IEEE P802.11  
Wireless LANs

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| Changes to D1.0 Clause 28.3.19, 28.3.20 | | | | |
| Date: 2017-03-10 | | | | |
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Abstract

This submission proposes resolutions for comments of TGax Draft 1.0 with the following CIDs:

5381, 5383, 5783, 6880, 6881, 6883, 6884, 6886, 6887, 6889, 6890, 6891, 9041, 9042, 9043, 9044, 9045, 9046, 9047, 9049, 9051, 9089, 9609, 9610, 9733, 10134, 10135, 10228, 10231, 10232

Revisions:

* Rev 0: Initial version of the document.
* Rev 3: typo in CID 10232 and changes to equation 28-129.

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** | **Clause** | **P.L.** | **Comment** | **Proposed Change** | **Resolution** |
| 5381 | Geonjung Ko | 28.3.20 | 369.05 | An AP does not need to issue a PHY-RXSTART.indication primitive in response to a HE trigger-based PPDU that does not overlap the primary channel, if the PPDU is not solicited by the AP. | An AP shall issue a PHY-RXSTART.indication primitive in response to a PPDU that does not overlap the primary channel, if the PPDU is the HE trigger-based PPDU the AP solicited. If the PPDU is the HE trigger-based PPDU that does not overlap the primary channel and the PPDU is not solicited by the AP, the AP shall not issue the primitive. | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 5381. |
| 5383 | Geonjung Ko | 28.3.20 | 369.08 | According to the baseline spec, the secondary channel means a 20 MHz channel. Therefore, it should be the secondary 20 MHz channel, secondary 40 MHz channel, or secondary 80 MHz channel. | As per comment | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 5383. |
| 5783 | Hongyuan Zhang | 28.3.20 | 368.42 | When HE-SIG-A CRC Fails, PHY.CCA(Busy) should not be held according to RXTIME in (28-128), which is based on some subfields of HE-SIG-A. | Creat a new RXTIME formula in this case, similar to the 11ac RXTIME formular with SignalExtension added. Refer to this new RXTIME formula if the SIGA CRC fails | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 5783. |
| 6880 | John Coffey | 28.3.20 | 368.48 | Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 5783. |
| 6881 | John Coffey | 28.3.20 | 368.49 | Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 5783. |
| 6883 | John Coffey | 28.3.20 | 369.39 | Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 6883. |
| 6884 | John Coffey | 28.3.20 | 369.40 | Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 6884. |
| 6886 | John Coffey | 28.3.20 | 369.65 | Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 6886. |
| 6887 | John Coffey | 28.3.20 | 369.65 | (Second instance on same line:) Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 6887. |
| 6889 | John Coffey | 28.3.20 | 370.23 | Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 6889. |
| 6890 | John Coffey | 28.3.20 | 370.23 | (Second instance on same line:) Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 6890. |
| 6891 | John Coffey | 28.3.20 | 370.23 | Contraction used: "doesn't". Please don't. | Change to "does not". | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 6891. |
| 9041 | Sigurd Schelstraete | 28.3.19 | 360.48 | Figure 128-43 and subsequent figures do not show post-FEC padding. | Add post-FEC padding to figures. | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9041. |
| 9042 | Sigurd Schelstraete | 28.3.19 | 362.44 | Wrong reference: 26.2.x | See comment | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9042. |
| 9043 | Sigurd Schelstraete | 28.3.19 | 364.51 | Figure 28-46 should include post-FEC padding. | Add post-FEC padding (most liekly in box "Padding & Tail") | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9043. |
| 9044 | Sigurd Schelstraete | 28.3.20 | 364.61 | Change Non-HT to NON\_HT | See comment | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9044. |
| 9045 | Sigurd Schelstraete | 28.3.20 | 365.05 | The term "cell" is used here without explanation or reference. | Explain "cell" or replace with a better term | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9045. |
| 9046 | Sigurd Schelstraete | 28.3.20 | 365.12 | Shouldn't CS/CCA state In Figure 28-47 end after reception of PHY-CCA.Indication? | Improve Figure to show correct end of CS/CCA state. | Rejected –  Rx state start after PHY generate the PHY-RXSTART.INDICATION(RXVECTOR) |
| 9047 | Sigurd Schelstraete | 28.3.20 | 365.30 | Show post-FEC padding in Figure 28-47 | See comment | Revised –  As proposed change.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9047. |
| 9049 | Sigurd Schelstraete | 28.3.20 | 369.11 | "The PHY includes the most recently measured RSSI value". Which one, the one measure during L-STf or HE-STF? Figure 28-47 shows RSSI measurements at two places. | Clarify | Revised –  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9049. |
| 9051 | Sigurd Schelstraete | 28.3.20 | 370.56 | "SignalExtension is 0 usec when TXVECTOR parameter NO\_SIG\_EXTN is true". This may be correct at transmitter side, but the receiver does not know the value of TXVECTOR. How will the receiver decide the value of SignalExtension? | Clarify | Revised –  As proposed changes  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9051. |
| 9089 | Sriram Venkateswaran | 28.3.20 | 369.00 | "The PHY entity shall maintain PHY-CCA.indication(BUSY, channellist) primitive for the predicted duration of the transmitted PPDU, as defined by RXTIME in Equation (28-128), for all supported modes, unsupported modes, Reserved HE-SIG-A Indication, and invalid HE-SIG-A CRC". For SIGA CRC failure case, SIGA contents will not be usable and in such case, how receiver will compute RXTIME which requires CP and LTF size which are not multiple of 4uS? | Clarification required. For SIGA CRC failure case, shall we use length from LSIG? If so, the spec should state it explicitly | Revised –  Addressed in CID 5783.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 5783. |
| 9609 | Yongho Seok | 28.3.20 | 369.46 | "The PHY entity shall maintain PHY-CCA.indication(BUSY, channellist) primitive for the predicted duration of the transmitted PPDU, as defined by RXTIME in Equation (28-128), for all supported modes, unsupported modes, Reserved HE-SIG-A Indication, and invalid HE-SIG-A CRC." The RXTIME in Equation (28-128) does work only if an STA can know the RXVECTOR parameter (such as GI\_TYPE and HE\_LTF\_TYPE) from the HE-SIG fields. But, the HE-SIG fields in the HE trigger-based PPDU do not have the RXVECTOR parameter required for calcuating the RXTIME in Equation (28-128). In such case, the RXTIME should be based on the L-SIG (i.e., Equation (21-106)). Please insert this exceptation case. | As per comment. | Revised –  Addressed in CID 5783.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 5783. |
| 9610 | Yongho Seok | 28.3.20 | 369.46 | "The PHY entity shall maintain PHY-CCA.indication(BUSY, channellist) primitive for the predicted duration of the transmitted PPDU, as defined by RXTIME in Equation (28-128), for all supported modes, unsupported modes, Reserved HE-SIG-A Indication, and invalid HE-SIG-A CRC." The RXTIME in Equation (28-128) does work only if an STA can know the RXVECTOR parameter (such as GI\_TYPE and HE\_LTF\_TYPE) from the HE-SIG fields. In the case of the HE-SIG-A error (e.g., CRC failure), the RXTIME should be based on the L-SIG of the received HE SU PPDU (i.e., Equation (21-106)). Please insert this exceptation case. | As per comment. | Revised –  Addressed in CID 5783.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 5783. |
| 9733 | Yongho Seok | 28.3.20 | 371.11 | "The receiving procedures are subject to further changes depending on the decisions of spatial reuse and 20 MHz only devices." On the spatial reuse operation, when the STA's MAC sublayer issues a PHY-CCARESET.request primitive, the PHY receive procedure (e.g, issue a PHY-RXEND.indication primitive) shall be explained. | As per comment. | Revised –  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9733. |
| 10134 | yujin noh | 28.3.19 | 363.40 | Considering not following the 4us boundary rule for TX/RXTIME anymore in 11ax, in order to reduce the confusion when PHY issues the PHY-TXEND.confirm primitive, "the PHY-TXEND.confirm primitive is generated at the end of last symbol of the PPDU" should be clarified with "the PHY-TXEND.confirm primitive is generated at the actual end of last symbol of the PPDU". | As in the comment. | Revised –  Modify as suggested.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 10134. |
| 10135 | yujin noh | 28.3.19 | 364.14 | RL-SIG should not be classified into L-Preamble. Move TX RL-SIG(BPSK) into the next steps with TX HE-Preamble. | As in the comment. | Revised –  Addressed in CID 9043.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9043. |
| 10228 | Yusuke Asai | 28.3.19 | 362.44 | Reference error. | Add a correct reference. | Revised –  Addresed in CID 9042.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9042. |
| 10231 | Yusuke Asai | 28.3.19 | 360.40 | Signal extension appears on this subclause; however, no definition is found in the draft. | Add the normative text or delete signal extension throughout the draft if it is not needed. | Rejected –  Should be able to find the definition after combing with 11n spec. |
| 10232 | Yusuke Asai | 28.3.19 | 364.37 | The rectangle blocks of "Packet Extension?" and "Signal Extension?" should be rhombuses because they are conditional branches. | As in comment. | Revised –  Addresed in CID 9043.  TGax editor to make the changes shown in 11-17/0234r3 under all headings that include CID 9043. |

**Propose:** Revised for CID 5381, 5383, 6883, 6884, 6886, 6887, 6889, 6890, 6891, 9043, 9044, 9045, 9046, 9049, 9089, 9609, 9610, 9733, 10135, 10228, 10232 per editing instructions in 11-17/0234r3.

*To the TGax Editor: modify P.L. 369.05 as following (CID 5381, 5383).*

The PHY shall not issue a PHY-RXSTART.indication primitive in response to a PPDU that does not overlap  
the primary channel, except when the PHY at an AP receives the HE-trigger based PPDU which is solicited by this AP. In such case, the PHY shall issue a PHY-RXSTART.indication primitive in response to a PPDU transmission either at the primary or at the secondary ~~channel~~ 20 MHz channel, the secondary 40 MHz channel, or the secondary 80 MHz channel.

*To the TGax Editor: replace BSS color with BSS Color in P.L. 369.39, 369.40, 369.65, 370.23 (CID 6883, 6884, 6886, 6887, 6889, 6890).*

*To the TGax Editor: modify P.L. 370.23 as following (CID 6891).*

If the BSS color ~~doesn't~~ does not contain an intended value,

*To the TGax Editor: replace figure 28-42, 28-43, 28-44, 28-45 with the following figures (CID 9041).*

 **Figure 28-42—PHY transmit procedure for an HE SU PPDU**

 **Figure 28-43—PHY transmit procedure for an HE extended range SU PPDU**



**Figure 28-44—PHY transmit procedure for an HE MU PPDU**  **Figure 28-45—PHY transmit procedure for an HE trigger-based PPDU**

*To the TGax Editor: replace figure 28-47, 28-48, 28-49, 28-50 with the following figures.(CID 9047)*

**Figure 28-47—PHY Receive procedure for HE\_SU PPDU.**

 **Figure 28-48—PHY Receive procedure for HE\_EXT\_SU PPDU.**

 **Figure 28-49—PHY Receive procedure for HE\_MU PPDU.**



**Figure 28-50—PHY Receive procedure for HE\_TRIG PPDU.**

*To the TGax Editor: modify P.L. 369,11 as following (CID 9049)*

The PHY includes the ~~most recently~~ measured RSSI and RSSI\_LEGACY value in the PHY-RXSTART.indication (RXVECTOR) primitive issued to the MAC.

*To the TGax Editor: modify P.L. 364,61 as following (CID 9044).*

If the detected format indicates a ~~Non-HT~~ NON-HT PPDU, refer to the receive procedure and state machine in Clause 17

*To the TGax Editor: modify P.L. 362.44 as following (CID 9042)*

NOTE 2—The transmit procedure for NON\_HT, HT\_MF, HT\_GF, and VHT format are specified in ~~26.2.x~~ 28.2.5 (Support for  
NON-HT, HT, and VHT formats)

*To the TGax Editor: modify P.L. 365.05 as following (CID 9045)*

The PHY has also been configured with ~~cell~~ BSS identification information and STA identification information (i.e., BSS Color value and STA ID in the cell) so that it can receive data intended for the STA in the specific ~~cell~~ BSS.

*To the TGax Editor: Replace Figure 28-46 with the following figure (CID 9043)*



**Figure 28-46—PHY transmit state machine for an HE PPDU**

*To the TGax Editor: modify P.L. 368.58 as following (CID 9733)*

Upon receiving the transmitted PHY preamble ~~overlapping the primary 20 MHz channel~~ in a greater than or equal to 20 MHz BSS, the PHY measures a receive signal strength. This activity is indicated by the PHY to the MAC via a PHY-CCA.indication primitive. A PHY-CCA.indication(BUSY, channel-list) primitive is also issued as an initial indication of reception of a signal as specified in 28.3.17.6 (CCA sensitivity). The channel-list parameter of the PHYCCA.indication primitive is absent when the operating channel width is 20 MHz. The channel-list parameter is present ~~and includes the element primary~~ when the operating channel width is 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz.

*In addition, modify P.L. 371.11 as following (CID 9733):*

~~The receiving procedures are subject to further changes depending on the decisions of spatial reuse and  
20 MHz only devices.~~

*To the TGax Editor: modify P.L. 368.58 as following (CID 10134)*

When no packet extension and signal extension are present, the PHY-TXEND.confirm primitive is generated at the end of ~~last symbol~~ the actual ending time of the PPDU.

**Proposed change:** Revised for CID 5783, 9089, 9609, 9610, 6880, 6881, 9733 per discussions and editing instructions in 11-17/0234r3

Discussion: If the HE-SIG-A is not correctly decoded, the RXTIME, which the receiver relies on to predict the time to wait, cannot be derived since HE-LTF mode and GI are indicated in HE-SIG-A. Also for the trigger based PPDU, since HE-SIG-A doesn’t include these information, STAs cannot derive RXTIME. For these cases, the receiver should use the L\_LENGTH field in the L-SIG to predict the time to wait.

In addition, the spatial reuse should be reflected in the Rx procedure.

11ac treats the Reserved VHT-SIG-A the same as invalid CRC: *If the VHT-SIG-A indicates an invalid CRC or Reserved VHT-SIG-A Indication or if the L-SIG Length field is invalid, the PHY shall issue the error condition PHY-RXEND.indication(FormatViolation) primitive.*

*To the TGax Editor: modify page 369 line 44~53as following:*

If the HE-SIG-A indicates a valid CRC and Reserved HE-SIG-A Indication is not indicated, for all supported modes, unsupported modes, ~~T~~the PHY entity shall maintain PHY-CCA.indication(BUSY, channellist) primitive for the predicted duration of the transmitted PPDU, as defined by RXTIME in Equation (28-128), unless it receives a PHY-CCARESET.request primitive before the end of the PPDU for instance during spatial reuse operation as described in 27.9. ~~for all supported modes, unsupported modes, Reserved HE-SIG-A Indication, and invalid HE-SIG-A CRC. Reserved HE-SIG-A Indication is defined as an HE-SIG-A with Reserved bits equal to 0.~~ If the HE-SIG-A indicates an unsupported mode, the PHY shall issue a PHY-RXEND.indication(UnsupportedRate) primitive. If the HE-SIG-A indicates an invalid CRC or Reserved HE-SIG-A Indication, the PHY shall issue the error condition PHY-RXEND.indication(FormatViolation)primitive and maintain PHY-CCA.indication(BUSY, channellist) primitive for the predicted duration of the transmitted PPDU derived from the LENGTH field in L-SIG as defined in Equation (28-129), unless it receives a PHY-CCARESET.request primitive before the end of the PPDU for instance during spatial reuse operation as described in 27.9. Reserved HE-SIG-A Indication is defined as an HE-SIG-A with Reserved bits equal to 0 or any other VHT-SIG-A field bit combinations that do not correspond to modes of PHY operation defined in Clause 28 (High Efficiency (HE) PHY specification). A STA, who wants to predict the duration of the HE trigger based PPDU, shall maintain PHY-CCA.indication(BUSY, channellist) primitive for the predicted duration of the transmitted PPDU derived from the LENGTH field in L-SIG as defined in Equation (28-129), unless it receives a PHY-CCARESET.request primitive before the end of the PPDU for instance during spatial reuse operation as described in 27.9.

*Also modify page 370 line 2~11 and page 370 line 33~42 as following:*

If the HE-SIG-A indicates a valid CRC and Reserved HE-SIG-A Indication is not indicated, for all supported modes, unsupported modes, ~~T~~the PHY entity shall maintain PHY-CCA.indication(BUSY, channellist) primitive for the predicted duration of the transmitted PPDU, as defined by RXTIME in Equation (28-128), unless it receives a PHY-CCARESET.request primitive before the end of the PPDU for instance during spatial reuse operation as described in 27.9. ~~for all supported modes, unsupported modes, Reserved HE-SIG-A Indication, and invalid HE-SIG-A CRC. Reserved HE-SIG-A Indication is defined as an HE-SIG-A with Reserved bits equal to 0.~~ If the HE-SIG-A indicates an unsupported mode, the PHY shall issue a PHY-RXEND.indication(UnsupportedRate) primitive. If the HE-SIG-A indicates an invalid CRC or Reserved HE-SIG-A Indication, the PHY shall issue the error condition PHY-RXEND.indication(FormatViolation) primitive and maintain PHY-CCA.indication(BUSY, channellist) primitive for the predicted duration of the transmitted PPDU derived from the LENGTH field in L-SIG as defined in Equation (28-129), unless it receives a PHY-CCARESET.request primitive before the end of the PPDU for instance during spatial reuse operation as described in 27.9. Reserved HE-SIG-A Indication is defined as an HE-SIG-A with Reserved bits equal to 0 or any other VHT-SIG-A field bit combinations that do not correspond to modes of PHY operation defined in Clause 28 (High Efficiency (HE) PHY specification)

In addition, add the following equation in P.L. 370.59

 (28-129)

Where

LENGTH is the LENGTH field in L-SIG.

*SignalExtension* is defined in Table 19-25 (HT PHY characteristics).

In addition, replace *Figure 28-51* *PHY receive state machine* with the figure below:



**Figure 28-51—PHY receive state machine**

**Proposed change:** Revised for CID 9051 per discussions and editing instructions in 11-17/0234r3

Discussions: The Signal Extension should be mentioned in PPDU format clause as in 11n, to clarify the conditions that Signal Extension should be applied.

*To the TGax Editor: add the following paragraphs after P.L. 242.30:*

Transmissions of frames with TXVECTOR parameter NO\_SIG\_EXTN equal to false are followed by a period of no transmission for a duration of aSignalExtension. See 10.3.8 (Signal Extension).

A Signal Extension shall be present in a transmitted PPDU, based on the parameters of the TXVECTOR, when the NO\_SIG\_EXTN parameter is equal to false and either of the following is true:   
— The FORMAT parameter is equal to HE.  
— The FORMAT parameter is equal to NON\_HT, and the NON\_HT\_MODULATION parameter is equal to NON\_HT\_DUP\_OFDM.

A Signal Extension shall be assumed to be present (for the purpose of timing of PHY-RXEND.indication and PHY-CCA.indication primitives, as described below and in 28.3.20 (PHY receive procedure)) in a received PPDU when either of the following is true, based on the determined parameter values of the RXVECTOR:   
— The FORMAT parameter is equal to HE.  
— The FORMAT parameter is equal to NON\_HT, and the NON\_HT\_MODULATION parameter is equal to NON\_HT\_DUP\_OFDM.

A PPDU containing a Signal Extension is called a *signal extended PPDU*. When transmitting a signal extended PPDU, the PHY-TXEND.indication primitive shall be emitted a period of aSignalExtension after the end of the actual ending time of the PPDU. When receiving a signal extended PPDU, the PHYRXEND.indication primitive shall be emitted a period of aSignalExtension after the end of the actual ending time of the PPDU.