IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Updates to EDCA channel access in an EDMG BSS | | | | |
| Date: 2017-02-16 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Oren Kedem | Intel |  |  | oren.kedem@intel.com |
| Carlos Cordeiro | Intel |  |  | [carlos.cordeiro@intel.com](mailto:carlos.cordeiro@intel.com) |
| Solomon Trainin | Qualcomm |  |  | [strainin@qti.qualcomm.com](mailto:strainin@qti.qualcomm.com) |

Abstract

This document proposes draft changes to EDCA channel access in an EDMG BSS support for EDMG STAs.

**non-enhanced directional multi-gigabit (non-EDMG) duplicate**: A transmission format of the physical  
layer (PHY) that duplicates a 2.16 GHz non-EDMG transmission in two or more 2.16 GHz channels and  
allows a station (STA) in a non-EDMG basic service set (BSS) on any one of the 2.16 MHz channels to  
receive the transmission. A non-EDMG duplicate format is one of the following:

* 4.32 GHz non-EDMG duplicate: A transmission format of the PHY that replicates a 2.16 GHz non-EDMG transmission in two adjacent 2.16 GHz channels.
* 6.48 GHz non-EDMG duplicate: A transmission format of the PHY that replicates a 2.16 GHz non-  
  EDMG transmission in three adjacent 2.16 GHz MHz channels.
* 8.64 GHz non-EDMG duplicate: A transmission format of the PHY that replicates a 2.16 GHz non-  
  EDMG transmission in four adjacent 2.16 GHz channels.
* 2.16+2.16 GHz non-EDMG duplicate: A transmission format of the PHY that replicates a 2.16  
  GHz non-EDMG transmission in two not neceseraly adjacent frequency segments of one 2.16 GHz channel.
* 4.32+4.32 GHz non-EDMG duplicate: A transmission format of the PHY that replicates a 2.16  
  GHz non-EDMG transmission in two frequency segments of two adjacent 2.16 GHz channels  
  where the two frequency segments of channels are not necessarily adjacent.

***Discussion***

*BSS Operating Channel could include adjacent and non adjacent channel combinations.*

**8.3.5.12.2 Semantics of the service primitive***Change figures in the Section as follows*

*Change Table 8-5 as follows*

|  |  |
| --- | --- |
| **channel-list parameter** | **Meaning** |
| primary | In an HT STA that is not a VHT STA, indicates that the primary 20 MHz channel is busy. In a VHT STA, indicates that the primary 20 MHz channel is busy according to the rules specified in 21.3.18.5.3. In a TVHT STA, indicates that the primary channel is busy according to the rules specified in 22.3.18.6.3. In an EDMG STA, indicates that the primary 2.16 GHz channel is busy. |
| secondary | In an HT STA that is not a VHT STA, indicates that the secondary channel is busy. In a VHT STA, indicates that the secondary 20 MHz channel is busy according to the rules specified in 21.3.18.5.4. In a TVHT STA, indicates that the secondary channel is busy according to the rules specified in 22.3.18.6.4. In an EDMG STA, indicates that the secondary 2.16 GHz channel is busy. |
| secondary40 | Indicates that the secondary 40 MHz channel is busy according to the rules specified in 21.3.18.5.4. In a TVHT STA, indicates that the secondary TVHT\_2W channel is busy according to the rules specified in 22.3.18.6.4. |
| secondary80 | Indicates that the secondary 80 MHz channel is busy according to the rules specified in 21.3.18.5.4. |
| Secondary1 | Indicates that the second secondary channel is busy. |
| Secondary2 | Indicates that the third secondary channel is busy. |



**Figure 3—The channel-list parameter element for 4.32 GHz, 6.48 GHz and 8.64 GHz channel  
width for EDMG Primary Channel Offset = 0**



**Figure 4—The channel-list parameter element for for 4.32 GHz, 6.48 GHz and 8.64 GHz channel  
width when EDMG Primary Channel Offset = 1**



**Figure 5—The channel-list parameter element for 2.16+2.16 GHz and 4.32+4.32 GHz channel  
width**

**10.22.2.12 EDCA channel access in an EDMG BSS** If the MAC receives a PHY-CCA.indication primitive with the channel-list parameter present, the channels  
 considered idle are defined in Table 4.  
 When a STA and the BSS, of which the STA is a member, both support multiple channel widths, an EDCA  
 TXOP is obtained based solely on activity of the primary channel. “Idle medium” in this subclause means  
 “idle primary channel.” Likewise “busy medium” means “busy primary channel.”  
 Once an EDCA TXOP has been obtained according to this subclause, further constraints defined in  
 10.36.11.5 and 10.22.3 might limit the width of transmission during the TXOP or deny the channel access,  
 based on the state of CCA on secondary channels.

**Table 4—Channels indicated idle by the channel-list parameter**

|  |  |
| --- | --- |
| **PHY-CCA.indication primitive channel-list element** | **Idle channels** |
| primary | Primary |
| secondary | 1st secondary channel |
| Secondary1 | 2nd secondary channel |
| Secondary2 | 3rd secondary channel |

In the following description, the CCA is sampled according to the timing relationships defined in 10.3.7  
(DCF timing relations). Slot boundaries are determined solely by activity on the primary channel. “Channel  
idle for an interval of PIFS” means that the STATE parameter of the most recent PHY-CCA.indication  
primitive was IDLE, and no PHY-CCA.indication (BUSY) occurred during the period of PIFS that ends at  
the start of transmission, the CCA for that channel was determined to be idle.  
If a STA is permitted to begin a TXOP (as defined in 10.22.2.4 (Obtaining an EDCA TXOP)) and the STA  
has at least one MSDU pending for transmission for the AC of the permitted TXOP, the STA shall perform  
exactly one of the following actions:

a) Transmit a 8.64 GHz mask PPDU or 4.32+4.32 GHz mask PPDU if the secondary, secondary1 and secondary2 channels were idle during an interval of PIFS immediately preceding the start of the TXOP.

b) Transmit a 6.48 GHz mask PPDU if the secondary and secondary1 channels were idle during  
an interval of PIFS immediately preceding the start of the TXOP or if EDMG Primary Channel Offset is 1 and secondary1 and secondary2 channels were idle during an interval of PIFS immediately preceding the start of the TXOP

c) Transmit a 4.32 GHz mask PPDU if the secondary channel was idle during an interval of PIFS immediately preceding the start of the TXOP or if EDMG Primary Channel Offset is 1 and the secondary1 channel was idle during an interval of PIFS immediately preceding the start of the TXOP

d) Transmit a 2.16+2.16 GHz mask PPDU if the secondary, secondary1 or secondary2 channel was idle during an interval of PIFS immediately preceding the start of the TXOP.   
  
e) Transmit a 2.16 GHz mask PPDU on the primary channel.

f) Restart the channel access attempt by invoking the backoff procedure as specified in 10.22.2 (HCF  
contention based channel access (EDCA)) as though the medium is busy on the primary channel  
as indicated by either physical or virtual CS and the backoff timer has a value of 0

NOTE 1—In the case of rule e), the STA selects a new random number using the current value of CW[AC], and the  
 retry counters are not updated (as described in 10.22.2.7 (Multiple frame transmission in an EDCA TXOP); backoff  
 procedure invoked for event a)).  
 NOTE 2—For an EDMG STA, an EDCA TXOP is obtained based on activity on the primary channel (see 10.22.2.4  
 (Obtaining an EDCA TXOP)). The width of transmission is determined by the CCA status of the non-primary channels  
 during the PIFS interval before transmission (see EDMG description in 10.3.2 (Procedures common to the DCF and  
 EDCAF)).