IEEE P802.11
Wireless LANs

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| LB230 CR HT Control  |
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Abstract

This submission proposes resolutions of comments received from TGax LB230.

(The proposed change is based on TGax Draft 2.2.)

* CIDs: 11162, 12340, 14143, 12206, 11969, 12356, 13534, 12857, 12644, 13137, 13138, 13872, 12437, 13185, 12439, 12440, 11148 (17 CIDs)

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.***

| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- |
| 11162 | 54.14 | 9.2.4.1.10 | +HTC / Order subfield lists 3 purposes but states only 2 purposes | Change two to three and number the bullet text to 1,2 and 3 respectively. | Revised- This comment is not related with the changes proposed by TGax Draft.The discussion should be in TGmd. But, at this moment, since the proposed change of the commenter is reasonable, TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 12340 | 54.14 | 9.2.4.1.10 | "two purposes" should be changed to "three purposes" | as in the comment | Revised- The cited wording has been removed from the baseline specification (i.e., TGmd D1.0). TGax editor only needs to update this subclause to be consistent with TGmd 1.0. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 14143 | 57.38 | 9.2.4.6.1 | combine two sentences from L34 to L38. I don't see any reasons for HE variant left behind alone. | as in comment | Revised- Agree in principle. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 12206 | 58.17 | 9.2.4.6.4.1 | A-control subfield does not has length of 4 | Change" 4 or more" to "variable" | Revised- Agree in principle. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 11969 | 59.25 | 9.2.4.6.4.1 | In the "Meaning" column of Table 9-18a, "Command Control Indication" should be replaced with "Command and Status (CAS)". | As suggested. | Revised- Agree in principle. This is an editorial comment and was already fixed by CID12805. TGax editor does not need any changes for this CID.  |
| 12356 | 70.07 | 9.2.4.6.4.7 | NAV should also be considered when deciding whether 20MHz channel is idle. | As in comment | Revise-d Agree in principle. The NAV on the primary channel is also considered in the BQR operation. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 13534 | 70.39 | 9.2.4.6.4.8 | By definition in Clause 3, SR\_PPDU with underscore is the correct description | Change SR PPDU to SR\_PPDU, i.e., change to 'Control subfield is an SR\_PPDU' and 'when the PPDU is and SR\_PPDU' | Accepted- Agree in principle.  |
| 12857 | 133.61 | 9.4.2.237.2 | Should be clearer that +HTC-HE Support, OM Control Support are mandatory for APs | Add "Set to 1 when transmitted by an AP" to the end of the rightmost cell for each of these | Revised- Agree in principle. Need some text for the +HTC-HE Support. For the OM Control support, D2.2 already applied the same change on the spec. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 12644 | 134.04 | 9.4.2.237.2 | "Indicates if the STA supports thereception of an HE variant HTControl field carried in a QoSData, QoS Null, or Managementframe." the "carried in" bit is not needed, since it can't be carried in anything else (and that's what the rightmost cell suggests too) | Delete "carried in a QoSData, QoS Null, or Managementframe" from the cited text | Revised- Agree in principle. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 13138 | 134.04 | 9.4.2.237.2 | There is no capability bit for CAS control. | Add a capability bit for CAS control. | Revised- The CAS Control is used for two purposes, RD operation and SRP procedure. For RD operation, the RD Responder subfield in the HT Extended Capabilities field is used as a capability indication. For SRP procedure, the SR Responder subfield in the HE MAC Capabilities Information field is used as a capability indication. Since there is capability indication information of each sub-feature of the CAS Control, a capability bit for the CAS Control is not needed. But, for the more clarification, Table 10-8a has some detailed condition to carry the CAS Control. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 13137 | 134.04 | 9.4.2.237.2 | There is a capability bit for +HTC-HE support. However, there is also capability for almost every funcitonallity of +HTC-HE like UMRS, OM, HLA, BSR, and BQR. Further, UPH is mandatory on STA side and deos not need capability bit. | Remove +HTC-HE Support in HE MAC Capabilities Information field. Make sure that there is capability bit for every optional +HTC-HE functionality. | Rejected- The HE variant HT Control field is used for many purposes. And the future amendment can defined additional A-Control subfield. +HTC-HE Support field may be good for a safey for the future extension.  |
| 13872 | 134.04 | 9.4.2.237.2 | "+HTC-HE Support - Indicates support for the reception of an HE variant HT Control field carried in a QoS Data, QoS Null, or Management frame."All A-Control subfields of an HE variant HT Control field have seperate capability signaling bits.For example, UMRS Support, OM Control Support, HE Link Adaptation Support, BSR Support, BQR Support, RD Responder and SR Responder.And, an UPH Control is a mandatory of 11ax. So, MAC Capability signaling is not needed.So, +HTC-HE Support bit is just wasting one bit without having any special meaning from the HE MAC Capabilities Information field. | Remove +HTC-HE Support bit from the HE MAC Capabilities Information field. | Rejected- The HE variant HT Control field is used for many purposes. And the future amendment can defined additional A-Control subfield. +HTC-HE Support field may be good for a safey for the future extension. |
| 12437 | 190.62 | 10.9 | There is no normative behavior related to "dot11HEUPHControlActivated". Another observation is that UPH Control is mandatory feature. Remove it | As in comment | Revised- Agree in principle. dot11HEUPHControlActivated is a control MIB variable. But, dot11HEControlFieldOptionImplemented is a capability MIB variable. Because the capability MIB variable is a static variable, any other dynamic variable can’t control this static MIB variable. Remove dot11HEUPHControlActivated. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 13185 | 191.17 | 10.9 | HE variant HT Control field can carry one or more Control subfields (that are supported by the recepient). | Replace sentence as: "The HE variant HT Control field carried in the frame may contain one or more Control subfields supported by the intended receiver that has:" | Revised- Agree in principle. The HE variant HT Control field can carry one or more Control subfields. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 12439 | 191.36 | 10.9 | Change to "A value of 6 in the Control ID subfield when the transmitting STA follows the reverse direction protocolprocedure as described in 10.28 (Reverse Direction Protocol) or SRP procedure as described in 27.9.3 (SRP-based spatial reuse operation)" | As in comment | Revised- Agree in principle. The SRP procedure can use the CAS Contol field. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 12440 | 191.50 | 10.9 | Change the sentence to "If there are more than one Control subfield in the A-Control subfield of QoS Data, QoS Null, or Managementframes carried in an (A-)MPDU, the Control subfields shall not have same Control ID values." | As in comment | Revised- Agree in principle. Change the wording for more clarification. TGax editor makes changes as shown in the as specified in 11-18/0627r0. |
| 11148 | 191.54 | 10.9 | "NOTE--An A-Control field that is present in a frame cannot contain only the Padding subfield"This sounds like reassurance to some individual who was worried about "padding only" A-Control fields, and couldn't be bothered to read the specification of the A-Control field.Notes should be used to highlight non-obvious consequences, not reassure lazy readers.TGax will go through the process I've observed before of inserting notes to reassure the nervous or lazy, then getting comments on the notes. Finally the note is deleted as causing more trouble than it's worth because familiarity with the document has cured the commenters of their need for reassurance. | Delete cited note. | Accepted- Agree in principle. Notes should be used to highlight non-obvious consequences. |

TGax editor: Update subclause 9.2.4.1.10 (+HTC/Order subfield) based on the Draft P802.11REVmd\_D1.0: (#11162, 12340)

* HT Control field
* General

TGax editor: Change this subclause as follows: (#14143)

The HT Control Middle subfield is defined in 9.2.4.6.2 (HT variant) and the VHT Control Middle subfield is defined in 9.2.4.6.3 (VHT variant). The A-Control subfield(#12353) is defined in 9.2.4.6.4 (A-Control).

~~The A-Control subfield(#12353) is defined in 9.2.4.6.4 (A-Control).~~

* A-Control

TGax editor: Change this subclause as follows: (#12206)

The format of the A-Control subfield of the HE variant HT Control field is shown in Figure 9-15a (A-Control subfield of the HE variant HT Control field).

|  |  |
| --- | --- |
|  |  |
|  | Control 1 | ... | Control N | Padding |
| Bits: | ~~4 or more~~ variable |  | ~~4 or more~~ variable | 0 or more |
| * A-Control subfield of the HE variant HT Control field
 |

* BQR Control

TGax editor: Change this subclause as follows: (#12356)

The Available Channel Bitmap subfield contains a bitmap indicating which subchannels are available at the STA transmitting the BQR. Each bit in the bitmap corresponds to a 20 MHz subchannel within the operating channel width of the BSS with which the STA is associated, with the LSB corresponding to the lowest numbered operating subchannel of the BSS. The bit in position *X* in the bitmap is set to 1 to indicate that the subchannel *X*+ 1 is idle; otherwise it is set to 0 to indicate that the subchannel is busy or unavailable. Availability of each 20 MHz subchannel is based on ~~ED rules~~ the ED-based CCA which ~~are~~ is defined in 28.3.19.6.5 (Per 20 MHz CCA sensitivity) and is reported for the 20 MHz subchannels located within the operating channel width of the reporting STA when the WM is idle as defined defined in 10.3.2.1 (CS mechanism) and in 27.5.3.5 (UL MU CS mechanism).

* CAS Control

TGax editor: Change this subclause as follows: (#13534)

The SR PPDU Indication subfield indicates whether the PPDU carrying the MPDU carrying the CAS Control subfield is an SR\_PPDU. The SR PPDU Indication is set to 1 when the PPDU is an SR\_PPDU; otherwise it is set to 0.

* HE MAC Capabilities Information field

TGax editor: Change this subclause as follows: (#12857, 12644)

|  |
| --- |
| * Subfields of the HE MAC Capabilities Information field
 |
| Subfield | Definition | Encoding |
| +HTC-HE Support | Indicates support for the reception of an HE variant HT Control field ~~carried in a QoS Data, QoS Null, or Management frame~~. | For a non-AP STA:Set to 1 if the STA supports reception of an HE variant HT Control field based on the description in 10.9 HT Control field operation.Set to 0 otherwise.An AP sets the +HTC-HE Support subfield to 1. |

* HT Control field operation

TGax editor: Change this subclause as follows: (#12437, 13185, 12439, 12440, 11148)

…

A STA that has a value of true for at least one of dot11RDResponderOptionImplemented, dot11MCSFeedbackOptionImplemented, and dot11AlternateEDCAActivated shall set dot11HTControlFieldSupported or dot11VHTControlFieldOptionImplemented or both to true. A STA that has(#11143) at least one of dot11HEULMUResponseSchedulingOptionImplemented, ~~dot11HEMCSFeedbackOptionImplemented,~~ dot11OMIOptionImplemented, dot11HEBSRControlImplemented, ~~dot11HEUPHControlActivated,~~ (#12437) dot11HEBQRControlImplemented, or ~~dot11HECASControlImplemented~~ dot11SRResponderOptionImplemented is true shall set dot11HEControlFieldOptionImplemented to true. A STA that has dot11HEMCSFeedbackOptionImplemented greater than zero shall set dot11HEControlFieldOptionImplemented to true. An HE STA that has dot11RDResponderOptionImplemented equal to true shall set dot11HEControlFieldOptionImplemented to true. An HE AP shall set dot11HEControlFieldOptionImplemented to true.

…

An HE variant HT Control field shall not be present in a frame addressed to a STA unless that STA declares support for +HTC-HE in the HE MAC Capabilities Information field of the HE Capabilities element. The HE variant HT Control field carried in the frame may contain ~~a~~one or more (#13185) Control subfield ~~supported by the intended receiver~~ under the conditions listed in Table 10-8a (Conditions for including Control subfield variants).

|  |
| --- |
| * Conditions for including Control subfield variants
 |
| Control subfield variant | Condition |
| TRS | The transmitting STA expects an HE TB PPDU that follow the TRS information as described in 27.5.3.2 (Rules for soliciting UL MU frames) and the recipient STA has set the TRS Support subfield of the HE MAC Capabilities Information field of the HE Capabilities elements it transmits to 1.  |
| OM | The transmitting STA changes its operating mode, as described in 27.8 (Operating mode indication) and the recipient STA has set the OM Control Support subfield of the HE MAC Capabilities Information field of the HE Capabilities elements it transmits to 1. |
| HLA | The transmitting STA follows the HE link adaptation procedure, as described in 27.13 (Link adaptation using the HLA Control subfield(#14137)) and the recipient STA has set the HE Link Adaptation Support subfield of the HE MAC Capabilities Information field of the HE Capabilities elements it transmits to a nonzero value. |
| BSR | The transmitting STA follows the corresponding buffer status report procedure, as described in 27.5.3.6 (HE buffer status feedback operation for UL MU) and the recipient STA has set the BSR Support subfield of the HE MAC Capabilities Information field of the HE Capabilities elements it transmits to 1. |
| UPH | The transmitting STA follows the UL MU operation procedure, as described in 27.5.3.3 (STA behavior for UL MU operation). |
| BQR | The transmitting STA follows the bandwidth query report procedure, as described in 27.5.2 (HE bandwidth query report operation for MU) and the recipient STA has set the BQR Support subfield of the HE MAC Capabilities Information field of the HE Capabilities elements it transmits to 1. |
| CAS | The transmitting STA follows either:— T~~t~~he reverse direction protocol procedure as described in 10.28 (Reverse Direction Protocol) and the recipient STA has set the RD Responder of the HT Extended Capabilities field of the HT Capabilities elements it transmits to 1 or—The SRP procedure as described in 27.9.3 (SRP-based spatial reuse operation) and the recipient STA has set the SR Responder subfield of the HE MAC Capabilities Information field of the HE Capabilities elements it transmits to 1.(#12439) |
| ONES | The transmitting STA includes an A-Control field that contains a Control subfield with Control ID subfield equal to 15 and Control Information subfield equal to all 1s and whose content can be ignored by the HE recipient STA.  |

…

An HE STA that receives an A-Control subfield shall ignore a Control field with a Control ID subfield whose value is not recognized or is not supported by the STA. ~~For any Control ID value only one Control subfield shall be present in the A-Control subfield of QoS Data, QoS Null, or Management frames carried in an (A-)MPDU.~~ If more than one Control subfield is present in an A-Control subfield, the Control subfields shall not have the same Control ID value. (#12440)

~~NOTE—An A-Control field that is present in a frame cannot contain only the Padding subfield.~~ (#11148)

An HE STA that receives a Control subfield with Control ID subfield equal to 15 shall ignore the remainder of the A-Control field.

TGax editor: Insert the following paragraph after 1st paragraph of the subclause 27.5.2:

**27.5.2 HE bandwidth query report operation for MU**

An HE STA shall set the BQR Support subfield of the HE Capabilities element it transmits to 1 if its dot11HEBQRControlImplemented is true; otherwise the HE STA shall set it to 0.

* A-MPDU contents in an HE TB PPDU

***TGax Editor: Change the paragraphs below of this subclause as follows (#CID12437):***

A STA may set the dot11HEUPControlActivated to false if the most recent OM Control field sent (if any) to the AP had the UL MU Disable field equal to 1; otherwise, the STA shall set the dot11HEUPHControlActivated to true.

A STA with dot11HEUPHControlActivated equal to true that is scheduled in a Trigger frame or is the intended receiver of an TRS Control field includes the dB value of its UL power headroom, *HRSTA*, in the TRS Control field of MPDUs carried in the HE TB PPDU sent in response to assist in the AP's MCS selection. The UL power headroom for the assigned MCS is defined in Equation (27-1).

…

 represents the maximum UL transmit power of an HE TB PPDU with the assigned MCS, after considering hardware capability, regulatory requirements and local maximum transmit power levels (see 11.8.5 (Specification of regulatory and local maximum transmit power levels)), as well as non-802.11 in-device coexistence requirements

 represents the current UL transmit power of the HE TB PPDU for the assigned MCS, which is determined by power control and subject to the STA’s capabilities and other requirements as defined in 28.3.14.2 (Power pre-correction)

*HRSTA* is the UL headroom, in dB, of the HE TB PPDU, the encoding of which is specified in 9.2.4.6a.5 (UPH Control).

**27.8 Operating mode indication**

**27.8.1 General**

***TGax Editor: Change the paragraph below of this subclause as follows (#CID12437):***

NOTE 2—To avoid possible frame loss, a first HE STA that sends an OM Control subfield to a second HE STA indicating reduced operating channel width and/or reduced active receive chains and/or changing UL MU operating mode can continue with its current operating channel width and active receive chains and UL MU operating mode until it infers that the second STA has processed this notification. The first HE STA might make this inference from ~~either~~ any combination of the following:

TGax editor: Insert the following paragraph after 1st paragraph of the subclause 27.5.3.6:

**27.5.3.6 HE buffer status feedback operation for UL MU**

An HE STA shall set the BSR Support subfield of the HE Capabilities element it transmits to 1 if its dot11HEBSRControlImplemented is true; otherwise the HE STA shall set it to 0.

**27.8 Operating mode indication**

**27.8.1 General**

TGax editor: Chane this subclause as follows:

An HE STA with dot11OMIOptionImplemented equal to true shall set the OM Control Support subfield in the HE MAC Capabilities Information field of the HE Capabilities element it transmits to 1; otherwise the HE STA shall set it to 0. An HE AP shall set dot11OMIOptionImplemented to true and the HE AP shall implement the reception of the OM Control subfield.

TGax editor: Insert the following paragraph after 4th paragraph of the subclause 27.9.3:

**27.9.3 SRP-based spatial reuse operation**

An HE STA shall set the SR Responder subfield of the HE Capabilities element it transmits to 1 if its dot11SRResponderOptionImplemented is true; otherwise the HE STA shall set it to 0.

TGax editor: Change Annex C as follows (#12437):

Dot11HEStationConfigEntry ::=

 SEQUENCE {

 dot11HEULMUResponseSchedulingOptionImplemented TruthValue,

 dot11ULMUMIMOOptionImplemented TruthValue,

 dot11OFDMARandomAccessOptionImplemented(#11985) TruthValue,

 dot11HEControlFieldOptionImplemented TruthValue,

 dot11OMIOptionImplemented TruthValue,

 dot11HEMCSFeedbackOptionImplemented INTEGER(#12436),

 dot11HEDynamicFragmentationLevel INTEGER,

 dot11AMPDUwithMultipleTIDOptionImplemented TruthValue,

 dot11MPDUAskedforAckInMultiTIDAMPDU TruthValue,

 dot11TXOPDurationRTSThreshold Unsigned32,

 dot11PPEThresholdsRequired TruthValue,

 dot11IntraPPDUPowerSaveOptionActivated TruthValue,

 dot11AMSDUFragmentationOptionImplemented TruthValue,

 dot11BSSColorCollisionAPPeriod Unsigned32,

 dot11BSSColorCollisionSTAPeriod Unsigned32,

 dot11AutonomousBSSColorCollisionReportingImplemented TruthValue,

 dot11HESRPOptionImplemented TruthValue,

 dot11HEBSRControlImplemented TruthValue,

 dot11HEUPHControlActivated TruthValue,

 dot11HEBQRControlImplemented TruthValue,

 dot11HECASControlImplemented TruthValue,

 dot11PartialBSSColorImplemented TruthValue,

 dot11SRResponderOptionImplemented TruthValue

 }

…

dot11HEUPHControlActivated OBJECT-TYPE

 SYNTAX TruthValue

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

 "This is a control variable.

 ~~Its value is determined by device capabilities.~~

 It is written by an external management entity or the SME.

 Changes take effect as soon as practical in the implementation.

 This attribute, when true, indicates that the ~~station implementation is capable~~ capability of receiving frames with an UPH Control subfield is enabled. The capability is disabled otherwise."

 DEFVAL { false }

 ::= { dot11HEStationConfigEntry 19}

…

dot11PartialBSSColorImplemented OBJECT-TYPE

 SYNTAX TruthValue

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

 "This is a capability variable.

 Its value is determined by device capabilities.

 This attribute, when true, indicates that the partial BSS color (see 27.16.3 (AID assignment)) is implemented. The capability is disabled otherwise."

 DEFVAL { false }

 ::= { dot11HEStationConfigEntry 22}

dot11SRResponderOptionImplemented OBJECT-TYPE

 SYNTAX TruthValue

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

 "This is a capability variable.

 Its value is determined by device capabilities.

 This attribute, when true, indicates that the SRP-based SR\_PPDU reception

 see 27.9.3 (SRP-based spatial reuse operation)) is implemented. The capability

 is disabled otherwise."

 DEFVAL { false }

 ::= { dot11HEStationConfigEntry 23}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

-- \* End of dot11HEStationConfigTable TABLE

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

…

dot11HEComplianceGroup OBJECT-GROUP

 OBJECTS {

 dot11HEULMUResponseSchedulingOptionImplemented,

 dot11ULMUMIMOOptionImplemented,

 dot11OFDMARandomAccessOptionImplemented(#11985),

 dot11HEControlFieldOptionImplemented,

 dot11OMIOptionImplemented,

 dot11HEMCSFeedbackOptionImplemented,

 dot11HEDynamicFragmentationImplemented,

 dot11AMPDUwithMultipleTIDOptionImplemented,

 dot11MPDUAskedforAckInMultiTIDAMPDU,

 dot11DurationRTSThreshold,

 dot11PPEThresholdsRequired,

 dot11IntraPPDUPowerSaveOptionActivated,

 dot11PartialBSSColorImplemented,

 dot11SRResponderOptionImplemented }

 STATUS current

 DESCRIPTION

 "Attributes that configure the HE Group for IEEE 802.11."

::= { dot11Groups 100 }