­­IEEE P802.11
Wireless LANs

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| Comment Resolutions on Clause 10.36.11.4.3 and 10.36.11.4.4 (Channel Access)  |
| Date: 2018-02-28 |
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Abstract

This submission proposes resolutions for the following 3 comments on Clause 10.36.11.4.3 and 10.36.11.4.4 (Channel Access):

1376, 1377, 2297 and 1897.

Revisions:

* Rev 0: Initial version of document

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 TGay Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

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

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| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 1376 | 10.36.11.4.3 | 140.27 | Replace "hybrid beamforming" with "hybrid beamforming training", otherwise it is not well defined | as in comment, consider also adding a reference to 10.38.9.2.4 | RevisedAccept in principle. There is a need to clarify whether a statement of hybrid beamforming in the text refers to the HBF protocol, the HBF announcement, or HBF training. We also add some references as requested by the commenter.TGay editor to make the changes shown in 11-18/0499r0 under all headings that include CID 1376 |
| 1377 | 10.36.11.4.3 | 140.43 | Replace "hybrid beamforming" with "hybrid beamforming training", otherwise it is not well defined | as in comment, consider also adding a reference to 10.38.9.2.4 | RejectedWrong reference: The statement says that “ An EDMG STA shall transmit an RTS frame with a control trailer to a peer EDMG STA to access the 42 channel and establish a SU-MIMO TXOP or announce the start of the hybrid beamforming protocol.”In this case, the word “protocol” is appropriate and so no change is made. |
| 2297 | 10.36.11.4.4 | 142.40 | The MU-MIMO transmission or hybrid beamforming protocol begins SIFS interval following the reception or expected reception of the 41 DMG CTS frame by the initiator'.This sentence indicates that there is no requirement for AP to receive DMG CTS to begin MU-MIMO transmissiom.A STA's SISO antenna pattern used to send DMG CTS may differ from the antenna pattern used to receive MU-MIMO PPDUBased on this requirement that AP does not need to receive DMG CTS, STA should be able to send DMG CTS using MU-MIMO reception antenna config to better protect its MU-MIMO reception | change the first sentence (on L29) to 'A STA that receives an RTS frame addressed to an MU group that the STA belongs to shall transmit a DMG CTS frame back to the initiator employing the most recent SISO or MU-MIMO antenna configuration used between the responder and the initiator' | RevisedAs the commenter has pointed out, the term “expected reception” implies that even if there is no receipt of the DMG CTS by the AP, the AP may transmit the MU-MIMO transmission or HBF training and logically that the DMG CTS may not even be needed to indicate that any of the recipient STAs has a clear channel. Removal of the term “expected reception” resolved this problem by implying that at least one of the recipient STAs is ready to receive the transmission / HBF training. TGay editor to make the changes shown in 11-18/0499r0 under all headings that include CID 2297 |
| 1897 | 10.36.11.4.3 | 142.01 | Editor Note: what is a "small delay"? This needs to be defined. | Address editor comment | RevisedSmall delay behaviour is already defined by Cyclic Shift Diversity (CSD) as defined in (30.4 EDMG Control Mode). We will delete ther text on adding a small delay and add text discussing CSD with a reference. TGay editor to make the changes shown in 11-18/0499r0 under all headings that include CID 1897. |

*Changes to D1.0*

***TGay Editor: Please make the following change on Pg 140 line 13 (#1376) (#1897); Note that the yellow highlighting of HBF is just to track all occurences of the term to assist with the online presentation and may be ignored:***

**10.36.11.4.3 SU-MIMO channel access procedure**

An EDMG STA shall transmit a Grant frame with a control trailer to a peer EDMG STA to indicate the intent to transmit a MIMO PPDU to the peer STA or announce the start of the hybrid beamforming protocol if the Grant Required field within the peer STA’s EDMG Capabilities element is one. Otherwise if the Grant Required field within the peer STA’s EDMG Capabilities is zero, the STA may transmit a Grant frame.

In the transmitted Grant frame, the value of the Allocation Duration field plus the Duration field of the Grant frame indicates the time offset from the PHY-TXEND.indication primitive of the Grant frame transmission when the EDMG STA intends to initiate access to the channel to transmit to or start the hybrid beamforming protocol with the peer EDMG STA. For the transmitted Grant frame, the TXVECTOR parameter SCRAMBLER\_INIT\_SETTING shall be set to CONTROL\_TRAILER and the parameter CT\_TYPE shall be set to GRANT\_RTS\_CTS2Self. The SISO/MIMO field shall be set to 1 and the SU/MU MIMO field shall be set to 0 to indicate that the following transmission (see SU-MIMO Beamforming 10.38.9.2.2) (#1376) or hybrid beamforming training (see Hybrid Beamforming for SU-MIMO and MU-MIMO 10.38.9.2.4) (#1376) is performed in SU-MIMO. The control trailer also indicates the corresponding DMG antenna configuration for the upcoming SU-MIMO transmission or hybrid beamforming training (#1376).

If an EDMG STA that receives a Grant frame with a control trailer indicating an SU-MIMO transmission or a hybrid beamforming announcement to itself is able to perform, respectively, the SU-MIMO reception or hybrid beamforming training (#1376) at the target time indicated by the Grant frame, the STA shall configure its DMG antennas according to the settings included in the control trailer of the received Grant frame within a time period determined by the value of the Allocation Duration field plus the value of the Duration field of the received Grant frame starting from the PHY-TXEND.indication primitive of the Grant frame transmission. The STA shall transmit a Grant Ack frame in response of the received Grant frame. For this transmitted Grant Ack frame, the TXVECTOR parameter SCRAMBLER\_INIT\_SETTING shall be set to CONTROL\_TRAILER and the parameter CT\_TYPE shall be set to GRANT\_RTS\_CTS2Self. If it uses SU-MIMO for the transmission of the reverse direction or desires to announce the hybrid beamforming protocol in the reverse direction, the SISO/MIMO field shall be set to 1 and the SU/MU MIMO field shall be set to 0. The control trailer also indicates the corresponding DMG antenna configuration for the upcoming SU-MIMO transmission in the reverse direction. If the STA intends to use SISO for the transmission in the reverse direction, the SISO/MIMO field shall be set to 0.

An EDMG STA shall transmit an RTS frame with a control trailer to a peer EDMG STA to access the channel and establish a SU-MIMO TXOP or announce the start of the hybrid beamforming protocol. This RTS frame should be transmitted using all SU-MIMO sectors using CSD (see 30.4 EDMG Control Mode).~~, with a small delay between each sector~~ (#1897). For the transmitted RTS frame, the TXVECTOR parameter SCRAMBLER\_INIT\_SETTING shall be set to CONTROL\_TRAILER and the parameter CT\_TYPE shall be set to GRANT\_RTS\_CTS2Self. The SISO/MIMO field shall be set to 1 and the SU/MU MIMO field shall be set to 0 to indicate that the following transmission or hybrid beamforming training (#1376) is performed in SU-MIMO. The control trailer also indicates the corresponding DMG antenna configuration for the upcoming SU-MIMO transmission or hybrid beamforming training (#1376).

If an EDMG STA that receives an RTS frame with a control trailer indicating an SU-MIMO transmission or a hybrid beamforming announcement (#1376) to itself is able to perform the SU-MIMO reception or hybrid beamforming training (#1376), it shall configure its DMG antennas according to the settings included in the control trailer of the received RTS frame. It shall also transmit a DMG CTS frame with a control trailer in response of the received RTS frame. For this transmitted DMG CTS frame, the TXVECTOR parameter SCRAMBLER\_INIT\_SETTING shall be set to CONTROL\_TRAILER and the parameter CT\_TYPE shall be set to CTS\_DTS. If it uses SU-MIMO for the transmission in the reverse direction, the SISO/MIMO field shall be set to 1 and the SU/MU MIMO field shall be set to 0. The DMG CTS frame should be transmitted using all SU-MIMO sectors using CSD (see 30.4 EDMG Control Mode~~, with a small delay between each sector~~ (#1897). The control trailer also indicates the corresponding DMG antenna configuration for the upcoming SU-MIMO transmission or hybrid beamforming training (#1376) in the reverse direction. If it uses SISO for the transmission of the reverse direction, the SISO/MIMO field shall be set to 0. The DMG CTS frame should be sent using the SISO sector. Alternatively, if the EDMG STA is not able to perform the SU-MIMO transmission, it may transmit a DMG DTS frame with a control trailer to the TXOP initiator to provide further information. The DMG DTS frame should be sent using a SISO transmission.

***TGay Editor: Please make the following change on Pg 142 line 40 (#2297) (#1376):***

The MU-MIMO transmission or hybrid beamforming ~~protocol~~ training (#1376) begins SIFS interval following the reception ~~or expected reception~~ (#2297) of the DMG CTS frame by the initiator. This is shown in Figure 91.

**References:**

1. **IEEE P802.11ayTM/D1.0.**