IEEE P802.11
Wireless LANs

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| Comment resolutions for Miscellaneous 11ax CID |
| Date: 2019-09-17 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D4.0 with the following CIDs (3 CIDs):

* 21176, 21180, 21206

Revisions:

* Rev 0: Initial version of the document.

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** |
| 21176 | Pooya Monajemi | 251.03 | The reference for HE rates is missing. | Add reference to 27.5. | Revised –Agree in principal with the comment. Exact text is added below.TGax editor to make the changes shown in 11-19/0463r0 under all headings that include CID 21176. |
| 21180 | Pooya Monajemi | 267.41 | This list is inconsistent with the text | Add Multi-STA BAR and MU-BAR to the list | Revised –Agree in principal with the comment. Exact text is added below.TGax editor to make the changes shown in 11-19/0463r0 under all headings that include CID 21180. |
| 21206 | Pooya Monajemi | 386.22 | There is insufficient rigor in the definitions in this section. Is all (or part) of any prior OMI disregarded? Are we to assume that non-20M operating STA must switch to 80M (and max Rx/Tx NSS) during each TWT? What if the operating BW of the BSS is 20 or 40 MHz? Can't an 160/80+80M Client associated to a 160/80+80M BSS remain at full BW? | A more general solution is to leave the OMI in affect during the TWT. Let the request provide set of channels Client supports, and response always include a single bit set. The actual frequency tuned would be the same as if that channel was now the P20 when operating at the current BW (per most recent OMI), which may or may not require retuning. | Revised –Agree in principal with the comment. Exact text is added below.TGax editor to make the changes shown in 11-19/0463r0 under all headings that include CID 21206. |

**Discussion (#CID 21176):**

*None*

**10.13.3 Minimum MPDU start spacing field rules**

***TGax Editor: Change the paragraph below of this subclause as follows (#CID 21176):***

*r* is the value of the PHY Data Rate (in megabits per second) defined in 19.5 (Parameters for HT MCSs) for HT PPDUs, in 21.5 (Parameters for VHT-MCSs) for VHT PPDUs, in 27.5 (Parameters for HE-MCSs) for HE PPDUs, and in Clause 20 (Directional multi-gigabit (DMG) PHY specification) for a DMG STA

**Discussion (#CID 21180):**

*The required changes exceed the changes specifically identified by the commenter, as shown below. Note that the comments in Microsoft Word comments describe considerations of interest to the reader, but shall not be included in the draft by the TGax editor.*

**10.30.2 Reverse direction (RD) exchange sequence**

***TGax Editor: Ammend the inserted parapgraph following after the 1st paragraph as shown below (#CID 21180).***

If the RD initiator is an HE STA and the RD responder is an HE AP, the RD response burst may contain one or more Basic or MU BAR Trigger frames. The ~~Basic~~ Trigger frames shall trigger the RD initiator and at least one other STA to ~~dp~~ do a full bandwidth UL MU-MIMO transmission.

**10.30.4 Rules for RD responder**

***TGax Editor: Ammend the changes to the 5th paragraph as shown below (#CID 21180):***

An RD responder shall not transmit an MPDU (either individually or aggregated within an A-MPDU) that is not one of the following frames:

 — Ack

 — Compressed BlockAck

 — Compressed BlockAckReq

 — Extended Compressed BlockAck

 — Extended Compressed BlockAckReq

 — Multi-STA BlockAck

 — QoS Ddata

 — QoS Null

 — Management

 — Basic Trigger

— MU BAR Trigger

***TGax Editor: Ammend the changes to the 7th paragraph as shown below (#CID 21180):***

During an RD response burst any PPDU transmitted by an RD responder shall contain at least one MPDU with an Address 1 field that matches the MAC address of the RD initiator or at least one Trigger frame that addresses the RD initiator, and the inclusion of traffic to STAs other than the RD initiator in a VHT MU PPDU or HE MU PPDU shall not increase the duration of the ~~VHT MU~~ PPDU beyond that required to transport the traffic to the RD initiator. The RD responder shall not transmit any frame causing a frame that is not a ~~Basic~~ Trigger frame and that causes a response after SIFS with an Address 1 field that does not match the MAC address of the RD initiator. The RD responder shall not transmit any PPDUs with a CH\_BANDWIDTH that is wider than the CH\_BANDWIDTH of the PPDU containing the frame(s) that delivered the RD grant.

An RD responder that transmits a ~~Basic~~ Trigger frame shall set the CS Required subfield to 1. An RD responder that transmits ~~and~~ a Basic Trigger frame shall allocate a number of streams for the RD initiator that is not smaller than the number of streams of the RD initiator's last PPDU.

If an RD initiator sets the RDG/More PPDU field to 1 in a +HTC frame transmitted during a TXOP and sets the AC Constraint subfield to 1 in that frame, the RD responder shall set the same AC as RD initiator's in the Preferred AC subfield of the Trigger Dependent User Info field in the Basic Trigger frame.

**Discussion (#CID** **21206):**

*The required changes exceed the changes specifically identified by the commenter, as shown below. Note that the comments in Microsoft Word comments describe considerations of interest to the reader, but shall not be included in the draft by the TGax editor.*

*The current draft only really defines SST for 20 MHz-only STA, and 80 MHz capable STA on an 80+80/160 MHz channel, and has contradictory definitions for STA that may have changed the operating channel width with OMI. Although supporting the other cases is a simple concept, in practice it requires small changes in many places.*

***TGax Editor: Ammend section 26.8.7 that was inserted by 11ax, as shown below (#CID 21206).***

**26.8.7 HE subchannel selective transmission**

**26.8.7.1 General**

An HE STA that supports HE subchannel selective transmission (SST) operation shall set dot11HESubchan­nelSelectiveTransmissionImplemented to true and shall set the HE Subchannel Selective Transmission Support field in the HE Capabilities element it transmits to 1. An HE STA that does not support HE SST operation shall set the HE Subchannel Selective Transmission Support field in the HE Capabilities element it transmits to 0.

An HE non-AP STA with dot11HESubchannelSelectiveTransmissionImplemented to true is an HE SST STA.

An HE AP with dot11HESubchannelSelectiveTransmissionImplemented to true is an HE SST AP.

An HE SST(#21516) STA may set up SST operation by negotiating a trigger-enabled TWT as defined in 26.8.2 (Individual TWT agreements) except that:

—The TWT request may have a TWT Channel field with at least one bit in the bitmap set to 1, indicating which subchannel(s) can be supported as a temporary primary channel for the negotiated TWT SP ~~up to one bit set to 1 to indicate which of the secondary channel is requested to contain the RU allocations addressed to the HE SST STA that is a 20 MHz operating STA~~(#21517, #20246, #21520, #21519)

~~—The TWT request may have a TWT Channel field with all the four LSBs or all the four MSBs set to 1 to indicate whether the primary 80MHz channel or the secondary 80 MHz channel is requested to contain the RU allocations addressed to the HE SST STA(#21517, #20246, #21520, #21519) that is an 80MHz operating STA~~

—The TWT response shall have a TWT Channel field with up to one bit set to 1 to indicate which subchannel shall be used as the temporary primary channel during this TWT SP ~~of the secondary channel will contain the RU allocations addressed to the HE SST STA~~(#21517, #20246, #21520, #21519) ~~that is a 20 MHz operating STA~~

~~—The TWT response shall have a TWT Channel field with all the 4 LSBs or all the 4 MSBs to indicate whether the primary 80 MHz channel or the secondary 80 MHz channel will contain the RU allocations addressed to the HE SST STA(#21517, #20246, #21520, #21519) that is a 80 MHz operating STA.~~

**26.8.7.2 SST operation**

An HE SST STA(#21517, #20246, #21520, #21519) and HE SST AP(#21518) that successfully sets up SST operation shall follow the rules defined in this subclause.

When an HE SST AP causes its operating channel or channel width to a change, if the temporary primary channel ~~a secondary channel~~ of a negotiated trigger-enabled TWT is not within the new operating channel or channel width, the HE SST AP and the HE SST STA implicitely terminate the negotiated trigger-enabled TWT.(#21514)

The set of subchannels used by an HE SST STA during a trigger enabled TWT SP is an HE SST operating channel. An HE SST operating channel differs from operation outside a TWT SP as follows:

— The operating channel width of an HE SST STA does not change when entering or exiting a TWT SP

— When the HE SST STA has an operating channel width less than the HE SST AP’s operating channel width, and does not contain within its operating channel width the temporary primary channel indicated in the TWT Channel field of the TWT response, then the HE SST STA shall temporarily change its primary channel for the duration of the TWT SP to the temporary primary channel, subject to the same channelization rules as defined in 21.3.14 (Channelization) if operating in the 5 GHz band, and 26.17.2 (HE BSS operation in the 6 GHz band) if operating in the 6 GHz band

NOTE— When the temporary primary channel is contained in the current operating channel and operating channel width of the HE SST STA, then no channel change or change of primary channel is performed.

The HE SST AP follows the rules defined in 26.8.2 (Individual TWT agreements) to exchange frames with the HE SST STA during negotiated trigger-enabled TWT SPs, except that the AP shall ensure that:

—The individually addressed RUs(#21207) allocated in DL MU PPDUs and in Trigger frames addressed to the HE SST STA(#21517, #20246, #21520, #21519) are within the HE SST operating channel ~~subchannel indicated in the TWT Channel field of the TWT response~~ and follows the RU restriction rules defined in 27.3.2.8 (RU restrictions for 20 MHz operation) if the HE SST STA(#21517, #20246, #21520, #21519) is a 20 MHz operating STA, in 27.3.2.X1 (RU restrictions for 40 MHz operation) if the HE SST STA is a 40 MHz operating STA and in 27.3.2.9 (80 MHz operating non-AP HE STAs) if the HE SST STA is an 80 MHz operating STA.(#21207, #Ed)

—The trigger-enabled TWT SPs do not overlap with TBTTs at which DTIM Beacon frames are sent

—The same ~~subchannel~~ temporary primary channel is used for all trigger-enabled TWT SPs with the same HE SST STA(#21207)that overlap in time

An HE SST STA(#21517, #20246, #21520, #21519) operating on ~~the secondary~~ a temporary primary channel shall not conduct OMI operation as defined in 26.9 (Operating mode indication) or OMN operation as defined in 11.41 (Noti­fication of operating mode changes) to change the operating bandwidth.

The HE SST STA follows the rules defined in 26.8.2 (Individual TWT agreements) to exchange frames with the HE SST AP during negotiated trigger-enabled TWT SPs, except that the STA:

—Shall be available ~~in the subchannel indicated in the TWT Channel field of the TWT response~~ on the HE SST operating channel at TWT start times

—Shall not access the medium in the subchannel using DCF or EDCAF

—Shall not respond to Trigger frames addressed to it (see 26.5 (MU operation) and 26.8.2 (Individual TWT agreements)) unless it has performed CCA until a frame is detected by which it can set its NAV, or until a period equal to NAVSyncDelay has transpired, whichever is earlier.

—Shall update its NAV according to 26.2.4 (Updating two NAVs) if it receives a PPDU ~~in the subchannel~~ on the HE SST operating channel

An HE SST STA may include a Channel Switch Timing element in (Re-)Association Request frames it transmits to an HE SST AP(#21517, #20246, #21520, #21519) to indicate the time required by the STA to switch between different subchannels. The received channel switch time informs the HE SST AP(#21517, #20246, #21520, #21519) of the duration of time that the HE SST STA(#21517, #20246, #21520, #21519)might not be available to receive frames before the TWT start time and after the end of the trigger-enabled TWT SP.

NOTE—An HE SST STA in PS mode is not required to move to the primary channel after the end of the trigger-enabled TWT SP

***TGax Editor: Change the paragraph identified by Draft (D), Page (P), and Line number (L) as follows (#CID 21206):***

**D4.3P41L51 (no change)**: **20 MHz operating non-access-point (non-AP) high efficiency station**(#20779) **(HE STA):** A non-AP HE STA that is operating in 20 MHz channel width mode, such as a 20 MHz-only non-AP HE STA or an HE STA that has reduced its operating channel width to 20 MHz using operating mode indication (OMI).

**D4.3P41L56 (insert)**: **40 MHz operating non-access-point (non-AP) high efficiency station** **(HE STA):** A non-AP HE STA that is operating in 40 MHz channel width mode, such as a non-AP STA that has changed its operating channel width to 40 MHz using operating mode indication (OMI).

**D4.3P41L56**: **80 MHz operating non-access-point (non-AP) high efficiency station**(#20779) **(HE STA):** A non-AP HE STA that is operating in 80 MHz channel width mode, such as a non-AP STA ~~(excluding the 20 MHz-only non-AP HE STA) which is not capable of 160 MHz operation or a non-AP STA~~ that has ~~reduced~~ changed its operating channel width to 80 MHz using operating mode indication (OMI).(#21499)

**D4.3P87L60**: The Channel Width subfield indicates the operating channel width supported by the STA for both reception and transmission. It is set to 0 for 20 MHz, 1 for ~~primary~~ 40 MHz, 2 for ~~primary~~ 80 MHz, and 3 for 160 MHz and 80+80 MHz. The value ~~0 indicates a primary 20 MHz~~ of the subfield does not indicate a change of primary channel, ~~unless the STA is~~ or change of temporary primary channel for an HE SST STA(#20246) ~~in which case it indicates any of the negotiated 20 MHz subchannels of the SST operation (see 26.8.7 (HE subchannel selective transmission))~~.

**D4.3P175L45:** When transmitted by a TWT requesting STA, the TWT Channel field contains a bitmap indicating which channel the STA requests to use as a temporary primary channel during a TWT SP. When transmitted by a TWT responding STA, the TWT Channel field contains a bitmap indicating which channel the TWT requesting STA is allowed to use as a temporary channel during the TWT SP. The TWT Channel field includes a bitmap that provides the channel that is being negotiated by a STA as a temporary channel during a TWT SP. Each bit in the bitmap corresponds to one minimum width channel for the band in which the TWT responding STA's associated BSS is currently operating, with the least significant bit corresponding to the lowest numbered channel of the operating channels of the BSS. In an S1G BSS, the The minimum width channel is equal to the SST Channel Unit field of the SST Operation element if such an element has been previously received or is equal to 1 MHz for a BSS with a BSS primary channel width of 1 MHz and 2 MHz for a BSS with a BSS primary channel width of 2 MHz if no such element has been previously received from the AP to which the SST STA is associated. In an HE BSS, the minimum width channel is equal to 20 MHz. A value of 1 in a bit position in the bitmap transmitted by a TWT requesting STA means that operation with that channel as the primary channel is requested during a TWT SP. A value of 1 in a bit position in the bitmap transmitted by a TWT responding STA means that operation with that channel as the primary channel is allowed during the TWT SP. In an HE BSS, ~~none of the bits, any 1 bit, the 4 LSBs, or the 4 MSBs~~ any of the bits in the bitmap can have a value of 1. The TWT Channel field is used by an S1G STA as defined in 10.53 (Subchannel Selective Transmission (SST)) and is used by an HE STA as defined in 26.8.7 (HE subchannel selective transmission). If the TWT channel field is 0 then the HE STAs operate as define in 26.8.2 (Individual TWT agreements).

**D4.3P192L23**: Indicates supports of 160/80+80 MHz OFDMA for a non-AP HE STA that sets (#20544)B1 of Supported Channel Width Set to 1~~, and sets B2 and B3 of Supported Channel Width Set each to 0~~, when operating with 40 MHz or 80 MHz channel width. The capability bit is applicable while receiving an 80+80 MHz or a 160 MHz HE MU PPDU, or transmitting an 80+80 MHz or a 160 MHz HE TB PPDU.

**D4.3P338L4**: An AP shall not transmit a 160 MHz or 80+80 MHz HE MU PPDU with an RU allocated to ~~an~~ a 40 MHz or 80 MHz operating non-AP HE STA unless the AP has received from the ~~80 MHz operating~~ non-AP HE STA an HE Capabilities element with the 80 MHz In 160/80+80 MHz HE PPDU subfield in the HE PHY Capabilities Information field equal to 1.(#20122)

**D4.3P338L11**: An AP shall follow the RU restriction rules defined in 27.3.2.8 (RU restrictions for 20 MHz operation) when assigning an RU to a 20 MHz operating non-AP STA ~~in~~ for a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz HE MU PPDU.(#21110) An AP shall follow the RU restriction rules defined in 27.3.2.X2 (RU restrictions for 40 MHz operation) when assigning an RU to a 40 MHz operating non-AP STA for an 80 MHz, 160 MHz, or 80+80 MHz HE MU PPDU. An AP shall follow the RU restriction rules defined in 27.3.2.9 (80 MHz operating non-AP HE STAs) when assigning an RU to an 80 MHz operating non-AP STA for a 160 MHz, or 80+80 MHz HE MU PPDU. An AP shall follow the rules in 27.3.2.7 (20 MHz operating non-AP HE STAs), 27.3.2.X1 (40 MHz operating non-AP HE STAs), and 27.3.2.9 (80 MHz operating non-AP HE STAs). The AP shall not allocate an RU to to a non-AP STA that lies outside the channel in which the STA is operating (see 27.3.2.6 (Resource allocation for an HE TB PPDU), or (if applicable) outside the HE SST operating subchannel ~~or the SST subchannel (if applicable) in which the STA is operating~~ (see 26.8.7 (HE subchannel selective transmission)) ~~if allocating RUs to a non-AP STA~~.(#20220)

**D4.3P338L24**: An AP(#21108) shall not transmit a 40 MHz, 80 MHz, 160 MHz or 80+80 MHz HE MU PPDU in the 5 GHz or 6 GHz bands with a 242-tone RU allocated to a 20 MHz operating non-AP HE STA unless the AP has received from the 20 MHz operating non-AP HE STA an HE Capabilities element with B5 of the Supported Channel Width Set subfield of the HE PHY Capabilities Information field equal to 1.

**D4.3P344L26**: An AP shall follow the RU restriction rules defined in 27.3.2.8 (RU restrictions for 20 MHz operation) when assigning an RU to a 20 MHz operating non-AP STA for a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz HE TB PPDU.(#21110) An AP shall follow the RU restriction rules defined in 27.3.2.X2 (RU restrictions for 40 MHz operation) when assigning an RU to a 40 MHz operating non-AP STA for an 80 MHz, 160 MHz, or 80+80 MHz HE TB PPDU. An AP shall follow the RU restriction rules defined in 27.3.2.9 (80 MHz operating non-AP HE STAs) when assigning an RU to an 80 MHz operating non-AP STA for a 160 MHz, or 80+80 MHz HE TB PPDU. An AP shall not set the RU Allocation subfield of the User Info field of a Trigger frame or TRS Control subfield that is addressed to a non-AP STA to a value such that the RU allocated to the STA lies outside the channel in which the STA is operating (see 27.3.2.6 (Resource allocation for an HE TB PPDU), ~~and 27.3.2.9 (80 MHz operating non-AP HE STAs))~~ or (if applicable) outside the HE SST operating ~~sub~~channel ~~(if applicable)~~ ~~in which the STA is operating~~ (see 26.8.7 (HE subchannel selective transmission)).(#20997, #20998, #20221)

A non-AP HE STA shall support the following features:

**D4.3P468L53**: —40 MHz and 80 MHz channel widths and all RU sizes and locations applicable to the 40 MHz and 80 MHz channel widths in the 5 GHz and 6 GHz bands (transmit and receive) except for a 20 MHz-only non-AP HE STA in which case the 40 MHz and 80 MHz channel widths, 996-tone RU, and 484-tone RU sizes in 5 GHz and 6 GHz bands are not applicable.

**D4.3P468L64 (inserted)**: —A 40 MHz operating non-AP HE STA shall support 26-, 52-, 106-, 242-, and 484-tone RU sizes on locations allowed in 27.3.2.X2 (RU restrictions for 40 MHz operation) in the primary 40 MHz channel within 80 MHz channel widths in the 5 GHz and 6 GHz bands (transmit and receive).

A non-AP HE STA may support the following:

**D4.3P469L32**: —For a 20 MHz~~-only~~ operating non-AP HE STA, 26-, 52-, 106-, and 242-tone RU sizes on locations allowed in 27.3.2.8 (RU restrictions for 20 MHz operation) in any 20 MHz channel within 40 MHz channel width in the 2.4 GHz band if the 20 MHz~~-only~~ operating non-AP HE STA supports the HE subchannel selective transmission operation as described in 26.8.7 (HE subchannel selective transmission).

**D4.3P469L37**:—For a 20 MHz~~-only~~ operating non-AP HE STA, 26-, 52-, 106-, and 242-tone RU sizes on locations allowed in 27.3.2.8 (RU restrictions for 20 MHz operation) in any 20 MHz channel within 40 MHz, 80 MHz, 160 MHz, and 80+80 MHz channel widths in the 5 GHz and 6 GHz bands if the 20 MHz~~-only~~ operating non-AP HE STA supports the HE subchannel selective transmission operation as described in 26.8.7 (HE subchannel selective transmission).

**D4.3P469L48 (inserted)**: — For a 40 MHz operating non-AP HE STA, 26-, 52-, 106-, 242-, and 484-tone RU sizes on locations allowed in 27.3.2.X2 (RU restrictions for 40 MHz operation) in the primary 40 MHz channel within 160 MHz, and 80+80 MHz channel widths in the 5 GHz and 6 GHz bands (transmit and receive) if the 40 MHz operating non-AP HE STA does not support the HE subchannel selective transmission operation as described in 26.8.7 (HE subchannel selective transmission).

**D4.3P469L48 (inserted)**:—For a 40 MHz operating non-AP HE STA, 26-, 52-, 106-, 242-, and 484-tone RU sizes on locations allowed in 27.3.2.X2 (RU restrictions for 40 MHz operation) in any 40 MHz channel within 80 MHz, 160 MHz, and 80+80 MHz channel widths in the 5 GHz and 6 GHz bands if the 40 MHz operating non-AP HE STA supports the HE subchannel selective transmission operation as described in 26.8.7 (HE subchannel selective transmission).

**D4.3P509L59**:A 20 MHz operating non-AP HE STA shall support tone mapping of 26-tone RU, 52-tone RU, and 106-tone RU for 40 MHz HE PPDU (see Table 27-8 (Data and pilot subcarrier indices for RUs in a 40 MHz HE PPDU and in a non-OFDMA 40 MHz HE PPDU(#20665))) in the 5 GHz and 6 GHz frequency bands, and for 80 MHz HE PPDU (see Table 27-9 (Data and pilot subcarrier indices for RUs in an 80 MHz HE PPDU and in a non-OFDMA 80 MHz HE PPDU(#20665))) in the 5 GHz and 6 GHz bands with the exception of RUs that are restricted from operation as specified in 27.3.2.8 (RU restrictions for 20 MHz operation).

***TGax Editor: Insert the following 2 sections before 27.3.2.9, and renumber as follows (#CID 21206):***

**27.3.2.X1 40 MHz operating non-AP HE STAs**

A 40 MHz operating non-AP HE STA is a non-AP HE STA that is operating in 40 MHz channel width mode, such as an HE STA that changed its operating channel width to 40 MHz using operating mode indication (OMI).

A 40 MHz operating non-AP HE STA shall operate in the primary 40 MHz channel except when the 40 MHz operating non-AP HE STA sets dot11HESubchannelSelectiveTransmissionImplemented equal to true. In this case, the 40 MHz operating non-AP HE STA may operate in any 40 MHz channel within the BSS bandwidth by following the procedure in 26.8.7 (HE subchannel selective transmission).

A 40 MHz operating non-AP HE STA shall support tone mapping of 26-tone RU, 52-tone RU, 106-tone RU, 242-tone RU, and 484-tone RU for 80 MHz HE PPDU (see Table 27-9 (Data and pilot subcarrier indices for RUs in an 80 MHz HE PPDU and in a non-OFDMA 80 MHz HE PPDU(#20665))) in the 5 GHz and 6 GHz bands with the exception of RUs that are restricted from operation as specified in 27.3.2.X2 (RU restrictions for 40 MHz operation).

A 40 MHz operating non-AP HE STA indicates support of tone mapping of 26-tone RU, 52-tone RU, 106-tone RU, 242-tone RU, and 484-tone RU for 80+80 MHz and 160 MHz HE PPDU using the 80 MHz In 160/80+80 MHz HE PPDU subfield in the HE PHY Capabilities Information field in the HE Capabilities element (see 9.4.2.242.3 (HE PHY Capabilities Information field)) with the exception of RUs that are restricted from operation as specified in 27.3.2.X2 (RU restrictions for 40 MHz operation).

**27.3.2.X2 RU restrictions for 40 MHz operation**

If a 40 MHz operating non-AP HE STA is the receiver of an 80 MHz, 80+80 MHz or 160 MHz HE MU PPDU, or the transmitter of an 80 MHz, 80+80 MHz or 160 MHz HE TB PPDU, then the RU tone mapping in 40 MHz is not aligned with the 80 MHz, 80+80 MHz or 160 MHz RU tone map­ping (see 27.3.2.2 (Resource unit, guard and DC subcarriers)).

An AP shall not assign the following RUs to a 40 MHz operating non-AP HE STA where the RU index is defined in Table 27-9 (Data and pilot subcarrier indices for RUs in an 80 MHz HE PPDU and in a non-OFDMA 80 MHz HE PPDU(#20665)):

—26-tone RU 10, 19, and 28 of an 80 MHz HE MU PPDU and HE TB PPDU

—26-tone RU 10, 19, and 28 of the lower 80 MHz of an 80+80 MHz and 160 MHz HE MU PPDU and HE TB PPDU

—26-tone RU 10, 19, and 28 of the upper 80 MHz of an 80+80 MHz HE MU PPDU and HE TB PPDU

—52-tone RU 5 and 12 of an 80 MHz HE MU PPDU and HE TB PPDU

—52-tone RU 5 and 12 of the lower 80 MHz of an 80+80 MHz and 160 MHz HE MU PPDU and HE TB PPDU

—52-tone RU 5 and 12 of the upper 80 MHz of an 80+80 MHz HE MU PPDU and HE TB PPDU

—106-tone RU 3 and 6 of an 80 MHz HE MU PPDU and HE TB PPDU

—106-tone RU 3 and 6 of the lower 80 MHz of an 80+80 MHz and 160 MHz HE MU PPDU and HE TB PPDU

—106-tone RU 3 and 6 of the upper 80 MHz of an 80+80 MHz HE MU PPDU and HE TB PPDU

—242-tone RU 2 and 3 of an 80 MHz HE MU PPDU and HE TB PPDU

—242-tone RU 2 and 3 of the lower 80 MHz of an 80+80 MHz and 160 MHz HE MU PPDU and HE TB PPDU

—242-tone RU 2 and 3 of the upper 80 MHz of an 80+80 MHz HE MU PPDU and HE TB PPDU