IEEE P802.11
Wireless LANs

|  |
| --- |
| [CSA with channel switch time announcement] |
| Date: 2018-01-11 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Gabor Bajko | Mediatek | 2840 Junction Rd |  | Gabor.bajko@mediatek.com |
| Thomas Derham | Broadcom |  |  | Thomas.derham@broadcom.com |

Abstract

[In the current standard there is a mechanism defined for the AP to announce when it wants to move to a different channel (the CSA or the extended CSA mechanism).

If the new channel the AP wants to move to is under DFS regulation, the prerequisites for operation defined by regulatory bodies sometimes entail a delay in the AP being able to operate in the new channel, and this leaves the STAs in limbo as to when the AP will start operating in the new channel. The standard does not have an indication for the AP to indicate on how long the channel switch would take and when could the STA expect to see beacons from the AP in the new channel.

There are a variety of time constraints the AP might have to obey to before it can start operating in the new channel:

- the AP wants to move to a DFS channel, in the US the AP it might only start operating in the new channel 60sec after it stops operating in the old channel (since FCC requires 60 sec CAC on the new channel)

- the AP wants to move to a DFS channel, in the EU the AP might only start operating in the new channel 60 sec to 10 min after it stops operating in the new channel if it does not have a CAC clearance.

- The AP might have a dedicated radio for monitoring DFS channels and thus be able to move to the new channel immediately

- The AP implementation might require some time to switch channels even if the new channel is not a DFS channel

This submission defines a new element to convey the time between sending the last beacon in the current channel and the first beacon in the new channel. The AP using CSA or extended CSA could include this element in the beacon or probe responses.

]

***Editor: add a new section 9.4.2.217:***

9.4.2.175 Max Channel Switch Time element

The Max Channel Switch Time element indicates the time delta between the time the last beacon is transmitted by the AP in the current channel and the expected time of the first beacon transmitted by the AP in the new channel. The format of the element is defined in figure 9-122:

|  |  |  |  |
| --- | --- | --- | --- |
| Element ID | Length | Element ID Extension | Switch Time |

Octets: 1 1 1 3

The Element ID and Element ID Extension are defined in Table 9-77.

The Length field has a value of 4.

The Switch Time field is a 3 octet field indicating the maximum time delta between the time the last Beacon frame is transmitted by the AP in the current channel and the expected time of the first Beacon frame in the new channel, expressed in TUs.

This element is optionally present in Beacon and Probe Response frames when a Channel Switch Announcement or Extended Channel Switch Announcement element is also present.

***Editor: add a new row into Table 9-31 (Beacon Frame body):***

|  |  |  |
| --- | --- | --- |
| Oder | Information | Notes |
| 72 (TBD – Editor) | Max Channel Switch Time | The Max Channel Switch Time element is optionally present when a Channel Switch Announcement or an Extended Channel Switch Announcement element is also present. |

***Editor: add a new row into Table 9-38 (Probe Response Frame body):***

|  |  |  |
| --- | --- | --- |
| Oder | Information | Notes |
| 85 (TBD – Editor) | Max Channel Switch Time | The Max Channel Switch Time element is optionally present when a Channel Switch Announcement or an Extended Channel Switch Announcement element is also present. |

***Editor: add a new row into Table 9-88 (Element IDs):***

|  |  |  |  |
| --- | --- | --- | --- |
| Element | Element ID | Element ID Extension | Extensible |
| Max Channel Switch Time  | 255 | 15 (TBD – Editor) |  |

***Editor:make the following changes to section 11.9.8.2***

An AP shall inform associated STAs that the AP is moving to a new channel and shall maintain the

association by advertising the switch using Channel Switch Announcement elements in Beacon frames,

Probe Response frames, and Channel Switch Announcement frames until the intended channel switch time. The AP should also include the Max Channel Switch Time element in Beacon and Probe Response frames when Channel Switch Announcement element is present.

The AP may force STAs in the BSS to stop transmissions until the channel switch takes place by setting the

Channel Switch Mode field in the Channel Switch Announcement element to 1. The channel switch should

be scheduled so that all STAs in the BSS, including STAs in power save mode, have the opportunity to

receive at least one Channel Switch Announcement element before the switch. The AP may send the

Channel Switch Announcement frame in a BSS without performing a backoff, after determining the WM is

idle for one PIFS (see 10.3.2.3 (IFS)).

When the AP includes the Max Channel Switch Time element with the Channel Switch Announcement element in the Beacon frame, it shall set the Channel Switch Count field of the Channel Switch Announcement element of the last Beacon frame transmitted in the current channel to 1. Further, the AP shall transmit the first Beacon frame in the new channel no later than the time indicated in the Switch Time field of the Max Channel Switch Time element after the last Beacon frame transmitted in the current channel, unless the AP determines that it is unable to operate on the new channel.

When the AP includes the Max Channel Switch Time element with the Channel Switch Announcement element in the Beacon frame, the value zero for the Channel Switch Count field of the CSA element shall not be used.

***Editor:make the following changes to section 11.10.3.2***

When dot11ExtendedChannelSwitchActivated is true, an AP shall inform associated STAs that the AP is

moving to a new channel and/or operating class and maintain the association by advertising the switch using

Extended Channel Switch Announcement elements in any transmitted Beacon frames, Probe Response

frames, and Extended Channel Switch Announcement frames until the intended channel switch time.

The AP should also include the Max Channel Switch Time element in Beacon and Probe Response frames when the Extended Channel Switch Announcement element is present. The AP may request STAs in the BSS to stop transmissions until the channel switch takes place by setting the

Extended Channel Switch Mode field to 1 in the Extended Channel Switch Announcement element. If

possible, the channel switch should be scheduled so that all STAs in the BSS, including STAs in power save

mode, have the opportunity to receive at least one Extended Channel Switch Announcement element before

the switch. The AP may send the Extended Channel Switch Announcement frame without performing a

backoff, after determining the WM is idle for one PIFS (see 10.3.2.3 (IFS)). When both the Extended

Channel Switch Announcement and the Channel Switch Announcement elements are transmitted in Public

Action frames, they shall be sent in separate frames.

When the AP includes the Max Channel Switch Time element with the Extended Channel Switch Announcement element in the Beacon frame, it shall set the Channel Switch Count field of the Extended Channel Switch Announcement element of the last Beacon frame transmitted in the current channel to 1. Further, the AP shall transmit the first Beacon frame in the new channel no later than the time indicated in the Switch Time field of the Max Channel Switch Time element after the last Beacon frame transmitted in the current channel, unless the AP determines that it is unable to operate on the new channel.

When the AP includes the Max Channel Switch Time element with the Extended Channel Switch Announcement element in the Beacon frame, the value zero for the Channel Switch Count field of the ECSA element shall not be used.