IEEE P802.11
Wireless LANs

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| Resolution of PHY CIDs II |
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Abstract

This submission proposes resolutions to PHY CIDs. The text used as reference is D1.2.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1273 | 30.2.2 | 229.00 | uplink MU-MIMO is optionally involved in MU-MIMO beamforming rather than MU-MIMO data transmission | clarify the definition of Uplink\_type for the MU-MIMO configuration |

**Proposed resolution**: Revised

**Note:** *MU\_MIMO\_TX\_CONFIG\_TYPE only appears once in D1.0/D1.2 (Table 33 —TXVECTOR and RXVECTOR parameters).*

**Modifications:** *In page 291, modify the name of the parameter MU\_MIMO\_TX\_CONFIG\_TYPE to MU\_MIMO\_BF\_CONFIG\_TYPE.*

*Modify the value of the parameter MU\_MIMO\_BF\_CONFIG\_TYPE (page 291) as follows:*

Indicates ~~how the MU-MIMO configuration was obtained.~~ whether the MIMO phase of MU-MIMO beamforming training consisted of a non-reciprocal MIMO phase or of a reciprocal MIMO phase.

Enumerated type:

~~Downlink\_type~~ Non\_reciprocal\_MU\_MIMO\_BF

~~Uplink\_type~~ Reciprocal\_MU\_MIMO\_BF

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 2000 | 9.4.2.252 | 66.07 | N STS subfield may contradict Nsts which is number of space-time streams, such as Nsts in P281L17 is different from NSTS in P180L16. | Use another term for N STS subfield and its corresponding variable. |

**Proposed resolution**: Revised

**Modifications:**

*- Figure 53, page 94 (“Channel Allocation field format when Scheduling Type is 1”): Replace “N STS” with “Number of Space-time Slots”*

*- Modify lines 7-13 of page 95 as follows:*

The value of the ~~N STS~~ Number of Space-time Slots subfield indicates the number of space-time slots allocated by the AP or PCP for asymmetric beamforming training. The ~~N STS~~ Number of Space-time Slots subfield is reserved if the Asymmetric Beamforming Training subfield is zero.

The value $2^{STS}$, where STS is the value of the Nmax STS subfield, indicates the maximum number of consecutive space-time slots a responder can occupy within a listen period of asymmetric beamforming training. The Nmax STS subfield is reserved if the Asymmetric Beamforming Training subfield is zero. The value $2^{STS}$ is no more than the value of the ~~N STS~~ Number of Space-time Slots subfield.

*- Modify lines 31 and 32 of page 223 as follows*

$N\_{STS}$ is the value of ~~N STS~~ Number of Space-time Slots subfield in the EDMG Extended Schedule element describing this 31 allocation.

*- Modify lines 10-15 of page 224*

The PCP or AP (i.e., the initiator) shall listen on the combination of sector and DMG antenna which was used for transmission of the DMG Beacon frame describing this allocation during the last BTI. The PCP or AP shall listen for $N\_{STS}$ space-time slots for any responder’s transmission, where $N\_{STS}$ is the value of the ~~N STS~~ Number of Space-time Slots subfield describing the allocation. A space-time slot has a duration of aAirPropagationTime + TXTIME(SSW) + aSIFSTime, where aAirPropagationTime accounts for the propagation delay between the initiator and the responder.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1588 |  |  | Currently, CSD is specified per transmit chain to prevent unintentional beamforming. In channel aggregation case (for example: totally 2 spatial streams case), primary channel have first stream and secondary channel have last stream. In this case, CSD is applied to last stream. But last stream don't need to apply CSD since two aggregated channel occupy different band | Need to define CSD for channel aggregation |

**Proposed resolution**: Rejected

**Discussion:**

* I agree with the commenter that, if one antenna is used per aggregated channel,no CSD among the signals would be necessary (for fields that require a CSD). If more than one antenna is used in each channel, a CSD would have to be applied among the signals (certain fields) transmitted in the same channel, but not between the set of signals transmitted in different channels.
* From a spec writing perspective, removing the delay from signals transmitted in different aggregated channels would require defining more cases/signals/equations, which is cumbersome. From an implementation perspective, having a signal definition that can be applied to all cases is also better than having a different definition for each case.
* Fact: CSD does not impact performance nor increases implementation complexity.
* For these reasons, the proposed resolution is to keep the spec as is and not include additional transmission definitions/equations.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 2109 |  |  | EDMG header A which is signaled by setting bit-46=1 in the the L-Header, which represent EDMG SC PPDU (or EDMG OFDM PPDU). However, none of the field in the EDMG Header-A indicates aggregation. It looks like two bits B37 and B46 are used to signal the support of DMG PPDU, DMG AMPDU, EDMG PPDU, and EDMG AMPDU. This needs to be clearly specified in the spec | Add a table to indicate the use of bit B46 and B37B46 B37 Expected behavior0 0 DMG PPDU0 1 DMG AMPDU1 0 EDMG PPDU1 1 EDMG AMPDU (EDMG A (including EDMG Single MPDU) |

**Proposed resolution**: Revised

**Modifications:** *Add the following at the end of 30.3.3.2.4.1:*

For EDMG SC mode and EDMG OFDM mode PPDUs, the aggregation field within the L-Header shall be set to 0. For EDMG SC mode and EDMG OFDM mode A-PPDUs, the aggregation field within the L-Header shall be set to 1.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1571 | 3.2 | 18.35 | the definition of single input, single output (SISO) is not clear. There are many cases such as SISO mode(P56L18) ,SISO PPDU(P140L8), SISO BRP TXSS(P184L5), SISO phase(P163L31),SISO transmission(P104L1),SISO feedback procedure(P165L24).Some tells single stream, some tells single chain,other tells single antenna. Some require at both transmitter's side and receiver's side,other require only transmitter's side. | please clarify them |

**Proposed resolution**: Revised

**Discussion:** I agree with the commenter that some of the SISO/MIMO-related terminology currently used in the 11ay draft is not as clear as it should be or possibly even correct in cases. To address this issue, we must look at each use of SISO/MIMO, determine its clearness/correctness, and make changes if necessary. Some of the examples given by the commenter, such as SISO BRP TXSS and SISO phase of MIMO BF training, are names/terms that are properly defined (lines 5-7 in page 228 and lines 15-23 in page 204, respectively) and do not need to be changed. At the same time, as previously discussed, other usages, such as SISO PPDU, MIMO PPDU, SISO transmission and MIMO transmission, must be looked into.

Unfortunately, addressing this issue is not easy. For example, “SISO PPDU” means different things in different places in the spec, including:

* PPDU that carries a single space-time stream (but could have been transmitted with multiple transmit chains)
* PPDU transmitted with a single transmit chain

The proposed modifications below, which address the “SISO PPDU” case, exemplify the problem at hand. I suggest to perform a more comprehensive review of this issue using D2.0 as reference.

**Modifications:**

*Modfy lines 31-32 of page 137 (CTS and DMG CTS procedure) as follows*

An EDMG STA that is addressed by an RTS frame sent in non-EDMG duplicate PPDU format to establish TXOP for the transmission of ~~only SISO PPDUs~~ PPDUs using a single transmit chain shall behave as follows:

*Modfy lines 16-19 of page 140 (EDMG RTS procedure) as follows*

In order to establish a TXOP with a peer EDMG STA for the transmission of ~~only SISO PPDUs~~ PPDUs using a single transmit chain, an EDMG STA shall transmit an RTS frame with the TXVECTOR parameter CH BANDWIDTH set according to rules specified in 10.22.2.12.

*Modfy lines 16-17 of page 141 (EDMG RTS procedure) as follows*

An EDMG STA transmitting an RTS frame to establish a TXOP for the transmission of at least one ~~MIMO PPDU or SISO PPDU with hybrid beamforming~~ PPDU with digital beamforming follows the procedure defined in 10.37.11.4.

*Modfy lines 16-21 of page 177 (MIMO channel access rules) as follows*

An EDMG STA that has either the MU-MIMO Supported set to 1 or the SU-MIMO Supported set to 1 in the Beamforming Capability field of its EDMG Capabilities element shall maintain physical and virtual CS and backoff procedure as specified in 10.22.2 (HCF contention based channel access (EDCA)) in order to be able to transmit and receive a ~~single stream (SISO)~~ single space-time stream PPDU used for the establishment of a TXOP during which ~~a MIMO transmission~~ the transmission of a PPDU with multiple space-time streams is to take place.

*Modfy lines 1-2 of page 178 (MIMO channel access rules) as follows*

Transmit a ~~SISO~~ PPDU using a single transmit chain if ~~the MIMO channel was busy~~ any DMG antenna connected to an active receive chain indicates busy during an interval of PIFS immediately preceding the start of the TXOP.

*Note:* 30.3.8 CCA sensitivity: A receiver that has more than one active RX chain shall issue PHY-CCA.indication(BUSY,RX-Antenna-ID) if the condition above applies to any DMG antenna connected to an active receive chain.

*Modfy lines 25-29 of page 199 as follows*

A 2.16 GHz EDMG ~~SISO PPDU transmission~~ PPDU transmitted using a single space-time stream, that includes the TRN field and is addressed to a STA that has the DMG TRN RX Only Capable subfield set to one in the STA’s EDMG Capabilities element shall have the DMG\_TRN parameter of the TXVECTOR set to one and the EDMG\_TRN\_LEN parameter of the TXVECTOR set to a value greater than 0 and less than 32. Otherwise, the DMG\_TRN parameter of the TXVECTOR shall be set to zero.

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| 1884 | 30 | 216.03 | Rx Sensitivity for SC, OFDM, and MIMO are missing | Tx Rx Sensitivity for SC, OFDM, and MIMO are missing. |
| 1991 | 30 | 216.03 | Rx Sensitivity for SC, OFDM, and MIMO are missing | Tx Rx Sensitivity for SC, OFDM, and MIMO are missing. |

**Proposed resolution**: Rejected

**Discussion:** More time is needed to determine different values, such as transmit center frequency leakage and receive sensitivity, which are defined in 30.3.9. I plan to present a contribution for the common requirements subclause (30.3.9) before the next interim meeting.