B61 | ~~B61-~~B62-B63 |
|  | Rx VHT-MCS Map | Rx Highest Supported Long GI Data Rate | Support for 80+80 MHz Channel Width at Half Max NSS | Reserved | Tx VHT-MCS Map | Tx Highest Supported Long GI Data Rate | Support for 160 MHz Channel Width at Half Max NSS | Reserved |
| Bits: | 16 | 13 | 1 | ~~3~~2 | 16 | 13 | 1 | ~~3~~2 |

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

If the Support for **80+80 MHz Channel Width at Half Max NSS** subfield is **0**, then the maximum supported NSS value for 80+80 MHz transmit/receive operation is equal to the maximum supported NSS value for 20, 40 and 80 MHz transmit/receive operation.

If the **80+80 Half Max NSS** subfield is **1**, then the maximum supported NSS value for 80+80 MHz transmit/receive operation is equal to half the maximum supported NSS value for 20, 40 and 80 MHz transmit/receive operation, rounded down. The VHT-MCS set supported for each supported NSS for 80+80 MHz transmit/receive operation is equal to the set supported for 20, 40 and 80 MHz transmit/receive operation at an NSS that is twice the NSS for 80+80 MHz operation.

If the **160 Half Max NSS** subfield is **0**, then the maximum supported NSS value for 160 MHz transmit/receive operation is equal to the maximum supported NSS value for 20, 40 and 80 MHz transmit/receive operation.

If the **160 Half Max NSS** subfield is **1**, then the maximum supported NSS value for 160 MHz transmit/receive operation is equal to half the maximum supported NSS value for 20, 40 and 80 MHz transmit/receive operation, rounded down. The VHT-MCS set supported for each supported NSS for 160 MHz transmit/receive operation is equal to the set supported for 20, 40 and 80 MHz transmit/receive operation at an NSS that is twice the NSS for 160 MHz operation.

NOTE—The VHT-MCS set supported for 20, 40 and 80 MHz transmit operation is defined in the Tx VHT-MCS Map subfield as described in 8.4.2.157.3 (Supported VHT-MCS and NSS Set field).

NOTE—The VHT-MCS set supported for 20, 40 and 80 MHz receive operation is defined in the supported Rx VHT-MCS Map subfield as described in 8.4.2.157.3 (Supported VHT-MCS and NSS Set 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 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 80+80 Half Max NSS subfield, and the 160 Half Max NSS 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 80+80 Half Max NSS subfield, and the 160 Half Max NSS 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. |

**References:**