IEEE P802.11
Wireless LANs

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| LB190-Once-Upon-A-Comment-Response |
| Date: 2013-01-07 |
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Abstract

Proposed resolutions for LB190 CID 7180, 7168, 7167, 26, 7324, 7331, 7397, 7398, 7232, 7233, 7328, 7336, 7335, 7396, 7213, most of which are comments on the use of the Operating Mode Notification element and frame.

**Revision Notes**

**R1:**

Greenify resolved comments.

Updates to some resolutions as a result of discussion during January 10 adhoc meeting.

**R0:**

Initial

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| **CID** | **Commenter** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 7180 | Yusuke Asai | 161.52 | 9.28.3 | The "RXVECTOR" parameter N\_TX is referred on P161L52; however, in TGad D4.0, a receiver cannot know the number of transmit chains of the received PPDU. Actually, the RXVECTOR parameter N\_TX is not present on Table 22-1. | Delete "N\_TX" on P161L52. | Accept |

**CID 7180**

**9.28.3 Link adaptation using the VHT variant HT Control field**

***TGac editor, in TGac D4.1, modify the nth paragraph of 9.28.3 as shown:***

In an MFB response solicited by an MRQ that was not carried in a VHT NDP Announcement frame, the MFB

is computed based on RXVECTOR parameters CH\_BANDWIDTH, GROUP\_ID, NUM\_STS,

FEC\_CODING, BEAMFORMED(#7181) and STBC of the received PPDU that carried the MRQ and might

additionally be based on other factors that are not part of the RXVECTOR. The NUM\_STS subfield of the

MFB subfield of VHT variant HT Control field shall be set to an equal or smaller value than the RXVECTOR

parameter NUM\_STS of the received PPDU from which the MRQ was triggered.

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| 7168 | David Hunter | 191.26 | 10.41 | Where is it specified that reducing the number of space time streams is only posible if the AP has a single receive chain? | A pointer to an explanation, or additonal words, is needed to explain this relationship. | Reject – The NOTE is correct. It instructs the VHT AP in the manner of behavior that is necessary to communicate its modified capability to associated STAs that are incapable of interpreting the Operating Mode Notification - see 10.2.4,which indicates that SM power save mode can only indicate that the STA is operating with a single RX chain instead of the maximum capable. |

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| 7167 | David Hunter | 190.58 | 10.41 | "A STA that has the Operating Mode Notification field in the Extended Capabilities element equal to 1 ...". Huh? What does this mean? A STA does not have either a field or an element, so how can it have these? Are these values of a field and an element found in the most recent Xyz frame transmitted by the STA? Or something else? | Specify exactly what are the actual criteria for a STA to be identified as "operating mode notification capable". | Revised – Tgac editor to make changes to 10.41 as shown in 11-13-0048r1 under the heading CID 7167 which replaces the reference to the field of the element with a reference to the MIB variable which is functionally equivalent because the MIB variable value forces a direct requirement on the field value. |

**CID 7167**

**10.41 Notification of operating mode changes**

***TGac editor, in TGac D4.1, modify the 1st paragraph of 10.41 as shown:***

A STA whose dot11OperatingModeNotificationImplemented is true(#7166) shall set the Operating Mode

Notification field in the Extended Capabilities element(#7338) to 1. A VHT STA shall set

dot11OperatingModeNotificationImplemented to true. A STA that has the value true for dot11OperatingModeNotificationImplemented is referred to as operating mode notification capable.

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| 26 | Brian Hart | 191.28 | 10.41 | Consider a VHT AP with associated 11n clients changing from 20 to 80 MHz. To help its 11n clients, the AP would also use 11n's Notify Channel Width frame ... but this maxes out at 40 MHz. What does a VHT STA do if it sees in close proximity (how close!?) broadcast frames to switch to 80 MHz and 40 MHz!!?? | a) Mention that Notify Channel Width frames are allowed here. b) Define rules related to how a VHT AP can send (and a VHT client should process) unicast/broadcast Notify Channel Width frames that indicates that the BSS is switching to 40 MHz, so there is no ambiguity with other frames sent at a similar (before/after) time indicating that the BSS is switching to a wider BW | Revised – Tgac editor to make changes found in doc 11-13-0047r1 under the heading CID 26 which generally conform with the commenter’s suggestion. |
| 7324 | Mark RISON |  |  | How does the Notify Channel Width mechanism interact with the Operating Mode Notification mechanism? | Disallow a VHT STA from using the NCW mechanism, or say the last one of NCW and OMN wins | Revised – Tgac editor to make changes found in doc 11-13-0047r1 under the heading CID 7324 which generally conform with the commenter’s suggestion. |

**CID 26, 7324**

**Discussion**

The first comment correctly points out that in the exampled transition from 20 to 80, both Notify Channel Width and Operating Mode Notification frames are needed if the BSS contains both VHT and HT STAs, so one cannot instruct the AP to NOT send the NCW in this example. Similarly, the associated STA cannot be instructed to ignore Notify Channel Width frames because of the possibility that an AP might decide in the case, for example, of an 80 MHz to 20 MHz transition, to send only the NCW frame and not the OMN.

A viable alternative would be to force a requirement at the VHT AP to always follow a defined order of transmission of the two frames (first NCW and second OMN) when both frames are to be transmitted and require VHT STA to obey both frames.

Another workable solution is to require a VHT AP to always use the OMN for all transitions (and optionally allow the use of NCW) and require the VHT STA associated with a VHT AP to ignore NCW.

**10.41 Notification of operating mode changes**

***TGac editor, in TGac D4.1, insert the following text to become the nth and mth paragraphs of 10.41 as shown:***

A VHT AP that has at least one VHT STA associated and that indicates a channel width change using management action frame(s) shall transmit Operating Mode Notification frame(s) to signal the channel width change. A VHT AP that has at least one non-VHT HT STA associated and that indicates a channel width change using management action frame(s) shall transmit Notify Channel Width frame(s) to signal the channel width change.

A VHT STA shall not transmit an individually addressed Notify Channel Width frame to a VHT STA.

A VHT STA associated with a VHT AP shall ignore Notify Channel Width frames received from the VHT AP.

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| 7331 | Mark RISON | 191.54 | 10.41 | If you're not allowed to transmit an OMN with a Rx Nss or BW not supported by the peer, doesn't that imply a single limited STA will prevent you from broadcasting an OMN? | Change the rule to only apply to unicast OMNs. For group OMNs, specify that a STA shall treat any Rx Nss/BW notification in excess of its capabilities as if there was no restriction | Reject – There really is no ambiguity in the case of the D4.0 language – there is only one STA mentioned in the paragraph before the first definitive reference, so that reference must refer to the first named STA and when this is established, the sentence is clearly indicating that a STA shall not advertise capabilities that it does not possess. |

**UNDO 7169 (see 1277r7)**

**CID 7331**

**Discussion**

I could maybe really be missing something here, but so far, I just don’t see it.

The cited language has changed slightly between D4.0 and D4.1, and I think, for the worse, due to someone else having the same mistaken interpretation of the language from D4.0 as the commenter, thanks to the insertion of an ambiguity into the language on the part of the commenter.

Does it make any sense to have a restriction on the transmitted RXNSS value based on the TX capability of the recipient?

“Hey, I can handle 4 streams!”

“Oh, no! I can only transmit 2 streams! A fancy 4 stream receiver like you is too classy for a cheap transmitter like me to talk to, so I won’t even bother trying.”

The RXNSS indication is expressing the capability of the RX function of the STA sending the RXNSS information and if the recipient is not capable of transmitting at such high RXNSS values, why should it matter?

Here is the D4.0 language:

A STA shall not transmit an Operating Mode field with the value of the Rx Nss subfield indicating a number

of spatial streams not supported by the STA, as reported in any Supported Rates element, Extended Supported

Rates element, Supported MCS Set or Supported VHT-MCS and NSS Set field in management frames transmitted

by the STA.

Here is the D4.1 language:

A STA shall not transmit an Operating Mode field with the value of the Rx NSS(#7360) subfield indicating

a number of spatial streams not supported by the recipient STA. The number of spatial streams supported by the recipient STA is reported in the Supported Rates element, Extended Supported Rates element, Supported MCS Set or Supported VHT-MCS and NSS Set field transmitted in management frames by the recipient STA(#7169).

A STA shall not transmit an Operating Mode field with the value of the Channel Width subfield indicating a

bandwidth not supported by the STA, as reported in the Supported Channel Width Set subfield in the HT Capabilitites Info field or the VHT Capabilities Info field in management frames transmitted by the STA.

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| 7397 | Mark RISON | 191.00 | 10.41 | "An AP should notify" -- a) why not a shall and b) what about non-APs? | Make them shalls and generalise them to STAs | Reject – should is correct, because the AP does not need to be required to signal the changes and there already is text which generalizes the use – see the second paragraph of 10.41 |
| 7398 | Mark RISON | 191.22 | 10.41 | "The notification should occur prior to a decrease in the maximum number of space-time streams and following an increase in the maximum number of space-time streams." -- but there's no similar statement for changes in the operating width | Add a similar statement for operating width | Revise – Tgac editor to make changes found in doc 11-13-0047r1 under the heading CID 7398 which generally implement the commenter’s suggested change. |

**CID 7397, 7398**

**Discussion**

Generalization is not necessary, as it is already provided - commenter should see the second paragraph of the section, quoted here:

A STA notifies other STAs that are operating mode notification capable of a change in its operating mode

using the Operating Mode Notification frame or by including the Operating Mode Notification element in the

Beacon, Probe Response, Association Request, Association Response, Reassociation Request, or Reassociation

Response , TDLS Setup Response, TDLS Setup Confirm, Mesh Peering Open or Mesh Peering Confirm

frames. The Operating Mode field in the Operating Mode Notification frame or the Operating Mode Notification

element is set to indicate that the STA is capable of receiving frames with a bandwidth up to and including

the indicated channel width and with a number of spatial streams up to and including the value

indicated by the Rx NSS(#7360) subfield.

I’m guessing that it says “should” at the cited location because the AP is free to do whatever it pleases, including:

Make an NSS or BW change without announcing this and then pay the price for its rudeness.

Make an NSS or BW change by dissociating all STAs and then restarting the BSS with different values for NSS and BW.

Perhaps no STA in the BSS is capable of operating at the increased capability of the AP, and therefore, there is no need to inform any STA of the change, such notification would be a waste of resources.

**Proposed changes**

**10.41 Notification of operating mode changes**

***TGac editor, in TGac D4.1, modify the following paragraphs of 10.41 as shown:***

An AP should notify associated STAs of a change in the maximum number of space-time streams it is able

to receive through one or more of the following mechanisms:

— Using individually addressed Operating Mode Notification frames and/or Notify Channel Width frames

— Including the Operating Mode Notification element in Beacon frames for a period of time that

ensures that STAs in PS mode will receive the notification

— Using the SM power save mechanism defined in 10.2.4 for HT STAs that are not operating mode

notification capable

The notification should occur prior to a decrease in the maximum number of space-time streams and following

an increase in the maximum number of space-time streams.

NOTE—An AP that is reducing the maximum number of space-time streams the AP is able to receive and that has associated

HT STAs that are not operating mode notification capable would use the SM power save mechanism to notify the

STAs that the AP is operating with a single receive chain.

An AP should notify associated STAs of a change in its operating channel width through one or more of the

following mechanisms:

— Using the Channel Switch Announcement element, Channel Switch Announcement frame or both

following the procedure defined in 10.9.8.2 (Selecting and advertising a new channel in an infrastructure

BSS)

— Using the Extended Channel Switch Announcement element, Extended Channel Switch Announcement

frame or both, following the procedure described in 10.10 (Extended channel switching (ECS))

— Using individually addressed Operating Mode Notification frames and/or Notify Channel Width frames

— Using the STA Channel Width field in the HT Operation element and/or Channel Width field in the

VHT Operation element

The notification should occur prior to a decrease in the operating channel width and following

an increase in the operating channel width.

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| 7232 | Liwen Chu | 190.61 | 10.41 | AP changes the operating mode through Beacon, Probe Response etc. VHT Operation element already includes all the information of Operating Mode Notification element. So It is not necessary to include Operating Mode Notification element in Beacon etc. in order to change the BSS operating mode. | Change to "A STA notifies other STAs that are operating mode notification capable of a change in its operating mode using the Operating Mode Notification frame or by changing the VHT/HT Operation element in the Beacon, Probe Response, Association Request, Association Response......" | Reject - RXNSS information is not contained in the VHT Operation element and it is possible for the AP to have one operating width with the BSS having a greater operating width. |

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| 7233 | Liwen Chu | 190.52 | 10.41 | Once an AP change the operation mode, the whole BSS operation mode is changed. In a VHT BSS with VHT TDLS connection that does not support TDLS Wider Bandwidth, the AP changes its operation channel from 80MHz to 40MHz without changing the 20MHz primary channel. Does the TDLS link use 40MHz width? | Clarify it. | Reject – the issue is clarified and unambiguous as can be seen in the changes to the TDLS language in 10.22.1. |

**CID 7233**

**Discussion**

Language already exists which suggests that this is true.

See 10.22.1:

**10.22.1 General**

Features that are not supported by the BSS but that are supported by both TDLS peer STAs may be used on

a TDLS direct link between those STAs, except PCO. An example is the use of an HT MCS on a TDLS

direct link between HT STAs when these STAs are associated with a non-HT BSS. Features that are supported

by the BSS shall follow the BSS rules when they are used on a TDLS direct link on the base channel.

The channel width of the TDLS direct link on the base channel shall not exceed the channel width of the

BSS to which the TDLS peer STAs are associated, except when the TDLS Wider Bandwidth subfield in the

Extended Capabilities element of the TDLS Setup Request frame or the TDLS Setup Response frame is 1

for both TDLS peer STAs. A TDLS direct link on the base channel shall not have a wider bandwidth than

the BSS bandwidth if either of the STAs indicate that they are incapable of supporting wider bandwidth

operation on the base channel.

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| 7328 | Mark RISON |  |  | It is not clear how channel width support requirements work in IBSSes (they can't be signalled in a VHT Operation IE, since this only indicates MCS and NSS support requirements) | Clarify | Reject – existing text provides clarity, but exists in a different subclause – commenter should see 10.39.4 Channel switching methods for a VHT BSS |

**CID 7328**

**Discussion**

Language already exists which covers the case of IBSS width.

**10.39.4 Channel switching methods for a VHT BSS**

***(last paragraph)***

A VHT STA that is a member of an IBSS adopts the values indicated by the Secondary Channel Offset element

and Wide Bandwidth Channel Switch element in received frames according to the rules in 10.1.5 (Adjusting

STA timers) and shall not transmit a value for the Secondary Channel Offset element or Wide

Bandwidth Channel Switch element that differs from the most recently adopted value unless it is a DO STA.

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| 7336 | Mark RISON | 73.00 | 8.4.1.50 | There is no point sending an OMN with Rx Nss Type set to 1 to a STA which does not support being an MU BFee | Say so | Reject – existing text already says so – commenter should see **8.4.1.50 Operating Mode field Table 8-53k—Subfield values of the Operating Mode field** |
| 7335 | Mark RISON | 73.45 | 8.4.1.50 | Can a non-AP set Rx Nss Type to 1? It can't receive VHTCBfs with FT set to MU, can it? | Add a NOTE to say 1 is only used by APs | Reject – the opposite is true – it is the AP that cannot set RX NSS Type to 1 – but a note is not needed because the bit description is very clear that the sender of the value 1 has received an MU PPDU and therefore, an AP cannot send that value – see 8.4.1.50. |

**CID 7336, 7335**

**Discussion**

NSS Type 1 value is set by a STA that has received an MU transmission, so this value would not be set to 1 when the OMN recipient is not capable of being an MU BFER, not MU BFEE. Conversely, if the OMN recipient is not capable of being an MU BFER, then it would not have sent an MU PPDU, and then the OMN transmitter would not be setting the bit, because it can only be setting the bit if it received an MU PPDU from the OMN recipient!

I.e. there is no need to say anything more than what is already said.

I.e. as the bit description already says, the value of 1 is used when the RXNSS value is a restriction in RX NSS that is based on analysis of an MU PPDU. The direct implication is the sender of the OMN is MU RX capable and the receiver of the OMN is MU TX capable.

see **8.4.1.50 Operating Mode field Table 8-53k—Subfield values of the Operating Mode field**

Rx NSS Type

Set to 0 to indicate that the Rx NSS(#7360) subfield carries the

maximum number of spatial streams that the STA can receive.

Set to 1 to indicate that the Rx NSS(#7360) subfield carries the

maximum number of spatial streams that the STA can receive in an

SU PPDU using a beamforming steering matrix derived from a

VHT Compressed Beamforming report(#7377) with the Feedback

Type subfield indicating MU in the VHT Compressed Beamforming

frame(s).

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| 7396 | Mark RISON | 107.10 | 8.4.2.168 | One cannot send more than one Operating Mode Notification in a given MMPDU. So what if a device wants to notify both a max NSS and a max NSS BFee SU from MU feedback? | Allow two OMNs per MMPDU? | Revise – Tgac editor to make changes found in doc 11-13-0047r1 under the heading CID 7396 which generally implement the commenter’s suggested change. |

**CID 7396**

**Discussion**

Sounds good to me!

**Proposed changes**

**8.5.23.4 Operating Mode Notification frame format**

***TGac editor, in TGac D4.1, modify 8.5.23.4 by showing in the frame format table that a second, optional, Operating Mode field may be present, and add text indicating that the second field may only be present if the RX NSS Type value is different from the RX NSS Type of the first Operating Mode field.***

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| 7213 | Wei Shi | 115.64 | 8.6.1 | A-MPDU pre-EOF padding is defined to include "subframe" padding when there are zero-length EOF subframes after the last subframe. In 9.12.6, line 51 says A-MPDU\_Length[n] is initialized as the length of the resulting A-MPDU pre-EOF padding. However, subframe padding cannot be determined until the steps taken in lines 16-26, pg 143. So this all appears a bit circular. | Add text in 9.12.6 to say that the initial value of A-MPDU\_Length[n] does not contain any padding (subframe or EOF) for the last subframe. |  |

**CID 7213**

**Discussion**

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**Proposed changes**

**References:**