### IEEE P802.11 Wireless LANs

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| 11ax D0.3 Comment Resolution for Two NAVs - Part II | | | | |
| Date: 2016-09-12 | | | | |
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Abstract

This submission proposes resolutions for comments of TGax Draft 0.3 with the following CIDs:

* 2316, 631, 811, 2905, 2257, 632, 205, 966

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Add additional note for NAV consideration of immediate response based on the feedback from Abhishek. Add CID 966 merged from 16/1154. The difference is marked with green.
* Rev 2: Minor Editoral change. The difference is marked with cyan.

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 D0.3 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D0.3 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** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 2316 | Yasuhiko Inoue | 53.16 | 25.2.1 | "Mandatory or optional support of two NAVs is TBD." It should be determined. | As in the comment | Revised –  Agree in principle with the commenter. Propose to make two NAVs mandatory for HE non-AP STA and optional for HE AP STA.  The reason is that maintaining two NAV is beneficial in dense deployment scenarios where a STA requires protection from frames transmitted by STAs within its BSS, i.e., intra-BSS, and avoid interference from frames transmitted by STAs in neighboring BSS, i.e., inter-BSS. For example, in a TXOP initiated by the associated AP for UL MU transmission, the intra-BSS NAV of the STA can be set by the AP to prevent the STA from contending the channel, and the regular NAV will not be updated by the associated AP so that NAV set by inter-BSS PPDU can be considered in UL MU CS as described in 25.5.2.4 (UL MU CS mechanism).  TGax editor to make the changes shown in 11-16/1173r2 under all headings that include CID 2316. |
| 631 | Geonjung Ko | 53.15 | 25.2.1 | 11ax considers dense deployment of STAs and may utilize TXOP protection and TXOP truncation frequently. In this environment, two NAVs would be beneficial to protect intra-BSS and to reduce interferences to inter-BSS. | Make two NAVs as a mandatory feature. | Revised –  Agree in principle with the commenter. Propose to make two NAVs mandatory for HE non-AP STA and optional for HE AP STA.  TGax editor to make the changes shown in 11-16/1173r2 under all headings that include CID 2316. |
| 811 | Jinsoo Ahn | 53.16 | 25.2.1 | If two NAVs is not used and HE STAs cannot distinguish NAV originator, NAV reset schemes may reset unintended NAV. But if HE AP shall not use NAV reset schemes in MU scenario, protection schemes including trigger NAV would overprotect its TXOP and may degrade performance of 11ax. | Change the first sentence to the following "Supporting two NAVs is mandatory feature of HE STA."  or  At least, HE STA shall distinguish originator of NAV even if supporting two NAVs is optional feature. | Revised –  Agree in principle with the commenter. Propose to make two NAVs mandatory for HE non-AP STA and optional for HE AP STA.  The reason is that maintaining two NAV is beneficial in dense deployment scenarios where a STA requires protection from frames transmitted by STAs within its BSS, i.e., intra-BSS, and avoid interference from frames transmitted by STAs in neighboring BSS, i.e., inter-BSS. For example, in a TXOP initiated by the associated AP for UL MU transmission, the intra-BSS NAV of the STA can be set by the AP to prevent the STA from contending the channel, and the regular NAV will not be updated by the associated AP so that NAV set by inter-BSS PPDU can be considered in UL MU CS as described in 25.5.2.4 (UL MU CS mechanism).  TGax editor to make the changes shown in 11-16/1173r2 under all headings that include CID 2316. |
| 2905 | Zhou Lan | 40.31 | 10.3.2.8a | NAV setting rules for MU RTS is not specified in the spec. If the exiting NAV setting rules will be used, after receiving MU RTS, STA 1 and STA 2 will set their NAV because the RA doesn't match. Then the drawing is not correct. Assume 11ax has new rule of existing NAV of looking at the STA ID of per user info, then the rule needs to be specified. | Clarify or adding the NAV setting rules of MU RTS/CTS operation | Revised –  Agree in principle with the commenter that the NAV setting rule needs to be clarified for Trigger frame in general.  In the legacy rule, STA shall not set the NAV from the Duration field if the received frame's RA is equal to the STA's own MAC address.  Propose to extend the legacy rule so that STA shall not set the NAV if the STA is solicited for immediate response (ex. by Trigger frame).  Further, in 16/1195, the authors point out that even in the case when the RA of the received frame is equal to the STA’s own MAC address, the STA may not be solicited for response. In that case, the STA shall attempt to set the NAV. Propose to remove the constraints that STA shall not set the NAV if the RA of the received frame is equal to the STA’s own MAC address. In essence, the constraint that “STA shall not set the NAV if the RA of the received frame is equal to the STA’s own MAC address” is replaced by the constraint that “STA shall not set the NAV if the STA is solicited for immediate response”.  Note that the NAV setting in the Figure is for STAs except AP, STA1, and STA2. Hence, the drawing is correct.  TGax editor to make the changes shown in 11-16/1173r2 under all headings that include CID 2905. |
| 2257 | Weimin Xing | 59.07 | 25.5.2.4 | Here if the NAV was set by a frame originating from the AP sending theTrigger frame, then the it's considered idle . but if the Trigger frame has a broadcast RA, the intend UL responders of Trigger frame will also update their NAV timer based on the duration in Trigger frame which will erase the oringinal NAV timer of the responder. | add a note here,such as" If the Trigger frame is a broadcast trigger frame, the NAV which is used to determine the meduim idle/busy has not been updated by the Duration field in the broadcast trigger frame. | Revised –  Agree in principle with the commenter that the NAV setting rule needs to be clarified for Trigger frame in general.  In the legacy rule, STA shall not set the NAV from the Duration field if the received frame's RA is equal to the STA's own MAC address.  Propose to extend the legacy rule so that STA shall not set the NAV if the STA is solicited for immediate response (ex. by Trigger frame).  Further, in 16/1195, the authors point out that even in the case when the RA of the received frame is equal to the STA’s own MAC address, the STA may not be solicited for response. In that case, the STA shall attempt to set the NAV. Propose to remove the constraints that STA shall not set the NAV if the RA of the received frame is equal to the STA’s own MAC address. In essence, the constraint that “STA shall not set the NAV if the RA of the received frame is equal to the STA’s own MAC address” is replaced by the constraint that “STA shall not set the NAV if the STA is solicited for immediate response”.  TGax editor to make the changes shown in 11-16/1173r2 under all headings that include CID 2905. |
| 632 | Geonjung Ko | 53.61 | 25.2.1 | If there is a BSS color collision and STA detects the collision, the STA cannot determine the origin of the detected frame including the same BSS color using BSS Color in HE-SIG-A. Also there is a frame that the STA cannot decode without further information, e.g., HE trigger-based PPDU. We need a NAV setting rule for this case. | Need a modification of the last sentence in 25.2.1.  From: "For all other received HE-SIG-As that are identified by the STA as Inter-BSS, the STA shall update its Inter-BSS NAV when the received value of the TXOP Duration field is greater than the STA's current regular NAV value."  To: "For all other received HE-SIG-As that are identified by the STA as Inter-BSS or cannot identified as Intra-BSS or Inter-BSS, the STA shall update its regular NAV when the received value of the TXOP Duration field is greater than the STA's current regular NAV value." | Revised –  Agree in principle with the proposed concept due to a different reason.  As discussed in 16/0862r3, it is possible that BSS color 0 may be used to transmit public action frame. Further, based on the classification mentioned in 16/889r1, if a STA only decodes HE-SIG-A and fails to decode any frame in a PSDU, then the frame is treated as unclassified. Hence, it is indeed possible that a STA receives TXOP Duration field and can not identify the frame as intra-bss or inter-BSS.  TGax editor to make the changes shown in 11-16/1173r2 under all headings that include CID 632. |
| 205 | Alfred Asterjadhi | 71.63 | 25.2.1 | From HE-SIG-A, we may not be able to conclusively say whether it is inter or intra, because of BSS color code collision. So, it is safer to say, "For all other HE-SIG-As. that are identified by the STA as Inter-BSS or cannot be identified as Intra-BSS or Inter-BSS" | As in comment. | Revised –  Agree in principle with the proposed concept due to a different reason.  As discussed in 16/0862r3, it is possible that BSS color 0 may be used to transmit public action frame. Further, based on the classification mentioned in 16/889r1, if a STA only decodes HE-SIG-A and fails to decode any frame in a PSDU, then the frame is treated as unclassified. Hence, it is indeed possible that a STA receives TXOP Duration field and can not identify the frame as intra-bss or inter-BSS.  TGax editor to make the changes shown in 11-16/1173r2 under all headings that include CID 632. |
| 966 | kaiying Lv | 53.00 | 25.2.1 | If TXOP Duration field is used to update the NAV, the remaining PPDU transmission time should be considered to calculate the NAV. | Comment resolution and supporting PPT will be provided | Revised.  Agree in principle with the commenter. Currently, the NAV update operation is performed when PHYRXEND.indication primitive is received. It may be possible that PHYRXEND.indication is sent before the end of PPDU. In this case, propose that the NAV update operation is performed at the expected end of the PPDU. Note that the STA will still defer for the duration of the PPDU based on the indication in L-SIG.  TGax editor to make the changes shown in 11-16/1173r2 under all headings that include CID 966. |

**Discussion:** *None.*

**Propose:**

Revised for CID 2316, 2905, 632, 966 per discussion and editing instructions in 11-16/1173r2.

***TGax editor: Delete texts and add underlined texts on page 72 for 25.2.2 Updating two NAVs as the following:***

**25.2.2 Updating two NAVs**

~~Mandatory or optional support of two NAVs is TBD.~~ (#2316)

An HE non-AP STA shall maintain two NAV timers. An HE AP STA may maintain two NAV timers. (#2316)

[start proposed texts in 1106r2]

A STA shall update the intra-BSS NAV with the duration information indicated by the received frame in a PSDU if and only if all the following conditions are met

* the frame is identified as intra-BSS according to the rule described in 25.2.1 (Intra-BSS and inter-BSS frame detection)
* the indicated duration information is greater than the STA's current intra-BSS NAV value
* ~~the received frame's RA is not equal to the STA's own MAC address~~ (#2905)
* the STA is not solicited for an immediate response by the PPDU carrying the frame. (#2905)

A STA shall update the regular NAV with the duration information indicated by the received frame in a PSDU if and only if all the following conditions are met

* the frame is identified as inter-BSS or cannot be identified as intra-BSS or inter-BSS according to the rule described in 25.2.1 (Intra-BSS and inter-BSS frame detection)
* the indicated duration information is greater than the STA's current regular NAV value
* ~~the received frame's RA is not equal to the STA's own MAC address~~(#2905)
* the STA is not solicited for an immediate response by the PPDU carrying the frame. (#2905)

[end proposed texts in 1106r2]

[start proposed texts in 1106r2]

A STA shall update the regular NAV with the duration information indicated by the RXVECTOR parameter TXOP\_DURATION if and only if all the following conditions are met

* the RXVECTOR parameter TXOP\_DURATION is not set to all 1s.
* the PPDU that carried information for the RXVECTOR parameter is identified as Inter-BSS or cannot be identified as intra-BSS or inter-BSS(#632) according to the rule described in 25.2.1 (Intra-BSS and inter-BSS frame detection)
* the STA does not receive a frame with the duration information indicated by a Duration field in the PSDU of the PPDU carrying the RXVECTOR parameter TXOP\_DURATION
* the duration information indicated by the RXVECTOR parameter TXOP\_DURATION is greater than the STA's current regular NAV

[end proposed texts in 1106r2]

[start proposed texts in 1106r2]

Various additional conditions may set or reset the intra-BSS NAV or regular NAV, as described in 10.4.3.3 (NAV operation during the CFP). When one NAV is reset, if the other NAV timer is 0, a PHY-CCARESET.request primitive shall be issued.

~~The intra-BSS NAV or regular NAV update operation is performed when the PHY-RXEND.indication primitive is received.~~The exact time of updating the NAVs uses the same rule as defined in 10.3.2.4 (setting and resetting the NAV).(#966)

NOTE 1 – If a PS-Poll is received in a HE SU PPDU, HE extended range PPDU, or HE MU PPDU, then the RXVECTOR parameter TXOP\_DURATION does not indicate duration information (see 25.12 TXVECTOR parameters TXOP\_DURATION for an HE PPDU).

NOTE 2 – Based on the setting rule, if a STA receives a frame with the duration information indicated by both a Duration field in the PSDU and the RXVECTOR parameter TXOP\_DURATION, then the duration information indicated by the RXVECTOR parameter TXOP\_DURATION is ignored.

[End proposed texts in 1106r2]

NOTE 3- The additional rules of NAV consideration for a STA that is solicited for an immediate response are described in 10.3.2.7 (CTS and DMG CTS procedure), 10.3.2.9 (Acknowledgment procedure), and 25.5.2.4 (UL MU CS mechanism).(#2905)

***TGax editor: Delete texts and add underlined texts on page 82 for 25.5.2.4 UL MU CS mechanism***

***as the following:***

**25.5.2.4 UL MU CS mechanism**

~~When two NAVs are supported by a STA, i~~(#2316)If one or both of the NAVs are considered and the considered  
NAV’s counter is nonzero, then the virtual CS indicates busy. Otherwise, the virtual CS is idle.

~~When only one NAV is supported by a STA, if the NAV is considered and the NAV counter is nonzero, then  
virtual CS is busy. Otherwise, the virtual CS is idle.~~ (#2316)

***~~Editor’s Note: The previous sentence is only needed if support for two NAVs is optional. Mandatory or~~******~~optional support for two NAVs is still TBD.~~*** (#2316)

***TGax editor: Delete texts and add underlined texts on page 55 line 58 for 10.3.2.4 Setting and resetting the NAV as the following:***

**10.3.2.4 Setting and resetting the NAV**

[Start exsiting texts]

A STA that receives at least one valid frame in a PSDU can update its NAV with the information from any  
valid Duration field in the PSDU.

[End exsiting texts]

~~When the received frame’s RA is equal to the STA’s own MAC address, the STA shall not update its NAV.~~ (#2905)

When the STA is solicited for an immediate response by the PPDU carrying the received frame, the STA shall not update its NAV. (#2905)

….

[Start exsiting texts]

For all other received frames the STA shall update its NAV when the received Duration is greater than the STA’s current NAV value. Upon receipt of a PS-Poll frame, a STA shall update its NAV settings as appropriate under the data rate selection rules using a duration value equal to the time, in microseconds, required to transmit one Ack frame plus one SIFS, but only when the new NAV value is greater than the current NAV value. If the calculated duration includes a fractional microsecond, that value is rounded up to the next higher integer.

[End exsiting texts]

A STA shall update the NAV with the duration information indicated by the RXVECTOR parameter TXOP\_DURATION if and only if all the following conditions are met(#2316)

* the RXVECTOR parameter TXOP\_DURATION is not set to all 1s.(#2316)
* the STA does not receive a frame with the duration information indicated by a Duration field in the PSDU of the PPDU carrying the RXVECTOR parameter TXOP\_DURATION (#2316)
* the duration information indicated by the RXVECTOR parameter TXOP\_DURATION is greater than the STA's current NAV value (#2316)
* the PPDU that carried information of the RXVECTOR parameter is not HE trigger-based PPDU triggered by the STA(#2316)

[Start exsiting texts]

Various additional conditions may set or reset the NAV, as described in 10.4.3.3 (NAV operation during the CFP). When the NAV is reset, a PHY-CCARESET.request primitive shall be issued.

[End exsiting texts]

The exact time of updating the NAV is described as follows.(#966) This NAV update operation is performed when the PHY-RXEND.indication primitive is received~~.~~, except when the PHYRXEND.indication primitive is received before the end of the PPDU, in this case, this NAV update operation is performed at the expected end of the PPDU.(#966)

NOTE 1 – If a PS-Poll is received in a HE SU PPDU, HE extended range PPDU, or HE MU PPDU, then the RXVECTOR parameter TXOP\_DURATION does not indicate duration information (see 25.12 TXVECTOR parameters TXOP\_DURATION for an HE PPDU). (#2316)

NOTE 2 – Based on the setting rule, if the STA receives a frame with the duration information indicated by both a Duration field in the PSDU and the RXVECTOR parameter TXOP\_DURATION, then the duration information indicated by the RXVECTOR parameter TXOP\_DURATION is ignored.(#2316)

NOTE 3- The additional rules of NAV consideration for a STA that is solicited for an immediate response are described in 10.3.2.7 (CTS and DMG CTS procedure), 10.3.2.9 (Acknowledgment procedure), and 25.5.2.4 (UL MU CS mechanism).(#2905)

[Start exsiting texts]

Various additional  
conditions may set or reset the NAV, as described in 10.4.3.3 (NAV operation during the CFP). When the  
NAV is reset, a PHY-CCARESET.request primitive shall be issued. This NAV update operation is  
performed when the PHY-RXEND.indication primitive is received.

Figure 10-5 (RTS/CTS/data/Ack and NAV setting) indicates the NAV for STAs that might receive the RTS  
frame, while other STAs might receive only the CTS frame, resulting in the lower NAV bar as shown (with the  
exception of the STA to which the RTS frame was addressed).

[End exsiting texts]

A STA that used information from an RTS or MU-RTS(#2316) frame as the most recent basis to update its NAV setting is permitted to reset its NAV if no PHY-RXSTART.indication primitive is received from the PHY during a  
NAVTimeout period starting when the MAC receives a PHY-RXEND.indication primitive corresponding to  
the detection of the RTS or MU-RTS(#2316) frame.