IEEE P802.11
Wireless LANs

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| Comment resolutions for miscellaneous OM Control |
| Date: 2017-05-01 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs (8 CIDs):

* 5851, 7249, 9495, 9803, 6260, 7051, 7192, 7193

Revisions:

* Rev 0: Initial version of the document (CIDs in green are in the editor’s tab).
* Rev 1: Incorporated some suggestions to clarify that the RUs are allocated within the Tx Channel Width as suggested by Zhou and Liwen (changes highlighted in green).
* Rev 2: Incorporated some further suggestions to go back to limiting the allocation to the primary channel (changes highlighted in blue).
* Rev 3: Added a note that the Tx Channel width only applies to HE TB PPDUs, not other PPDUs and further suggestions. (changes in this color)
* Rev 4 and Rev 5: Editorials.

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** |
| 5851 | Hyunhee Park | 24.44 | In the Control information subfield of OMI, Channel Width is not distingushed for Rx or Tx. The Control information subfield of OMI should be revised (for example, (1) adding Tx Channel Width or (2) adding Rx/Tx indication, deleting Tx NSS, etc.) | Add Tx Channel Width in Fugure 9-15d. | Revised –Agree in principle with the comment. Proposed resolution adds the Tx Channel Width field in the figure, and provides the corresponding normative behavior that is related to this field.The proposal also contains some improvements to the ROM subclause by adding missing acronyms and some clarifications that are missing otherwise.TGax editor to make the changes shown in 11-17/0601r5 under all headings that include CID 5851. |
| 7249 | Kiseon Ryu | 24.58 | Channel Width subfield in Operating Mode A-Control field indicates the channel width of the STA not only for ROM but also for TOM. | Modify the text as below:The Channel Width subfield indicates the operating channel width supported by the STA in transmission and reception, and is set to 0 for 20 MHz, 1 for 40 MHz, 2 for 80 MHz, and 3 for 160 MHz and 80+80 MHz. | Revised –Agree in principle with the comment. Proposed resolution adds the Tx Channel Width field (as suggested by CID 5851) in the figure, and provides the corresponding normative behavior that is related to this field.The proposal also contains some improvements to the ROM subclause by adding missing acronyms and some clarifications that are missing otherwise.TGax editor to make the changes shown in 11-17/0601r5 under all headings that include CID 7249. |
| 9495 | Yanchun Li | 24.58 | Current ROM shall be improved to settle the case with large number of STA in narrow band ROM mode. Current ROM requires all STAs to occupy primary 20MHz and causes low channel utility. Need to allocate some narrow band ROM STA to RU in non-primary portion. | The Channel Width field shall support indication of specific 20MHz channel which STA prefers in this ROM mode. | Rejected –ROM operation is an enhancement of the OMN that signals the operating channel width of the STA in RX, and other parameters of intereset. Allocations of narrowband RUs are out of scope of this feature.  |
| 9803 | Young Hoon Kwon | 24.58 | Operating channel width for transmission of Trigger based PPDU also needs to be indicated, and the Channel Width subfield can be used for this purpose too. | Modify the text to "The Channel Width subfield indicates the operating channel width supported by the STA in reception and transmission, and is ...". | Revised –Agree in principle with the comment. Proposed resolution adds the Tx Channel Width field in the figure, and provides the corresponding normative behavior that is related to this field.The proposal also contains some improvements to the ROM subclause by adding missing acronyms and some clarifications that are missing otherwise.TGax editor to make the changes shown in 11-17/0601r5 under all headings that include CID 9803. |
| 6260 | John Coffey | 24.63 | Confusing text: why "the" non-AP STA? Which one? Later in the paragraph we have "An AP". | Change "the" to "a". | Accepted |
| 7051 | Junichi Iwatani | 24.31 | Regarding the name "Operating Mode", in other clauses (especially 27.8 Operating mode indication), this is called "OMI A-Control field". It is not clear whether they have the same meaning. The same word (e.g., Operating mode indication(OMI)) should be used. | as in comment | Revised –Agree in principle with the comment. Proposed resolution is to add the acronyms and specify when and what acronym is used in different parts of these subclauses. TGax editor to make the changes shown in 11-17/0601r5 under all headings that include CID 7051. |
| 7192 | kaiying Lv | 24.58 | add "and /or transimition" after "in reception" | As in comment | Revised –Agree in principle with the comment. Proposed resolution adds the Tx Channel Width field (as suggested by CID 5851) in the figure, and provides the corresponding normative behavior that is related to this field.The proposal also contains some improvements to the ROM subclause by adding missing acronyms and some clarifications that are missing otherwise.TGax editor to make the changes shown in 11-17/0601r5 under all headings that include CID 7192. |
| 7193 | kaiying Lv | 24.62 | add a "HE" before non-AP | As in comment | Rejected –This subclause describes the definition and setting of fields within a frame. the normative behavior, including which STA generates them is covered in dependent subclauses of clause 28 which is explicitly targeting HE. As such there is no need for an additional HE classifier.  |

## Discussion: *None*

**3.4 Abbreviations and acronyms**

**TGax Editor: *Insert the following acronyms as follows (#7051):***

OM Operating mode *(#7051)*

OMI Operating mode indication(#5197)

OMN Operating mode notification *(#7051)*

ROM Receive operating mode *(#7051)*

TOM Transmit operating mode *(#7051)*

* Operating mode (OM) Control

**TGax Editor: *Change this subclause as follows (#CID 5851, 7249, 9803, 7192)):***

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 indication)). The format of the subfield is shown in Figure 9-15d (Control Information subfield format when Control ID subfield is 1).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 B2 | B3 B4 | B5 | B6 B8 | B9 B10 | B11 |
|  | Rx NSS |  Channel Width | UL MU Disable | Tx NSTS | Tx Channel Width | Reserved |
| Bits: | 3 | 2 | 1 | 3 | 2 | 1 |
| * Control Information subfield format when Control ID subfield is 1*(#5851, 7249, 9803, 7192)*
 |

The Rx NSS subfield indicates the maximum number of spatial streams, *NSS*, that the STA supports in reception 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 160 MHz 80+80 MHz.

The UL MU Disable subfield indicates whether UL MU operation is suspended or resumed by the non-AP STA. The UL MU Disable subfield is set to 1 to indicate that UL MU operation is suspended; otherwise 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 for transmittingHE TB PPDUs and is set to *NSTS* – 1.*(#5851, 7249, 9803, 7192)*

The Tx Channel Width subfield indicates the channel width for an RU allocations that the STA supports for transmitting HE TB PPDUs, and is set to 0 for primary 20 MHz, 1 for primary 40 MHz, 2 for primary 80 MHz, and 3 for 160 MHz and 80+80 MHz.*(#5851, 7249, 9803, 7192)*

NOTE—The Tx Channel Width subfield does not restrict the bandwidth of PPDUs that are not HE TB PPDUs. These non-HE TB PPDUs send in response to a soliciting PPDU follow the bandwidth selection rules defined in 10.7.11 (Channel Width in non-HT and non-HT duplicate PPDUs).

* Operating mode indication
* General

**TGax Editor: *Change this subclause as follows (#CID 5851, 7249, 9803, 7051)):***

An HE STA can change its operating mode setting using either operating mode notification (OMN) as*(#7051)* described in 11.42 (Notification of operating mode changes), or the operating mode indication (OMI)*(#7051)* procedure described in this subclause.

OMI*(#7051)* is a procedure used between an OMI initiator and an OMI responder. An HE STA that transmits a frame including an OM Control subfield is defined as an OMI initiator. An HE STA that receives a frame including an OM Control subfield is defined as an OMI responder.

An HE STA may send to a STA that indicated value 1 in the OM Control Support field in its HE Capabilities element an individually addressed QoS Data, QoS Null or Class 3 Management frame that contains the OM Control subfield, after association, to indicate a change in its receive and/or transmit operating parameters. An HE STA with dot11OMIOptionImplemented equal to true implements the reception of an individually addressed QoS Data, QoS Null or Class 3 Management frame that contains the OM Control subfield that indicates a change in receive operating mode (ROM) and/or transmit operating mode (TOM) parameters. An HE STA with dot11OMIOptionImplemented equal to true shall set the OM Control Support subfield in the HE MAC Capabilities Information field of its HE Capabilities element to 1.*(#7051)*

An HE AP shall set dot11OMIOptionImplemented to true and the HE AP shall implement the reception of the OM Control subfield.

An HE STA should not transmit an OM Control subfield and an Operating Mode field in the same PPDU. When a STA transmits both OM Control subfield and Operating Mode field then the OMI responder shall use the channel width and the RX NSS of the most recently received OM Control subfield or Operating Mode field sent from the OMI initiator.*(#7051, Ed)*

The OMI initiator shall indicate a change in its ROM parameters by including the OM Control subfield in a QoS Data, QoS Null or Class 3 Management frame that solicits an immediate acknowledgement and is addressed to the OMI responder as defined in 27.8.2 (Rules for receive operating mode (ROM) indication).*(# 7051)*

NOTE—Frames that solicit an immediate acknowledgement are, for example, QoS Null frames and QoS Data frames with Normal Ack or Implicit BAR ack policy and Action frames.

The OMI initiator supports receiving PPDUs with a bandwidth up to the value indicated by the Channel Width subfield and with a number of spatial streams, *NSS*, that is*(#Ed)* up to the value indicated by the Rx NSS subfield of the OM Control subfield as defined in 27.8.2 (Receive operating mode (ROM) indication).The OMI initiator shall indicate a change in its TOM parameters*(#7051)* by including the OM Control subfield in a QoS Data, QoS Null or Class 3 Management frame that solicits an immediate acknowledgement frame and is addressed to the OMI responder as defined in 27.8.3 (Rules for transmit operating mode (TOM) indication).

The OMI initiator, which indicates that UL MU Disable subfield is 0, supports transmitting HE TB PPDUs with a RU allocation bandwidth that is up to the value indicated by the Tx Channel Width subfield and with a number of space time streams, *NSTS*, that is up to the value indicated by the Tx NSTS subfield of the OM Control subfield as defined in 27.8.3 (Transmit operating mode (TOM) indication). The OMI initiator shall set the Tx Channel Width subfield to a value that is less than or equal to the Channel Width subfield of the OM Control subfield.*(#5851, 7249, 9803, 7192)*

* Receive operating mode (ROM) indication

**TGax Editor: *Change this subclause as follows (#CID 7051, Ed)):***

The ROM indication allows the OMI initiator to adapt the maximum operating channel width and/or the maximum number of spatial streams, *NSS*,*(#Ed)* it can receive from the OMI responder.

An OMI initiator that sends a frame that includes an OM Control subfield should change its ROM parameters, Rx NSS and Channel Width, as follows:

* When the OMI initiator changes a ROM parameter*(#7051)* from higher to lower, it should make the change for that parameter only after the TXOP in which it received the immediate acknowledgement from the OMI responder.
* When the OMI initiator changes a ROM parameter*(#7051)* from lower to higher, it should make the change for that parameter after the TXOP in which it expects to receive acknowledgement from the OMI responder.

An OMI initiator that is an HE AP should be capable to receive with bandwidth and with *NSS* that are up to the values of the most recently transmitted Channel Width subfield and Rx NSS subfield that the OMI initiator has successfully indicated in the OM Control subfield or in the Operating Mode field sent to any associated STA.*(#Ed)*

NOTE—In the event of transmission failure of the frame containing the OM Control subfield, the OMI initiator attempts the recovery procedure defined in 10.22.2.7 (Multiple frame transmission in an EDCA TXOP).

The OMI responder shall use the values indicated by the Channel Width and Rx NSS subfields of the most recently received OM Control subfield sent by the OMI initiator to send PPDUs to the OMI initiator in subsequent TXOPs*(#Ed)*.

After transmitting the acknowledgement for the frame containing the OM Control subfield, the OMI responder may transmit subsequent SU PPDUs or MU PPDUs that are addressed to the OMI initiator.

NOTE—A subsequent PPDU is a PPDU that is intended for the OMI initiator and need not be the immediately following PPDU.

* Rules for transmit operating mode (TOM) indication

**TGax Editor: *Change this subclause as follows (#CID 5851, 7249, 9803, 7501)):***

The TOM indication allows the OMI initiator to suspend responding to any variant of the Trigger frame and UMRS Control subfields, or to adapt the maximum operating channel width and/or the maximum number of space time streams, *NSTS*, it can transmit as a response to a Trigger frame and UMRS Control subfield sent by the OMI responder.*(#Ed)*

An OMI initiator that is a non-AP STA may indicate changes in its transmit parameters by sending a frame that contains the OM Control subfield to the OMI responder. The OMI initiator shall set:

* The UL MU Disable subfield to 1 to indicate suspension of the UL MU operation (see 27.5.2 (UL MU operation); otherwise it shall set the UL MU Disable subfield to 0 to indicate resumption or continuation of participation in UL MU operation.
* An AP that is an OMI initiator shall set the UL MU Disable subfield to 0.
* The Tx NSTS subfield to the maximum *NSTS* that the STA may use in response to Trigger frames or UMRS Control subfields intended to it.*(#Ed)*
* The Tx Channel Width subfield indicates the maximum channel width that the STA will use in response to Trigger frames or UMRS Control subfields intended to it.*(#5851, 7249, 9803, 7192, Ed)*

An OMI initiator that sent the frame including the OM Control subfield should change its TOM parameters, Tx NSTS, UL MU Disable and Tx Channel Width, as follows:*(#5851, 7249, 9803, 7051, 7192)*

* When the OMI initiator changes a TOM parameter*(#7051)* from higher to lower, it should make the change for that parameter only after the TXOP in which it received the immediate acknowledgement from the OMI responder.
* When the OMI initiator changes a TOM parameter*(#7051)* from lower to higher, it should make the change for that parameter only after the TXOP in which it expects to receive acknowledgement from the OMI responder.

The TOM parameter UL MU Disable changes from higher to lower when its value changes from value 0 to value 1.*(#7051, Ed)*

An OMI responder that successfully receives a frame containing an OM Control subfield from an OMI initiator performs the following operations.

The OMI responder shall consider the OMI initiator as not responding to any Trigger frame variant or UMRS Control subfields for subsequent TXOPs (see 27.5.2 (UL MU operation)) when the UL MU Disable subfield is 1 in the received OM Control subfield.*(#Ed)*

NOTE 1—The STA sets the UL MU Disable subfield to 1 to indicate that it will not respond to any variant of the Trigger frame and will not respond to any UMRS Control subfield.*(#Ed)*

NOTE 2—A device may have multiple radios that can result to difficult in-device coexistence challenges. The device might set UL MU Disable subfield to 1 if it has trouble responding to Trigger frames or UMRS Control subfields because the timing or high transmit power would cause interference with another radio in the device.*(#Ed)*

The OMI responder shall consider the OMI initiator as participating in UL MU operation for subsequent TXOPs when the UL MU Disable subfield is 0 in the received OM Control subfield with the following restrictions:

* The maximum *NSTS* that the OMI initiator can transmit in response to Trigger frames or UMRS Control subfields is indicated in the Tx NSTS subfield of the OM Control subfield
* The maximum channel width over which the OMI initiator can transmit in response to Trigger frames or UMRS Control fields is indicated in the Tx Channel Width subfield of the OM Control subfield*(#5851, 7249, 9803, 7192, Ed)*

The OMI responder shall indicate a number of spatial streams, *NSS*, in the Per User Info field of a Trigger frame, which contains the AID of the OMI initiator, that is less than or equal to the *NSTS* that is calculated from the Tx NSTS subfield of the OM Control subfield received from the OMI initiator.*(#Ed)*

The OMI responder shall indicate an RU allocation in the RU Allocation subfield of the Per User Info field of a Trigger frame or UMRS Control subfield, intended to the OMI initiator, that is within the operating channel width specified in the Tx Channel Width subfield of the OM Control subfield received from the OMI initiator. *(#5851, 7249, 9803, 7192)*