IEEE P802.11
Wireless LANs

|  |
| --- |
|  |
| Date: 2011-09-20 |
| Author(s): |
| Name | Affiliation | Address | Phone | Email |
| Simone Merlin | Qualcomm Inc | 5775 Morehouse DrSan Diego, CA 92109 | 8588451243 | smerlin@qualcomm.com |
| Youhan Kim | Qualcomm | 1700 Technology DriveSan Jose, CA 95110 |  | youhan.kim@qca.qualcomm.com |
| Allert Van Zelst | Qualcomm | Straatweg 66-s, Breukelen, the Netherlands |  | allert@qualcomm.com |
| Menzo Wentink | Qualcomm | Straatweg 66-s, Breukelen, the Netherlands |  | mwentink@qualcomm.com |

Abstract

This document provides resolution for the comments listed below

Comments are from: 11-11-0907-0x-00ac-lb178-comments-tgac-d1-0.xlsx

Comments refer to: Draft P802.11ac\_D1.0.pdf

**Comments**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3100 | 95.55 | Modify section 10.15.2 (Basic 20/40 MHz BSS functionality) to include the VHT BSS.  | define the basic operation in a VHT BSS based on the BW capabilities declared by AP and STA   | Agree in principle | MAC |
| 3101 | 95.55 | Modify section 10.15.3.3 (Channel management at the AP and in an IBSS) describing the operation for channel switching in VHT | describe the channel switching operation including VHT AP/STA | Agree in principle | MAC |
| 3102 | 95.55 | Modify section 10.15.4.4 (Restrictions on non-AP STAs that are not infrastructure BSS members)to include VHT operation | describe the BW usage limitation including VHT AP/STA, similarly to the 5GHz HT case | Agree in principle | MAC |

**Discussion**

Agree in principle with the comments.

11ac draft has a section 10.40.1 (Basic VHT BSS functionality) where the requested behavior specifications can be defined.

In this document, the relevant concepts from 10.12.2, 10.15.3.3 and 10.15.4.4 are adapted to the corresponding VHT cases

Background on channel and bandwidth switch operations

* Channel and bandwidth switch can be done through Channel switch announcement element/frame (8.4.2.21) and Extended Channel switch announcement element/frame
* Channel switch announcement element (8.4.2.21) and Extended Channel switch announcement element (8.4.2.55) have same fields and functionalities, except that the Extended element has one additional field indicating the new operating bandwidth
	+ The usage of the two elements is similar: AP includes them in, e.g., the beacon to advertize a channel switch in advance (10.9.8.2, 10.10); the Channel Switch Count field tells the time at which the switch will happen; The Extended element allows to switch to a new operating class
	+ The use of the Extended element was introduced by 11y and is subject to the STA/AP supporting the Extended Channel Switch operation mode as advertized in the Extended Capabilities Element included in the Beacons or other advertizing frames
	+ A Bacon may carry the Ch. Switch or Extended Ch. Switch or both, depending on the capabilities of the STAs.
* In the following resolution, references to sections 10.9.8.2 and 10.10 are added
* Both elements do not carry indication of the new BW
	+ For ‘11n’ case, the Secondary Channel Offset (8.4.2.22) element is used in conjunction with the Channel Switch element to advertize the new BW; Note that the Extended Channel Switch Announcement indicates the operating class, which allows to identify the primary/secondary channel offset within 40MHz without using an explicit Secondary Channel Offset element
	+ For 11ac we introduced a new Wide Bandwidth Channel switch element (8.4.2.143), which indicates BW and center frequency of the segment(s)
* In the following resolution, the following clarifications are added
	+ Channel Number Field indicates the position of the primary channel
	+ Defined when the Secondary Channel Offset and Wide Bandwidth Channel Switch is present and what is the meaning
* A Channel Switch Announcement FRAME also exists, which includes a Channel Switch Announcement  + Secondary Channel Offset; In VHT, this frame may also include the Wide Bandwidth Channel switch element;
* An Extended Channel Switch Announcement Frame also exists which includes the same info as an Extended Channel Switch Announcement Element
	+ As there is no 80+80 Operating class, the frame does not allow to indicate if the channel width after the switch is 80+80 or 160 and identify the secondary 80MHz, hence it can only be used to announce a switch to a bandwidth up to 80MHz;
	+ To maintain backward compatibility the frame should not be used to indicate a change to operating class with bandwidth greater than 40MHz
* STA or AP can also change operation BW by sending a Notify Channel Width frame (HT) or a VHT Operating Mode Notification Frame (8.4.1.49)
	+ The Notify Channel Width can be sent as broadcast by the AP;
	+ The use of the VHT Operating Mode Notification Frame is already described in 8.4.1.49 VHT Operating Mode Notification frame format and 10.25.1 Basic VHT BSS functionality, as amended in DCN 11/1217r1
* Note: by using the Extended Channel Switch Announcement, a VHT BSS can potentially transition to an operating class that does not support VHT operation

**Instructions to the editor**

**10.40.1 Basic VHT BSS functionality**

***Modify 10.40.1 as follows***

A VHT AP declares its channel width capability (80 MHz only or 80+80 MHz or 160 MHz) in the Supported Channel Width Set subfield of the VHT Capabilities element as described in Table 8-ac13—Subfields of the VHT Capabilities Info field.

A VHT STA shall not indicate support for 80+80 MHz unless it supports reception and transmission of 80+80 MHz PPDUs using all MCSs within the VHTBSSBasicMCSSet and all MCSs that are mandatory for the attached PHY.

An VHT STA shall not indicate support for 160 MHz unless it supports reception and transmission of 160 MHz PPDUs using all MCSs within the VHTBSSBasicMCSSet and all MCSs that are mandatory for the attached PHY.A VHT STA shall set the Supported Channel Width Set in its HT Capabilities element to 1, indicating that both 20 MHz and 40 MHz operation is supported.

A VHT STA sets the Rx MCS Bitmask of the Supported MCS Set field of its HT Capabilities element according

to the setting of the Rx MCS Map subfield of the VHT Supported MCS Set field of its VHT Capabilities

element as follows: for each subfield Max MCS For *n* SS, , of the Rx MCS Map field with(#2098) a value other than 3 (no support for that number of spatial streams), the STA shall indicate support for MCSs 8(*n*-1) through 8(*n*-1)+7 in the Rx MCS Bitmask, where *n*(#2043) is the number of spatial streams.

A VHT AP shall set the STA Channel Width field in the HT Operation element and the Channel Width field

in the VHT Operation element to indicate the BSS operating channel width as shown in Table 10-ac1.



A STA that has a value of true for dot11VHTOptionImplemented shall set dot11HighThroughputOptionImplemented to true.

A VHT STA that is a member of a VHT BSS shall not transmit a 20 MHz VHT PPDU on a channel other than the primary 20 MHz channel of the BSS, except for a 20 MHz VHT PPDU transmission on an offchannel

TDLS direct link.

A VHT STA that is a member of a VHT BSS with a 40 MHz, 80 MHz, 160 MHz or 80+80 MHz operating channel width shall not transmit a 40 MHz VHT PPDU that does not use the primary 40 MHz channel of the BSS, except for a 40 MHz VHT PPDU transmission on an off-channel TDLS direct link.

A VHT STA that is a member of a VHT BSS with an 80 MHz, 160 MHz or 80+80 MHz operating channel width shall not transmit an 80 MHz VHT PPDU that does not use the primary 80 MHz channel of the BSS, except for an 80 MHz VHT PPDU transmission on an off-channel TDLS direct link.

A VHT STA that is a member of 160 or 80+80 MHz BSS shall not transmit an 160 or 80+80 MHz VHT PPDU

that does not use the primary 80 MHz channel and the secondary 80 MHz(#3333) channel(#3327) of the BSS,

except for an 160 or 80+80 MHz VHT PPDU transmission on an off-channel TDLS direct link.

A VHT STA shall not transmit to a VHT STA using a bandwidth that is not indicated as supported in the Supported Channel Width Set subfield of the HT Capabilities element, VHT Capabilities element, or VHT Operating Mode Notification frame most recently received from that VHT STA.

A STA shall not transmit a PPDU with a TXVECTOR parameter CH\_BANDWIDTH indicating a channel bandwidth that is wider than(#3761) the BSS operating channel width.

A VHT AP announces a switch of operating channel, operating bandwidth or both, by either

* using the Channel Switch Announcement Element, Channel Switch Announcement Frame or both, following the procedure described in 10.9.8.2
* using the Extended Channel Switch Announcement Element, Extended Channel Switch Announcement Frame or both, following the procedure described in 10.10

and in addition following the procedures in this section.

The New Channel Number field in the Channel Switch Announcement Element, Extended Channel Switch Announcement Element, Channel Switch Announcement Frame or Extended Channel Switch Announcement Frame, identifies the primary20 channel after the switch. The value of the New Channel Number field is set equal to dot11CurrentPrimaryChannel (22.3.14 (Channelization)) after the switch.

When announcing a switch to a 40MHz operating bandwidth, either in conjunction with a channel switch or alone, the Secondary Channel Offset Element shall be present in the same frame as the Channel Switch Announcement element;1

NOTE1 -- Note that the indicated operating class within the Extended Channel Switch Announcement element or frame identifies the bandwidth and the relative position of the primary20 and secondary20 channels, hence a Secondary Channel Offset Element is not required when the Extended Channel Switch Announcement element only is used.

When announcing a switch to a 80, 80+80 or 160MHz operating bandwidth, either in conjunction with a channel switch or alone, the Secondary Channel Offset Element and the Wide Bandwidth Channel Switch Element shall be present in the same frame as the Channel Switch Announcement element or Extended channel Switch Announcement element. When announcing a switch to a 80, 80+80 or 160MHz by using the Extended Channel Switch Announcement element, the value of the New Operating Class field identifies the primary40 channel.

If the Secondary Channel Offset Element and Wide Bandwidth Channel Switch element are both not present within the same frame where a Channel Switch Announcement Element is present, the operating bandwidth after the switch is 20MHz;An Extended Channel Switch Announcement frame shall not be used to switch to an operating bandwidth greater than 40MHz.

When switching the BSS to a lower operating bandwidth, the AP may recalculate the TS bandwidth budget and may delete one or more active TSs by invoking the MLME-DELTS.request primitive with a ReasonCode value of SERVICE\_CHANGE\_PRECLUDES\_TS.A VHT STA that is a member of an IBSS adopts the values indicated by the Secondary Channel Offset Element and Wide Bandwidth Channel Switch element in received frames according to the rules in 10.1.5 (Adjusting STA timers) and shall not transmit a value for the Wide Bandwidth Channel Switch Element and Secondary Channel Offset Element that differs from the most recently adopted value.