IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CR on Beamforming in BTI | | | | |
| Date: 2018-03-01 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Yanchun Li | Huawei | F1-17, Huawei Industrial Base, Bantian, Longgang District, Shenzhen, China 518129 | +86 15337257958 | liyanchun@huawei.com |
| Mengyao Ma | Huawei |  |  | ma.mengyao@huawei.com |
| Yan Xin | Huawei |  |  | yan.xin@huawei.com |
| Kaifeng Xia | Huawei |  |  |  |
|  |  |  |  |  |

Abstract

This document proposes resolution for CIDs 1131, 2298 and 2299 from [1].

These CIDs are related to Clause 10.38.4 Beamforming in BTI [2].

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Page Number** | **Line Number** | **Comment** | **Proposed Change** | **Resolution** |
| 2298 | 150 | 26 | Within a BTI, should AP complete sweeping of 1 RF chain before moving to another RF chain? | Specify AP completes sweeping one RF chain before send DMG beacon from another RF chain | Rejected-  It is implementation dependent.  Implementation option 1, AP can complete sweeping of RF chain 1, then starts sweeping of RF chain 2. Implementation option 2, AP can perform SLS on RF chain 1 and 2 with interlaced pattern.  As long as AP receives with both RF chain 1 and 2 in the following A-BFT, both implementation options are ok. |
| 2299 | 156 | 15 | If 1 antenna from 1 RF chain requires more than 1 BTI to complete SSW, then multiple RF chain in a BTI is not necessary.    If AP uses multiple RF chains in a BTI, it implies AP can finished SSW of antenna 1 of RF chain y in the current BTI and it needs to switch to another antenna 2 of RF chain y in the next BTI. In this case l on L15 should be equal to 1 | specify l=1 in case of using multiple RF chains in 1 BTI, or provide an examples of use case of l>1 | Rejected-  The value of L is implementation dependent.  Beacon has two purposes: 1, to enable AP discovery; 2, to disseminate some basic element such as schedule element.  Consider example 1 (for l>1):  For the 2nd purpose, AP can use antenna 1 and 2 in two consecutive BIs’ BTIs. AP can use first BTI primarily for antenna 1’s discovery, and also enable antenna 2 to disseminate schedule element for some STA that is covered by antenna 2 and needs SP in first BI. Then, AP can use second BTI primarily for antenna 2’s discovery and also enable antenna 1 to disseminate schedule element.  Example 2:  The numbers of sectors to be swept by AP’s antenna 1 and 2, respectively, are different. AP needs 16 beacon frames for antenna 1 while AP needs 8 beacon frames for antenna 2. AP can transmit 12 beacon frames for antenna 1 in 1st BTI. Then, AP can transmit 4 beacon frames for antenna 1 and 8 beacon frames for antenna 2 in 2nd BTI.  Example 3:  AP needs to sweep over 3 antennas in 2 BIs. AP can have full sweep for antenna 1 and the first half for antenna 2 in 1st BTI. Then, AP can have the second half for antenna 2 and full sweep for antenna 3 in 2nd BTI. |
| 1131 | 151 | 18 | My understanding is that in general station is allowed to set the TRN-LEN parameter of the TXVECTOR to a value greater than 0 if the PACKET-TYPE parameter of the TXVECTOR is set to TRN-T-PACKET.    Why text allow the station to set the TXVECTOR to TRN-T-PACKET for a DMG Beacon frame but require the TRN-LEN to be zero. | Disallow to set the TXVECTOR PACKET-TYPE to TRN-T-PACKET for DMG Beacon. | Rejected-  It is not necessary to disallow to set the TXVECTOR PACKET-TYPE to TRN-T-PACKET for DMG Beacon.  DMG Beacon is transmitted in DMG control mode. According to 802.11REVmd, in DMG control mode header, “The field (Packet Type = 0 (BRP-RX packet), Packet Type = 1 (BRP-TX packet)) is reserved when the Training Length field is 0.”  Thus, when Training Length field is set to 0, it does not matter that Packet Type is BRP-RX packet or BRP-TX packet. |

**CID 2298**

*Comment:*

Within a BTI, should AP complete sweeping of 1 RF chain before moving to another RF chain?

*Proposed change:*

Specify AP completes sweeping one RF chain before send DMG beacon from another RF chain

*Resolution:*

Rejected.

*Discussion:*

It is implementation dependent. Implementation option 1, AP can complete sweeping of RF chain 1, then starts sweeping of RF chain 2 (e.g. in order of 1-1-2-2). Implementation option 2, AP can perform SLS on RF chain 1 and 2 with interlaced pattern (e.g. in order of 1-2-1-2). As long as AP receives with both RF chain 1 and 2 in the following A-BFT, both implementation options are ok.

**CID 2299**

*Comment:*

If 1 antenna from 1 RF chain requires more than 1 BTI to complete SSW, then multiple RF chain in a BTI is not necessary.  
  
If AP uses multiple RF chains in a BTI, it implies AP can finished SSW of antenna 1 of RF chain y in the current BTI and it needs to switch to another antenna 2 of RF chain y in the next BTI. In this case l on L15 should be equal to 1

*Proposed change:*

Specify l=1 in case of using multiple RF chains in 1 BTI, or provide an examples of use case of l>1

*Resolution:*

Rejected.

*Discussion:*

The value of L is implementation dependent.

Beacon has two purposes: 1, to enable AP discovery; 2, to disseminate some basic element such as schedule element.

Consider example 1 (for l>1):

For the 2nd purpose, AP can use antenna 1 and 2 in two consecutive BIs’ BTIs. AP can use first BTI primarily for antenna 1’s discovery, and also enable antenna 2 to disseminate schedule element for some STA that is covered by antenna 2 and needs SP in first BI. Then, AP can use second BTI primarily for antenna 2’s discovery and also enable antenna 1 to disseminate schedule element.

Example 2:

The numbers of sectors to be swept by AP’s antenna 1 and 2, respectively, are different. AP needs 16 beacon frames for antenna 1 while AP needs 8 beacon frames for antenna 2. AP can transmit 12 beacon frames for antenna 1 in 1st BTI. Then, AP can transmit 4 beacon frames for antenna 1 and 8 beacon frames for antenna 2 in 2nd BTI.

Example 3:

AP needs to sweep over 3 antennas in 2 BIs. AP can have full sweep for antenna 1 and the first half for antenna 2 in 1st BTI. Then, AP can have the second half for antenna 2 and full sweep for antenna 3 in 2nd BTI.

**CID 1131**

*Comment:*

My understanding is that in general station is allowed to set the TRN-LEN parameter of the TXVECTOR to a value greater than 0 if the PACKET-TYPE parameter of the TXVECTOR is set to TRN-T-PACKET.

Why text allow the station to set the TXVECTOR to TRN-T-PACKET for a DMG Beacon frame but require the TRN-LEN to be zero.

*Proposed change:*

Disallow to set the TXVECTOR PACKET-TYPE to TRN-T-PACKET for DMG Beacon.

*Resolution:*

Rejected.

*Discussion:*

It is not necessary to disallow to set the TXVECTOR PACKET-TYPE to TRN-T-PACKET for DMG Beacon.

DMG Beacon is transmitted in DMG control mode. According to 802.11REVmd, in DMG control mode header, “The field (Packet Type = 0 (BRP-RX packet), Packet Type = 1 (BRP-TX packet)) is reserved when the Training Length field is 0.”

Thus, when Training Length field is set to 0, it does not matter that Packet Type is BRP-RX packet or BRP-TX packet.

Overall, there are 3 cases:

1. Case 1, Training Length=0, Packet Type= reserved (can be either 0 or 1):

A DMG or EDMG AP does not append any TRN subfield to DMG Beacon, DMG STA just receives the Beacon without any BRP-Tx or BRP-Rx training.

1. Case 2, Training Length>=1, Packet Type= 0 (BRP-RX packet):

An EDMG AP does append one or more TRN subfields to DMG Beacon, DMG STA can receive the Beacon with BRP-Rx training. The obtained Rx beam can be used for receiving AP’s signal from the Tx sector which is used for the DMG beacon transmission. Further, if DMG STA has Tx/Rx beam reciprocity,

The DMG STA can choose candidate Tx beam(s) based on the obtained Rx beam.

1. Case 3, Training Length>=1, Packet Type= 1 (BRP-TX packet):

Since there is no way for STA to report the best beam in BRP-Tx training, this case is meaningless.

Thus, current spec draft allows the aforementioned case 1 and 2. “Text allow the station to set the TXVECTOR to TRN-T-PACKET for a DMG Beacon frame but require the TRN-LEN to be zero”, is to forbid case 3.

Straw Poll:

* **Do you agree to accept resolutions to CIDs 1131, 2298 and 2299 in doc** 11-18/0449 r0**?**

**References:**

1. 11-18-0067-01-00ay-11ay-d1-0-comment-database
2. Draft P802.11ay\_D1.0