IEEE P802.11
Wireless LANs

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| Resolution of multiple antenna CCA and MIMO Channel Access CIDs  |
| Date: 2018-04-26 |
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Abstract

This submission proposes resolutions to 1361, 1362, 2079 CIDs

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| **CID** | **Clause** | **Comment** | **Proposed change** | **Resolution**  |
| 1361 | 8.3.5 | Consider adding a method to assign Antennas to RX chains to the PHY-SAP interface, or at least add that to the description of the ANT-CONFIG parameter | Add an interace or modify exiting one to specify which antenna is assinged to which RX chain | Revised |
| 1362 | 8.3.5.12.2 | The PHY-CCA.indication should also have an indication of the RX-Antenna-ID it was measured on. | Add RX-Antenna-ID to PHY-CCA-config | Revised  |

**8.3.4.3 PHY SAP service primitives parameters**

Table 8-3 shows the parameters used by one or more of the PHY SAP service primitives.

**Table 8-3—PHY SAP service primitive parameters**

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| **Parameter**  | **Associated primitive**  | **Value** |
| DATA  | PHY-DATA.requestPHY-DATA.indication | Octet value X'00'–X'FF' |
| TXVECTOR  | PHY-TXSTART.request  | A set of parameters |
| STATE  | PHY-CCA.indication  | (BUSY, [channel-list], [antenna-list])(IDLE, [antenna-list]) |
| RXVECTOR  | PHY-RXSTART.indicationPHY-RXEND.indication | A set of parameters |
| RXERROR  | PHY-RXEND.indication  | NoError, FormatViolation,CarrierLost, UnsupportedRate,Filtered |
| IPI-STATE  | PHY-CCARESET.requestPHY-CCARESET.confirm | IPI-ON, IPI-OFF |
| IPI-REPORT  | PHY-CCA.indicationPHY-CCARESET.confirm | A set of IPI values for the precedingtime interval |
| PHYCONFIG\_VECTOR  | PHY-CONFIG  | A set of parameters |
| TXSTATUS  | PHY-TXSTART.confirm  | A set of parameters |
| STATE  | PHY-TXBUSY.indication  | IDLE, BUSY |

**8.3.5.12.2 Semantics of the service primitive**The primitive provides the following parameters:

PHY-CCA.indication(

STATE,

IPI-REPORT,

channel-list,

RX-antenna-ID

)

*Change the fourth paragraph as follows*

When STATE is IDLE or when, for the type of PHY in operation, CCA is determined by a single channel,
the channel-list parameter is absent. Otherwise, it carries a set indicating which channels are busy. The
channel-list parameter in a PHY-CCA.indication primitive generated by a VHT STA contains at most a
single element. Table 8-5 defines the members of this set.In case of an EDMG STA, the channel-list parameter contains the primary and secondary and may contain the secondary1 and secondary2, the RX-antenna-ID parameter indicates one or set of IDs of the DMG antennas in which the channel indication is provided.

**30.3.8 CCA sensitivity**The start of a valid 2.16 GHz EDMG PPDU at a receive power level greater than the minimum sensitivity
for a 2.16 GHz SC PPDU using MCS 1 shall cause the receiver to issue a PHY-CCA.indication(BUSY)

with a probability > 90% within aCCAtime. The PHY-CCA.indication(BUSY) shall be maintained for the
duration of the PPDU. The receiver shall issue the PHY-CCA.indication(BUSY) for any signal 20 dB
above the minimum sensitivity for a 2.16 GHz PPDU using SC MCS 1.
For a receiver open to any combination of 4.32 GHz, 6.48 GHz, 8.64 GHz, 2.16+2.16 GHz, or 4.32+4.32
GHz channels, the start of a valid EDMG PPDU at a receive power level greater than the minimum
sensitivity for a 2.16 GHz SC PPDU using MCS 1 at the primary channel shall cause the receiver to issue a
PHY-CCA.indication(BUSY) with a probability > 90% within aCCAtime. The PHY-
CCA.indication(BUSY) shall be maintained for the duration of the PPDU. The receiver shall issue the
PHY-CCA.indication(BUSY,primary/secondary/secondary1/secondary2) for any signal 20 dB above the
minimum sensitivity for a 2.16 GHz PPDU using SC MCS 1 at any of the channels
(primary/secondary/secondary1/secondary2) the receiver is open to receive in.

A receiver that has more than one active RX chain shall issue PHY-CCA.indication(BUSY,RX-Antenna-
ID, primary/secondary/secondary1/secondary2) if the condition above applies to any DMG antenna connected to an active receive chain.

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| **CID** | **Clause** | **Comment** | **Proposed change** | **Resolution**  |
| 2079 | 30.3.3.2.4.1 | Table 29: use case for Control Trailer and Channel BW is missing and it is unclear when and how they should be used | Please include text and/or reference to when and how control trailer and channel BW modes should be used in the network. Currently, the text is very unclear | Revised  |

**10.3.2.7 CTS and DMG CTS procedure***Change the subclause as follow*

An EDMG STA that is addressed by an RTS frame sent in non-EDMG duplicate PPDU format to establish TXOP shall behave as follows:

If the NAV in the primary channel indicates idle:

* STA shall respond with a DMG CTS in non-EDMG or non-EDMG duplicate PPDU format frame after a SIFS.

In case DMG CTS is sent in a non-EDMG duplicate PPDU format in response to an RTS sent to establish a TXOP for the transmission of a SISO or an MU PPDU, the TXVECTOR parameters shall be configured as follows:

* SCRAMBLER\_INIT\_SETTING shall be set to indicate Channel\_BW
* CH\_BANDWIDTH shall be set to channels that were indicated by the RTS’s RXVECTOR CH\_BANDWIDTH SIGNALING encoded value as defined in Table 30 and that CCA of the channels were idle for a duration of PIFS prior to the start of the RTS frame.
* CH\_BANDWIDTH SIGNALING value shall be set to the encoded value of the set of channels indicated by the CH\_BANDWIDTH parameter as defined in Table 30.

In case DMG CTS is sent in a non-EDMG duplicate PPDU format in response to an RTS sent to establish a TXOP for the transmission of a SU MIMO PPDU, the TXVECTOR parameters shall be configured as follows:

* SCRAMBLER\_INIT\_SETTING shall be set to indicate CONTROL\_TRAILER and the parameter CT\_TYPE shall be set to CTS\_DTS.
* CH\_BANDWIDTH shall be set to channels that were indicated by the RTS’s RXVECTOR CH\_BANDWIDTH value and that CCA of the channels were idle for a duration of PIFS prior to the start of the RTS frame.

Otherwise:

* The STA shall not respond with a DMG CTS frame.
* The STA may respond with a DMG DTS frame in a non-EDMG or non-EDMG duplicate PPDU after a SIFS.

In case the DMG DTS frame is sent in a non-EDMG duplicate PPDU format, the STA shall set the Duration, NAV-SA and NAV-DA fields of the DMG DTS frame to zero value and shall set the TXVECTOR parameters as follows:

* SCRAMBLER\_INIT\_SETTING shall be set to Channel\_BW.
* CH\_BANDWIDTH shall be set to the channels that were indicated by the RXVECTOR parameter CH\_BANDWIDTH SIGNALING of the received RTS frame
* CH\_BANDWIDTH SIGNALING value shall be set to the encoded value of the set of channels indicated by the CH\_BANDWIDTH parameter as defined in Table 30.

An EDMG STA that is addressed by an RTS frame sent to establish TXOP for transmission of at least one MIMO PPDU shall follow the procedure defined in section 10.36.11.4.

**10.3.2.14 EDMG RTS procedure**

*Change the subclause as follow*

In order to establish TXOP with an EDMG STA, an EDMG STA shall transmit RTS frame with TXVECTOR parameter CH BANDWIDTH set according to rules specified in 10.22.2.12.

If the TXOP is established to send at least one SU or MU PPDU, and the number of bits set in CH\_BANDWIDTH is greater than 1, the RTS frame shall be sent in non-EDMG duplicate PPDU format, the TXVECTOR parameter SCRAMBLER\_INIT\_SETTING shall be set to indicate CONTROL\_TRAILER and the parameter CT\_TYPE shall be set to GRANT\_RTS\_CTS2Self.

If the TXOP is established to send at least one SU or MU PPDU, and the number of bits set in CH\_BANDWIDTH is equal to 1, the RTS frame shall be sent in non-EDMG PPDU format, the TXVECTOR parameter SCRAMBLER\_INIT\_SETTING shall be set to indicate CONTROL\_TRAILER and the parameter CT\_TYPE shall be set to GRANT\_RTS\_CTS2Self.

If the TXOP is established to only send PPDUs in SISO transmission than:

If the number of bits set in CH\_BANDWIDTH is greater than 1:

* The RTS frame shall be sent in non-EDMG duplicate PPDU format.
* The TXVECTOR parameter SCRAMBLER\_INIT\_SETTING shall be set to Channel\_BW.
* CH\_BANDWIDTH SIGNALING value shall be set to the encoded value of the set of channels indicated by the CH\_BANDWIDTH parameter as defined in Table 30.

If the number of bits set in CH\_BANDWIDTH is equal 1, STA may perform one of below options:

* Follow the procedure as defined in the paragraph above.
* Transmit the RTS in non-EDMG format and shall follow the procedure defined in 10.3.2.4.

A CF-End frame sent to truncate a TXOP initiated by RTS frame carried in non-EDMG duplicate format shall be sent using a non-EDMG duplicate format and the TXVECTOR parameters CH\_BANDWIDTH of the CF-End frame shall be set to the same values as indicated by the RXVECTOR parameters of the DMG CTS frame if received or to the same values as indicated by the TXVECTOR parameters of the RTS frame otherwise.

If the CF-End frame is sent to truncate a TXOP where only SISO PPDUs were transmitted, the CH\_BANDWIDTH SIGNALING value shall be set to the encoded value of the set of channels indicated by the CH\_BANDWIDTH parameter as defined in Table 30

An EDMG STA transmitting an RTS frame to establish TXOP for the transmission of at least one MIMO PPDU or SISO PPDU with Hybrid BF follows the procedure defined in 10.36.11.4.

**SP/M:** Do you accept the resolutions given in this document ?