IEEE P802.11
Wireless LANs

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| Power save improvements |
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Abstract

This document proposes to allow multiple AWs per BI for use by EDMG STAs, thereby improving power consumption.

9.4.2.137 Awake Window element

*Change Figure 9-526 as follows*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Elemend ID | Length | Awake Window Duration | EDMG Awake Window Duration |
| Octets: | 1 | 1 | 2 | 2 |

*Insert at the end of the subclause*

The EDMG Awake Window Duration field contains the duration, in microseconds, of the awake window for the CBAP allocations scheduled through the EDMG Extended Schedule element.

**11.2.7 Power management in a PBSS and DMG infrastructure BSS**

**11.2.7.2 Non-AP and non-PCP STA power management mode**

**11.2.7.2.2 Non-AP and non-PCP STA operation without a wakeup schedule**

*Change the third paragraph as follows*

As long as there is at least one STA that has entered doze state through the unscheduled power save mechanism, the AP or PCP shall establish at least one ~~an~~ awake window by transmitting an Awake Window element, and shall include a UPSIM element in every DMG Beacon and Announce frame it transmits. The AP or PCP may establish ~~an~~ awake windows and/or include a UPSIM element in a DMG Beacon or Announce frame it transmits even if no STA is in doze state. The absence of a UPSIM element in a DMG Beacon or Announce frame is equivalent to presence of the UPSIM element in the frame with all bits of the Power Save Indication Bitmap field in the UPSIM element set to 0. The UPSIM element in every DMG Beacon or Announce frame transmitted by the AP or PCP shall indicate the power state of all STAs at the time of frame transmission.

**11.2.7.2.3 Non-AP and non-PCP STA operation with a wakeup schedule**

*Change the second to last paragraph as follows*

If a non-AP and non-PCP STA has established a WS with the AP or PCP and the non-AP and non-PCP STA is in PS mode, the non-AP and non-PCP STA shall have *m* successive awake BIs repeating every *n* beacon interval, where *n* is the value of the Sleep Cycle field of the DMG Wakeup Schedule element contained in the PSC-RSP frame received from the AP or PCP during the frame exchange that established the WS, and *m* is the value of the Number of Awake BIs field in the DMG Wakeup Schedule element contained in that PSC-RSP frame. During each of its awake BIs, the non-AP and non-PCP STA shall be awake during the awake windows that are ~~if it is~~ present, and during all allocated SPs in which it is either the source or destination DMG STA.

**11.2.7.4 ATIM frame usage for power management of non-AP STAs**

*Change the first paragraph as follows*

An awake window is present within the first CBAP of a beacon interval that is scheduled through the Extended Schedule element and has the Source AID and Destination AID fields in that Extended Schedule element equal to the broadcast AID, or in a CBAP that is scheduled through the CBAP Only field in the DMG Parameters field (9.4.1.47) set to 1, for dot11MaxLostBeacons beacon intervals following the most recent transmission of the Awake Window element (9.4.2.137) by the AP or PCP with the Awake Window Duration field set to a nonzero value. If present in the first CBAP, the awake window starts from the beginning of a CBAP and has a duration that is defined by the value of the Awake Window Duration field in the Awake Window element or the CBAP duration, whichever is smaller.

*Insert the following after the first paragraph*

If the value of the EDMG Awake Window Duration field within the transmitted Awake Window element is nonzero, an awake window is present within a CBAP allocation of a beacon interval if all of the following conditions are met:

1. The CBAP allocation is scheduled in the beacon interval through the EDMG Extended Schedule element
2. The CBAP allocation has the Destination AID field equal to the broadcast AID

If all these conditions are met, the awake window is present in the CBAP allocation for dot11MaxLostBeacons beacon intervals following the most recent transmission of the Awake Window element (9.4.2.137) by the AP or PCP. The awake window has a duration equal to the value of the EDMG Awake Window Duration field within the Awake Window element or the CBAP allocation duration, whichever is smaller.

*Change the fourth paragraph as follows*

~~If present, the awake window starts from the beginning of a CBAP and has a duration that is defined by the value of the Awake Window Duration field in the Awake Window element or the CBAP duration, whichever is smaller.~~ During the awake window, a STA shall transmit only ATIM frames and, if the ATIM frame is individually addressed, Ack frames. A DMG STA in PS mode shall be in the awake state during each awake window that lies within each awake BI for that STA.

*Change the sixth paragraph as follows*

A STA that is in PS mode and following a wakeup schedule and has not performed unscheduled power save to enter doze state and receives an ATIM frame during the awake window shall be awake during allocations within the current beacon interval that have the Source AID equal to broadcast AID or have a Source AID that identifies a STA whose MAC address is equal to the TA field of the received ATIM frame, or during any DTI that is scheduled through the CBAP Only field in the DMG Parameters field (9.4.1.47) set to 1. If a STA transmits an ATIM frame during the awake window, it shall attempt to deliver its BUs during allocations within the current beacon interval that have a Destination AID equal to broadcast AID or have a Destination AID that identifies a STA whose MAC address is equal to the RA field of the transmitted ATIM frame, or during any DTI that is scheduled through the CBAP Only field in the DMG Parameters field (9.4.1.47) set to 1. A non-EDMG STA that receives or transmits an ATIM frame during the awake window may enter the doze state when it has successfully transmitted to and received from all corresponding peer STAs for this beacon interval a QoS Data frame with the EOSP subfield set to 1; otherwise it shall stay active until the end of the current beacon interval. An EDMG STA that receives from, or transmits to, a peer EDMG STA an ATIM frame during an awake window may enter the doze state when it has successfully transmitted to and received from all corresponding peer STAs for this allocation a QoS Data frame with the EOSP subfield set to 1; otherwise it shall stay active until the end of the allocation. ATIM frame transmissions and MSDU transmissions follow the rules defined in 11.2.8.