IEEE P802.11
Wireless LANs

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| Comment Resolution on PHY Introduction Part - 1 |
| Date: 2018-09-08 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Lochan Verma | Qualcomm |  |  | lverma@qti.qualcomm.com |
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Abstract

This submission shows

* Resolution for a comment received from TGax comment collection (TGax Draft D3.0)
* The proposed changes are based on 11ax D3.0.

The submission provides resolutions to comments related to HE PHY Capabilities (9.4.2.237.3).

* The submission provides resolutions to 26 CIDs:
16142, 15888, 15889, 15890,

15958, 15891, 15892, 16744, 16745,

16746, 16748, 16749, 17108, 17109,

15893, 15894, 15897, 16139, 15971,

15983, 15986, 16019, 16020, 16072,

16145, 16138

Revisions:

* Rev 0: Initial version of the document.
* Rev 2: CID 16142, 15897, 16139, 16072, 16138 fixed

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
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| 16142 | 155.5 | There is a DCM Max NSS Tx capability field, but no normative behaviour associated with it | Add normative behavioural requirements in Subclause 27.15.3 | Revised—Agree with the comment.TGax Editor: make changes for CID 16142 according to 11-18-1459-02-00ax |

***Discussion***

***------------- Begin Text Changes ---------------***

***To TGax editor:*** ***P:L::367:25*** *Please make the changes below*

An HE STA that transmits an HE PPDU with DCM to a recipient STA shall use an NSS that is less than or equal to the value indicated in the DCM Max NSS Rx subfield in the HE PHY Capabilities Information field in the HE Capabilities element received from the recipient STA. An HE AP that transmits a Trigger frame addressed to a recipient STA, shall set the Number of Spatial Streams subfield of the User Info field in the Trigger Frame to less than or equal to the value indicated in the DCM Max NSS ~~R~~Tx (CID16142) subfield in HE PHY Capabilities Information field in the HE Capabilities element received from the recipient STA if the DCM subfield of the User Info field in the Trigger frame is set to 1.

***------------- End Text Changes ---------------***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15888 | 157.30 | It seems the note is misleading. Those STAs must set LDPC supprot to 1. Othe STAs may also be able to set the bit to 1. | Change the description accoridng to the comment | Reject—The Note is accurate. LDPC coding support (transmit and receive) is mandatory for a STA that supports more than 4 spatial streamsLDPC coding support (transmit and receive) is mandatory for a STA that supports HE PPDU BW > 20 MHzLDPC coding support (transmit and receive) is mandatory for a STA that supports MCS 10 and MCS 11 |

***Discussion:***

Table 9-262aa Subfields of the HE PHY Capabilities Information field

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LDPC coding support (transmit and receive) is mandatory for a STA that supports more than 4 spatial streams

LDPC coding support (transmit and receive) is mandatory for a STA that supports HE PPDU BW > 20 MHz

LDPC coding support (transmit and receive) is mandatory for a STA that supports MCS 10 and MCS 11

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| CID | P.L | Comment | Proposed Change | Resolution |
| 15889 | 162.59 | The relationship with HE MCS NSS Support is missing | Change the encoding and definition accoridng to the comment | Reject—In 11ax D2.0, 1024-QAM was allowed for use on RU sizes > 242-tone RU. This restriction was relaxed in D3.0 by addition of the following capabilities -- Tx 1024-QAM<242-tone RU Support; Rx 1024-QAM<242-tone RU Support.MCS and NSS map definition tied to BWs (<=80 MHz, >80MHz) and not RU sizes. Hence no change is required.Furthermore, Pg:L::366:34 has description of the capabilities. |
| 15890 | 163.6 | The relationship with HE MCS NSS Support is missing | Change the encoding and definition accoridng to the comment | Reject—Resolution of CID15889 applies. |
| 15958 | 164.44 | "Rx 1024-QAM Support < 242-tone RUIndicates support fro [sic] receiving 1024-QAM on a 26-, 52-, and 106-tone RU.[...]An HE STA may transmit an HE PPDU with 1024-QAM on a 26-, 52-, and 106-tone RU to a recipient STA if it has received from the recipient STA an HE Capabilities element with the Rx 1024-QAM Support < 242-tone RU subfield in the HE PHY Capabilities Information field equal to 1; otherwise the HE STA shall not transmit an HE PPDU with 1024-QAM on a 26-, 52-, and 106-tone RU."Does this mean that if the AP sets this to 0, the STA should refuse to transmit 1024-QAM on a 26/52/106-tone RU even if commanded to do so by the AP in the Trigger frame? | Add a requirement that an AP that sets Rx 1024-QAM Support < 242-tone RU to 0 shall not request an RU with < 242 tones and 1024-QAM | Reject—The comment is already resolved by the following text P:L::366:40“An HE AP shall not set UL MCS subfield of the User Info field in a Trigger frame to 10 or 11 for a 26-, 52- , or 106-tone RU allocation unless the User Info field is addressed to a non-AP HE STA from which the HE AP has received an HE Capabilities element with the Tx 1024-QAM Support < 242-tone RU subfield in the HE PHY Capabilities Information field equal to 1.” |
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***Discussion on CID15899***

***In 11ax D2.0, 1024-QAM was allowed for use on RU sizes > 242-tone RU. This restriction was relaxed in D3.0 by addition of the following capabilities.***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15891 | 162.40 | Remove the row since it duplicates with the row in P162L59 | Change the encoding and definition accoridng to the comment | Revised—There exists duplication. TGax Editor: make changes for CID 15891 according to 11-18-1459-00-00ax |
| 15892 | 162.44 | Remove the row since it duplicates with the row in P163L6 | Change the encoding and definition accoridng to the comment | Revised—There exists duplication. TGax Editor: make changes for CID 15892 according to 11-18-1459-00-00ax |
| 16744 | 162.40 | Definition of "Tx 1024-QAM Support < 242-tone RU" in Table 9-262ss is duplicated on line 59 | Remove duplication | Revised—Refer to resolution of CID15891 |
| 16745 | 162.40 | Why is "Tx 1024-QAM Support < 242-tone RU" reserved for an AP? Is this for TB only? | Clarify | Reject—Yes, the capability is for HE TB PPDU. It allows AP to set MCS correctly in the Trigger frame for this non-AP STA.This field is reserved for an AP because Tx properties are not advertised.  |
| 16746 | 162.40 | Name of subfield is "Tx 1024-QAM < 242-tone RU Support" in Figure 9-589cl. In Table 9-262aa "Tx 1024-QAM Support< 242-tone RU" is used (for one of the duplicate entries) | Align names between Figure 9-589cl and Table 9-262aa. | Revised—“Tx 1024-QAM Support < 242-tone RU” is deleted. “Rx 1024-QAM Support < 242-tone RU” is deleted. Furthermore, some language edits are made.TGax Editor: make changes for CID 16746 according to 11-18-1459-00-00ax |
| 16748 | 162.44 | Name of subfield is "Rx 1024-QAM < 242-tone RU Support" in Figure 9-589cl. In Table 9-262aa "Rx 1024-QAM Support< 242-tone RU" is used (for one of the duplicate entries) | Align names between Figure 9-589cl and Table 9-262aa. | Revised—Refer to resolution of CID 16746. |
| 16749 | 162.45 | Definition of "Rx 1024-QAM Support < 242-tone RU" in Table 9-262ss is duplicated on page 163, line 6 | Remove duplication | Revised—Refer to resolution of CID 16746. |
| 17108 | 162.40 | same capability defined repeatedly at L40 and L59. delete one of them |  | Revised—Refer to resolution of CID 16746. |
| 17109 | 162.44 | same capability defined repeatedly at P162L44 and P163L06. delete one of them |  | Revised—Refer to resolution of CID 16746. |

***Discussion***

Table 9-262aa Subfields of the HE PHY Capabilities Information field

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***------------- Begin Text Changes ---------------***

***To TGax editor:*** Delete from Table 9-262aa (Subfields of the HE PHY Capabilities Information field) the row corresponding to [P:L::162::40] and [P:L::162:44]

* *Tx 1024-QAM Support < 242-tone RU*
* *Rx 1024-QAM Support < 242-tone RU*

***To TGax editor:*** ***Make the changes on P:L::366:34***

An HE STA may transmit an HE PPDU with 1024-QAM on a 26-, 52-, and 106-tone RU to a recipient STA if it has received from the recipient STA an HE Capabilities element with the ~~Rx 1024-QAM Support < 242- tone RU~~ Rx 1024-QAM < 242-tone RU Support (CID16746) subfield in the HE PHY Capabilities Information field equal to 1; otherwise the HE STA shall not transmit an HE PPDU with 1024-QAM on a 26-, 52-, and 106-tone RU.

An HE AP shall not set UL MCS subfield of the User Info field in a Trigger frame to 10 or 11 for a 26-, 52- , or 106-tone RU allocation unless the User Info field is addressed to a non-AP HE STA from which the HE AP has received an HE Capabilities element with the ~~Tx 1024-QAM Support < 242-tone RU~~ Tx 1024-QAM < 242-tone RU Support (CID16746) subfield in the HE PHY Capabilities Information field equal to 1.

***------------- End Text Changes ---------------***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15893 | 163.10 | Shouldn't the field name be "Rx Full BW SU RU Using HE MU PPDU With Compressed SIGB" | As in the comment | Reject—The current capability, “Rx Full BW SU Using HE MU PPDU With Compressed SIGB” is not ambiguous.Furthermore, the description of the capability makes it clear that this capability indicates support for reception of an HE MU PPDU with single RU spanning the entire PPDU BW, using compressed HE-SIG-B. |
| 15894 | 163.15 | Shouldn't the field name be "Rx Full BW SU RU Using HE MU PPDU With Non-Compressed SIGB" | As in the comment | Reject—The current capability, “Rx Full BW SU Using HE MU PPDU With Compressed SIGB” is not ambiguous.Furthermore, the description of the capability makes it clear that this capability **Indicates support for reception of an HE MU PPDU with single RU spanning the entire PPDU bandwidth, using non-compressed HE-SIG-B format, when its PPDU bandwidth is less than or equal to 80MHz.** |
| 15897 | 163.10 | It seems that HE DL MU PPDU from AP to STA is mandatory. Are you saying that HE MU PPDU with single full BW RU to STA is optional? | Clarify it. | Revised—No, the capability bits pertain to signalling methods to indicate transmitting a single RU with full BW using an HE MU PPDU, with compressed and non-compressed HE-SIG-B format.However, the text descriptions requires qualification that the capability is only for MU PPDU sent to a single user.TGax Editor: make changes for CID 15892 according to 11-18-1459-02-00ax |
| 16139 | 156.4 | Table 28-19 indicates that HE-SIG-B compression is used if and only if full-bandwidth MU-MIMO is being used. Therefore references to compressed HE-SIG-B would be much clearer as references to full-bandwidth MU-MIMO (and ditto non-compressed) | Change "Rx Full BW SU Using HE MU PPDU With Non-Compressed SIGB" to "Rx Full BW SU Using HE MU PPDU With MU-MIMO" throughout; change "Rx Full BW SU Using HE MU PPDU With Compressed SIGB" to "Rx Full BW SU Using HE MU PPDU Without MU-MIMO" throughout | Revised—11ax allows transmitting a full BW HE MU PPDU with SIGB compression to a single user. Hence, the statement “HE-SIG-B compression is used if and only if full BW MU-MIMO is being used” is not true. Table 28-19 needs a fix.TGax Editor: make changes for CID 16139 according to 11-18-1459-02-00ax |

***Discussion on 15897***

Table 9-262aa Subfields of the HE PHY Capabilities Information field

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The following was presented in 11-18/755r1.

In Draft 2.3, for bandwidth being 80MHz or less, when transmitting single RU with full BW using an HE MU PPDU, both compressed and non-compressed HE-SIG-B format are allowed. For 80+80MHz or 160MHz, one entry is missing in SIGB RU allocation field as indicated by the commenter, therefore only compressed SIGB is allowed for this case.

As current stage, it might be late to insert new entry in SIGB, and even for 80MHz or less bandwidths there could be different implementations, some using compressed SIGB other using non-compressed SIGB. Meanwhile, using HE MU format to transmit a single user full BW PPDU is not a typical usage, and transmitter may always use HE SU format to transmit the same data field. Therefore, to address the interop issues, it is better to add two PHY HE capability bits, one for receiving single user full BW HE MU PPDU using compressed SIGB format, the other for using non-compressed SIGB format. No new entry is needed for 80+80MHz or 160MHz.

***------------- Begin Text Changes ---------------***

***To TGax editor:*** Fix Table 9-262aa (Subfields of the HE PHY Capabilities Information field)

|  |  |  |
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| Rx Full BW SU Using HE MU PPDU With Compressed SIGB | Indicates support for reception of an HE MU PPDU with a single user being allocated (CID 15897) an RU spanning the entire PPDU bandwidth and a compressed HE-SIG-B format. | Set to 0 if not supported. Set to 1 if supported. |
| Rx Full BW SU Using HE MU PPDU With Non- Compressed SIGB | Indicates support for reception of an HE MU PPDU with a single user being allocated (CID 15897) a bandwidth less than or equal to 80 MHz, an RU spanning the entire PPDU bandwidth and a non-compressed HE-SIG-B format | Set to 0 if not supported. Set to 1 if supported. |

***------------- End Text Changes ---------------***

Discussion CID 16139



11ax allows transmitting a full BW HE MU PPDU with SIGB compression to a single user. Hence, the statement “HE-SIG-B compression is used if and only if full BW MU-MIMO is being used” is not true. Table 28-19 needs a fix.

***------------- Begin Text Changes ---------------***

***To TGax editor:*** Fix Table 28-19 (HE-SIG-A field of an HE MU PPDU)

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| --- | --- | --- | --- |
| B22 | SIGBCompression | 1 | ~~Set to 1 for full bandwidth MU-MIMO.~~~~Set to 0 otherwise.~~Set to 1 if Common field in HE-SIG-B is no present.Set to 0 if Common field in HE-SIG-B is present. (CID 16139) |

***------------- End Text Changes ---------------***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15971 | 154.56 | 3.2 ms is awfully long for a GI | Change "ms" to "<micro>s" at the referenced location | Accept— |
| 15983 | 158.28 | DCM Max Constellation Tx and DCM Max NSS Tx should be reserved for an AP since they're for TB PPDU tx | At the end of the rightmost cell of the rows for DCM Max Constellation Tx and DCM Max NSS Tx in Table 9-262aa, add "Reserved at an AP." | Revised— |
| 15986 | 159.33 | "The minimum value of this field is 3." should not be the case for Beamformee STS > 80 MHz if the STA does not support > 80 MHz | Change the last sentence of the rightmost cell at the referenced location to "Reserved if the SU Beamformee field is 0 or the Channel Width Set field does not indicate support for bandwidths greater than 80 MHz." | Accept— |
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Discussion on CID15983

DCM Max Constellation Tx and DCM Max NSS Tx are defined in relation to HE TB PPDU. An AP does not transmit HE TB PPDUs. Hence the clarification that these capabilities are reserved for an AP is adding clarity to the specification.



***------------- Begin Text Changes ---------------***

***To TGax editor:*** ***Make the following changes to Table 9-262aa (Subfields of the HE PHY Capabilities Information field) on P:L::158:28***

|  |  |  |
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| DCM Max Constellation Tx | Indicates…capable of transmitting.Reserved for an AP.(CID15983) | .. |
| DCM Max NSS Tx | Indicates ….HE TB PPDUReserved for an AP. (CID15983) | … |

***------------- End Text Changes ---------------***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 16019 | 160.54 | "Indicates that the STA supports a power boost factor <alpha>r for the r-th RU in the range [0.5, 2]." -- r is undefined | Change the cited text at the referenced location to "Indicates that the STA supports a power boost factor for RUs in an HE MU PPDU in the range [0.5, 2]." | Accept— |
| 16020 | 160.54 | "Indicates that the STA supports a power boost factor <alpha>r for the r-th RU in the range [0.5, 2]." -- the description in 28.3.9 Mathematical description of signals does not use this terminology and instead says "the ratio between the maximum value of <alpha>r and the minimum value of <alpha>r to 2 unless the Power Boost Factor subfield of the HE PHY Capabilities Information field in the HE Capabilities element from all recipient STAs is 1, in which case the AP can use a ratio of up to 4" --- would be better to align the wordings | As it says in the comment | Reject—The capability indicates support of power boost factor for RUs in an HE MU PPDU in the range [0.5,2]. In other words, its an indication for support of +/-3dB power boost on RUs.The normative behaviour of this capability is described in 28.3.9. |

Discussion

Table 9-262aa Subfields of the HE PHY Capabilities Information field



On P:L::451:26,



***------------- Begin Text Changes ---------------***

***------------- End Text Changes ---------------***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 16072 | 161.6 | "For a transmitting STA acting as a beamformee" is not clear (transmitting what?) | Change the definition at the referenced location to "For a STA transmitting HE beamforming feedback, it indicates the maximum supported Nc for HE beamforming.". Change "beamforming sounding feedback" in the encoding to "HE beamforming feedback" | Revised—TGax Editor: make changes for CID 16072 according to 11-18-1459-02-00ax |
| 16145 | 159.12 | An AP that supports >=4SS is required to support DL MU-MIMO (resolution to CID 12669 missed this point) | Copy the NOTE from the SU Beamformer row's rightmost cell to the end of the MU Beamformer row's rightmost cell | Accept—The addition of note will add clarity. |

***Discussion CID 16072***

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***------------- Begin Text Changes ---------------***

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| Max Nc | ~~For a transmitting STA acting as a beamformee, it indicates the maximum Nc for beamforming sounding feedback supported.~~For a STA transmitting HE beamforming feedback, it indicates the maximum supported Nc for HE beamforming feedback. (CID16072) | If SU beamformee capable, then set to the maximum Nc for beamforming sounding feedback minus 1. Otherwise, reserved. |

***------------- End Text Changes ---------------***

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| **CID** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 16138 | 158.49 | The description in Table 9-262aa is "Indicates support for the reception on an RU in an HEMU PPDU from a non-AP STA where the RU does not span the entire PPDU bandwidth (106-tone RU within 20 MHz bandwidth)" but the description in the text below makes no reference to 106-tone RUs of 20M BW: "A non-AP HE STA shall not transmit an HE MU PPDU with an RU not occupying the entire PPDU band-width to a peer STA unless it has received from the peer STA an HE Capabilities element with the Rx HEMU PPDU From Non-AP STA subfield in the HE PHY Capabilities Information field equal to 1." | Delete the parenthesis from the cited table text | Revised—TGax Editor: make changes for CID 16138 according to 11-18-1459-02-00ax |

Discussion:

The following requirements are defined in HE PHY introduction section 28.1

A non-AP HE STA may support transmission of an HE MU PPDU with a single RU spanning the entire PPDU bandwidth or a 20 MHz HE MU PPDU with a single 106-tone RU in the primary 20 MHz channel.

An HE AP may support reception of the payload on an RU in an HE MU PPDU where RU spans the entire PPDU bandwidth or a single 106-tone RU within the 20 MHz channel.

“Rx Full BW SU Using HE MU PPDU With Compressed SIGB” and “Rx Full BW SU Using HE MU PPDU With Non- Compressed SIGB” capability cover the HE MU PPDU with a single RU spanning the entire PPDU BW case.

Table 9-262aa subfields of the HE PHY capabilities information field.



***------------- Begin Text Changes ---------------***

***To TGax editor:*** ***Make the following changes to Table 9-262aa (Subfields of the HE PHY Capabilities Information field) on P:L::158:28***

|  |  |  |
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| Rx HE MU PPDU From Non-AP STA | ~~Indicates support for the reception on an RU in an HE MU PPDU from a non-AP STA where the RU does not span the entire PPDU bandwidth (106-tone RU within 20 MHz bandwidth)~~Indicates support for the reception of payload in a 20 MHz HE MU PPDU with a single 106-tone RU in the primary 20 MHz channel. (CID16138) | … |

***To TGax editor:*** ***Make the following changes P:L::365:6***

A non-AP HE STA shall not transmit payload in ~~an HE MU PPDU~~ a 20 MHz HE MU PPDU with a single 106-tone RU in the primary 20 MHz channel (CID16138) ~~with an RU not occupying the entire PPDU bandwidth~~ to a peer STA unless it has received from the peer STA an HE Capabilities element with the Rx HE MU PPDU From Non-AP STA subfield in the HE PHY Capabilities Information field equal to 1.

***------------- End Text Changes ---------------***