### IEEE P802.11 Wireless LANs

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| 11be D1.4 CR for updating NSTR Bitmap via EHT OM Control subfield or Operation Mode field | | | | |
| Date: 2022-03-21 | | | | |
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Abstract

This submission proposes resolutions for the following CIDs:

5672

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Add scenarios in discussion.
* Rev 2: Fix the errors in Resolution. Remove Operating Mode field. Wording.

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 TGbe D1.4 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe D1.4 Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5672 | Julien Sevin | 35.3.14.3 | 274.60 | How to indicate a modification of the NSTR bitmap in operation time | As in comment | **Revised:**  Agree with the commenter in principle.  NSTR Bitmap may change along with Channel Width update. So it is better to update both in one frame.  The proposed solution is:  1) The NSTR non-AP MLD delivers its preconfigured NSTR Indication Bitmap 0, NSTR Indication Bitmap 1, etc, in STA Info field of ML element in (Re)Association Request frame.  2) The NSTR non-AP MLD indicates the NSTR Indication Bitmap to be used through the Index of NSTR Indication Bitmap subfield included in EHT OM Control subfield.  Tgbe editor: please implement changes as shown in doc 11-22/0515r2 tagged as 5672 |

**Discussion:**

***Scenario 1:***

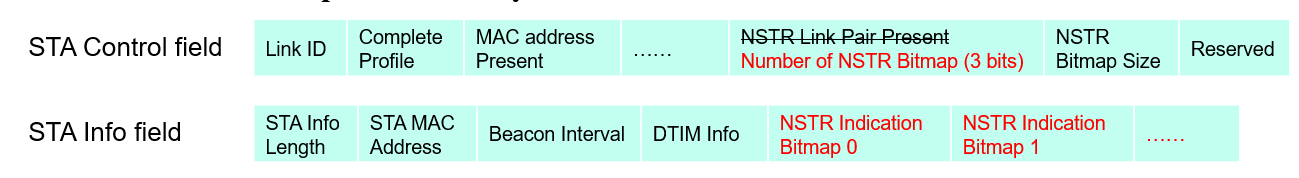
*The non-AP MLD with 3 affiliated STAs setup 3 links in 5 GHz band with the AP MLD. The STA on link 1 is going to change its Channel Width from 20 MHz to 80 MHz, which will lead to a change from STR to NSTR between link 1 and link 2, because of frequency gap between them is too small to do STR. Then the non-AP MLD has to inform the AP MLD the NSTR Indication Bitmap to be used as well as the Channel Width update.*

*In this scenario, NSTR Indication Bitmap changes along with Channel Width update. So it is better to update both in one frame. Or there will be problems for the AP MLD to do data transmission on the links with the no-AP MLD during the period that only Channel Width updated without NSTR Indication Bitmap.*

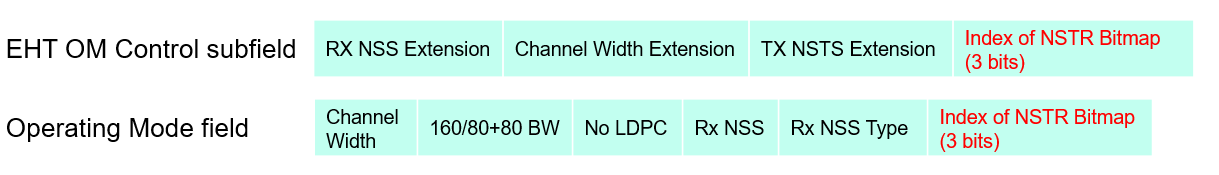
*According to 35.3.16.4 Nonsimultaneous transmit and receive (NSTR) operation, NSTR Indication Bitmap is actually a PHY parameter. So it is reasonable to update it through OM Control subfield.*

***Proposed Solution:***

*The NSTR non-AP MLD delivers its preconfigured NSTR Indication Bitmap 0, NSTR Indication Bitmap 1, etc, in STA Info field of ML element in (Re)Association Request frame. The number of NSTR Indication Bitmap is indicated by STA Control Field of the ML element.*



*A subfield in EHT OM Control field indicates which NSTR Indication Bitmap is to to used.*



*The Index of NSTR Bitmap can indicate one NSTR Indication Bitmap from at most 8 preconfigured NSTR Indication Bitmaps, which is enough in practice. To be future proof, value 7 is reserved.*

***Other scenarios:***

*Scenario 2:*

*The NSTR Indication Bitmap of the non-AP MLD was changed because of CSA/eCSA of an AP affiliated with the AP MLD.*

*In this scenario, after CSA/eCSA, it’s the non-AP MLD to initiate a frame exchange. So non-AP MLD can inform the AP MLD its new NSTR Indication Bitmap at first.*

*Scenario 3:*

*The NSTR Indication Bitmap of the non-AP MLD was changed because of an AP affiliated with the AP MLD update its Channel Width.*

*In this scenario, it is unreasonable for the AP to indicate the change of Channel Width to each STA on the link, one by one, through OM Control subfield. Critical Update would be utilized in general. So it is similar to Scenario 2.*

**End of discussion**

**Propose:**

*TGbe editor: Change 9.4.2.312.2.3 Link Info field of the Basic Multi-Link element as follows (track changes on):*

……

The format of the STA Control field is defined in [Figure 9-1002k (STA Control field format)](#bookmark135).

B0 B3 B4 B5 B6 B7 B8 B10 B11 B12 B15

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Link ID | Complete Profile | MAC  Address Present | Beacon Interval Present | DTIM Info Present | Number of NSTR  Bitmap | NSTR  Bitmap Size | Reserved |

Bits: 4 1 1 1 1 3 1 4

**Figure 9-1002k—STA Control field format(5672)**

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(5672)If the value of the Maximum Number Of Simultaneous Links subfield in the MLD Capabilities field is greater than 0, the Number of NSTR Bitmap subfield that is greater than 0 in the STA Control field indicates if at least one NSTR link pair is present in the MLD that contains the link corresponding to that STA. It is set to the number of NSTR Indication Bitmap subfield(s) contained in the STA Info field if there is at least one such link pair; otherwise it is set to 0. Value 7 is reserved for the number of NSTR Indication Bitmap subfield(s).

(5672)If the Complete Profile subfield is equal to 1 and the Number of NSTR Bitmap subfield is greater than 0 in the STA Control field, then the STA Info field contains NSTR Indication Bitmap subfield(s). The size of each NSTR Indication Bitmap subfield is indicated in the NSTR Bitmap Size subfield; otherwise, the NSTR Indication Bitmap subfield(s) is not present in the STA Info field. The number of NSTR Indication Bitmap subfield(s) in the STA Info field is the Number of NSTR Bitmap subfield in the STA Control field. The NSTR Bitmap Size subfield in the STA Control field is set to 1 if the length of the corresponding NSTR Indication Bitmap subfield is 2 octets and is set to 0 if the length of the corresponding NSTR Indication Bitmap subfield is 1 octet. The NSTR Bitmap Size subfield in the STA Control field is reserved if the Number of NSTR Bitmap subfield in that field is 0.

The format of the STA Info field is defined in [Figure 9-1002l (STA Info field format)](#bookmark136).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| STA Info Length | STA MAC  Address | Beacon Interval | DTIM Info | NSTR  Indication Bitmap 0 | NSTR Indication Bitmap 1 | …… |

Octets: 1 0 or 6 0 or 2 0 or 2 0 or 1 or 2 0 or 1 or 2

**Figure 9-1002l—STA Info field format(5672)**

*TGbe editor: Change 9.2.4.7.9 EHT OM Control as follows (track changes on):*

* + - * 1. **EHT OM Control**

(5672)The Control Information subfield in an EHT OM Control subfield contains information related to the OM changes for bandwidth of 320 MHz, Tx NSTS larger than 8, Rx NSS larger than 8, and NSTR Indication Bitmap for the STA transmit ting the frame containing this information (see 35.9 (Operating mode indication)). The format of the subfield is shown in [Figure 9-33a (Control Information subfield format in an EHT OM Control subfield)](#bookmark5).

B0 B1 B2 B3 B5

|  |  |  |  |
| --- | --- | --- | --- |
| Rx NSS  Extension | Channel Width Extension | Tx NSTS  Extension | Index of NSTR Indication Bitmap |

Bits: 1 1 1 3

**Figure 9-33a—Control Information subfield format in an EHT OM Control subfield(5672)**

*TGbe editor: Add the following paragraph at the end of 9.2.4.7.9 EHT OM Control as follows (track changes on):*

(5672)The Index of NSTR Indication Bitmap subfield indicates which NSTR Indication Bitmap contained in the STA Info field of the per-STA profile subelement in Multi-Link element, that is delivered by (Re)Association Request frame, is to be used. If it is 0, the NSTR Indication Bitmap 0 is to be used; if it is 1, the NSTR Indication Bitmap 1 is to be used; etc. The value 7 for the Index of NSTR Indication Bitmap is reserved.

*TGbe editor: Change 9.2.4.7.9 EHT OM Control as follows (track changes on):*

* + - 1. **Multi-link device capability signaling**

……

(5672)An MLD shall set the Number of NSTR Bitmap subfield value to 0 in a STA Control field that corresponds to link ID *i* (where 0  *i*  15 ) if it is a multi-radio MLD and does not contain any NSTR link pair formed by the link with link ID *i*; otherwise it shall set the subfield value to the number of NSTR Indication Bitmap(s) contained in the STA Info field that corresponds to the link. An NSTR mobile AP MLD shall set the Number of NSTR Bitmap subfield value to 1 in the STA Control field that corresponds to link ID *i*. An AP MLD that is not an NSTR mobile AP MLD shall set the Number of NSTR Bitmap subfield value in each STA Control field to 0.

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*TGbe editor: Add the following paragraph at the end of 35.9 Operating mode indication as follows (track changes on):*

(5672)The NSTR Indication Bitmap 0 is the default NSTR Indication Bitmap, which shall be used at first. The OMI initiator that is an NSTR non-AP MLD may indicate the NSTR Indication Bitmap to be used, through transmitting a frame containing the Index of NSTR Indication Bitmap subfield that is not equal to 7.

(5672)The OMI initiator shall update the NSTR Indication Bitmap being used as described in table 35-xxx:

(5672)The OMI responder that is an AP MLD, shall update the NSTR Indication Bitmap being used for the non-AP MLD after receiving a frame that contains the subfield from the OMI initiator as described in table 35-xxx:

**(5672)Table 35-xxx**

|  |  |  |  |
| --- | --- | --- | --- |
| Channel Width change of the link on which the frame containing the OM Control sufield is transmitted | STR change of a link pair including the link on which the frame containing the OM Control subfield is transmitted | OMI Initiator | OMI Responder |
| Lower to Higher | STR to NSTR | Change the parameters only after the TXOP in which it received the immediate acknowledgment from the OMI responder. | After the TXOP in which it sent the immediate acknowledgment to the OMI initiator, applies NSTR MLO for the link pair first, then applies the Channel Width for the link as soon as it infers that the OMI Initiator has applied the NSTR Indication Bitmap. |
| Lower to Higher | No change | As described in 26.9 | As described in 26.9 |
| Higher to Lower | NSTR to STR | Change the parameters only after the TXOP in which it received the immediate acknowledgment from the OMI responder. | After the TXOP in which it sent the immediate acknowledgment to the OMI initiator, applies the Channel Width for the link first, then applies STR MLO for the link pair as soon as it infers that the OMI Initiator has applied the Channel Width for the link. |
| Higher to Lower | No change | As described in 26.9 | As described in 26.9 |

(5672)Note – How the OMI responder infers that the OMI Initiator has applied the NSTR Indication Bitmap for the link pair or the Channel Width for the link is beyond the scope of this standard.