IEEE P802.11
Wireless LANs

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| Clarifications of non-PCP non-AP STA power management  |
| Date: 2015-03-12 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Solomon Trainin | Intel |  |  | solomon.trainin@intel.com |
| Carlos Cordeiro  | Intel  |  |  | carlos.cordeiro@intel.com |
| Kirshenbaum, Erez  | Qualcomm |  |  | erezk@qti.qualcomm.com |
| Gal, Shahar  | Qualcomm |  |  | sgal@qti.qualcomm.com |
| Joe Andonieh  | Peraso |  |  | joe@perasotech.com |
| Payam Torab Jahromi  | Broadcom |  |  | ptorab@broadcom.com |

Abstract

Clarifications to resolve contradicitions found in realtion to power management of a non-AP and non-PCP stations

*Discussion: There are several contradictions and lack of definition in sub clause 10.2.6 to be fixed in this proposal.*

8.4.2.130

P1009L56

*Discussion: As mentioned in few places and specifically defined in sub clause 10.2.6.2.4, any associated non-PCP non-AP STA may get WS of any other STA from PCP. It is not clear how the WS should be interpreted in relation to identify and predict power state of the STA the WS belongs to. Following modification clarifies how the Active mode is distinguished from PS mode and Awake BI in the PS mode is distinguished from Doze BI*

*Editor modify the text as follows:*

— The BI Start Time field is calculated as follows:

* If the STA is transitioning into PS mode the BI Start Time field is set to the lower 4 octets of the TBTT of the current beacon interval plus a value that is less than 231-1 microseconds
* If the STA is in PS mode and intends to stay in PS mode longer than 231-1 microseconds the BI Start Time field is set to the lower 4 octets of the two’s complement of the current value of the BI Start Time field minus the lower 4 octets of the TBTT of the beacon interval at the start of the last sleep cycle
* If the STA is in PS mode and intends to change its current sleep cycle, the BI Start time field of the new sleep cycle is set to be equal to the lower 4 octets of TBTT of first Awake BI of the following sleep cycle plus a value that is an integral multiple of the current sleep cycle multiplied by Beacon Interval duration and is less than 231-1 microseconds.

— The Sleep Cycle field indicates the sleep cycle duration in beacon intervals, i.e., the sum of awake BIs and doze BIs that make up the sleep cycle. The Sleep Cycle field value can only be a power of two and is less than the result of (231-1) devided by the beacon interval duration. Other values are reserved.

— The Number of Awake/Doze BIs field indicates the number of awake BIs at the beginning of each sleep cycle. A value of zero in this field indicates that no awake BI’s are included in the sleep cycle.

*Editor add Note at end of the sub clause 8.4.2.130*

NOTE:

A STA that has the WS element of another STA can identify Active and PS mode, Awake, and Doze BI of the STA that the WS belongs to using the parameters of the WS and lower 4 bytes of TBTT of the BI.

* If 0<two’s complement (BI Start Time - lower 4 octets (TBTT)) < 231 the STA is in Active mode
* If two’s complement (BI Start Time - lower 4 octets (TBTT)) >= 231 or two’s complement (BI Start Time - lower 4 octets (TBTT)) =0 the STA is in PS mode
* In the PS mode the STA is at a position in a sleep cycle that is equal to MOD ((two’s complement (lower 4 octets (TBTT)-BI Start Time)/BI), Sleep Cycle). It is Awake BI if the position <= Number of Awake/Doze BIs and Doze BI otherwise.

**10.2.6.1 General**

P1579L6

*Discussion: defined power management mechanism operates with entire beacon intervals, and does not address parts of beacon intervals*

*Editor change as follows*

To enable non-AP and non-PCP STAs and PCPs to sleep for one or more beacon intervals a non-AP and non-PCP STA power save mechanism and a PCP power save mechanism are defined in this subclause.

P1579L4

*Discussion:*

*Awake BI is defined to exist in both active and power save modes. 10.2.6.1 General in one place “Active mode: A STA is in the awake state,… as indicated in Table 10-3 (Power states for an Awake BI)” and in other place: “Table 10-3 (Power states for an Awake BI) lists the power states for a non-AP and non-PCP STA in PS mode … It introduces contradiction. For example in 10.2.6.2.3* ***“****The non-AP and non-PCP STA shall be awake during the Awake Window within the CBAPs … during each of its Awake BIs” There are clarifications to sovle the contradiction*

*Fix the text as follows:*

P1579L40

— Active mode: A STA is in the awake state, except that the STA can switch to doze state in an Awake

BI when the STA is allowed to doze.

*P1580L23*

*Editor insert new rows in the table Table 10-3*

|  |  |  |  |
| --- | --- | --- | --- |
| DTI | Awake Window  | Awake | Awake |
| DTI with CBAP Only subfield set to 1 | Doze or Awake  | Doze or Awake |
| Destination AID field of a CBAP equal to the broadcast AID in the schedule | Doze or Awake  | Doze or Awake  |

P1581L1

*Editor add new rows in Table 10-4*

|  |  |  |  |
| --- | --- | --- | --- |
| DTI | DTI with CBAP Only subfield set to 1 | Doze | Doze |
| Destination AID field of a CBAP equal to the broadcast AID in the schedule | Doze  | Doze  |

P1583L33

*Editor append as follows:*

The non-AP and non-PCP STA shall be awake during the Awake Window within the CBAPs and during allocated SPs in which it is either the source or destination DMG STA during each of its Awake BIs under a PS mode.

P1581L56

*Sub clause 10.2.6.2.2*

*Discussion: PS mode mentioned in the sub clause is result of Frame’s control PM field set/reset and is different from PS mode defined in 10.2.6.1 that is not clear from the text reading. Suggest to clarify it by adding words “PM field” to PS mode*

*Editor in sub clause 10.2.6.2.2 replace all appearances of PS mode by* “PM field PS mode”

Sub clause 10.2.6.2.3

*Discussion: Role of the WS elememt in transition from Active mode to PS mode is explained clear, but the WS role in the PS mode is not presented*

P1582L54

*Editor modify as follows:*

After receiving a PSC-RSP frame from the AP or PCP with a status code indicating success and responding with an acknowledgment, the STA switches to the PS mode at the instant specified by the BI Start Time field of the DMG Wakeup Schedule element transmitted to the AP or PCP. In PS mode, the STA transitions between Awake BI and Doze BI following the WS established with the AP or PCP.

P1582L60

*Discussion:*

1. *Awake BI and Doze Bi are different in relation to allow wakeup access, hence even the SP scheduling is established the WSE shall be included. Propose to remove the WSE exclusion.*
2. *There is requirement that STA shall be awake in Awake window but in no place delivery of AW element is defined, suggest adding the AWE to the PSC-REQ and PSC-RSP*

*Editor modify as follows:*

A DMG Wakeup Schedule element shall be included and an Awake Window element may be included in any PSC-REQ frame that the STA transmits to the AP or PCP as an explicit request for a wakeup schedule and an Awake Window. If the AP or PCP accepts the proposed WS and the Awake window, it shall reply with a PSC-RSP frame indicating a status code of SUCCESS. Otherwise, it shall respond with a PSC-RSP frame with a status code indicating the reason for rejecting the request. The AP or PCP may suggest an alternative schedule or an Awake Window in the PSC-RSP frame and set the status code to REJECT\_WITH\_SCHEDULE. If the STA accepts the alternative schedule and the Awake Window, it shall include this WS and this Awake Window in a subsequently transmitted PSC-REQ frame.

P1583L11

*Discussion: Implication that “pseudo-static SPs for the non-AP and non-PCP STA become an implicit WS request” makes the entire paragraph inadequate, suggest to remove:*

*Editor remove the paragraph from beginning at line* P1583L11

*P1583L29*

*Discussion:*

*Power save states of STA in relation to specified allocations are defined in Tables 10-3 and . Rules in the Tables are not aligned with definition in the paragraph, suggest provide aligned rules in the tables, refer to the tables in the paragraph and remove excessive definition*

*Editor modify as follows:*

If a non-AP and non-PCP STA has implicitly established a WS with the AP or PCP and the non-AP and non-

PCP STA is in PS mode, the STA shall be awake as indicated in Tables 10-3 and 10-4.

*P1583L36*

*Discussion: Paragraph that starts with “The WS established by a non-AP and non-PCP STA might contain …” is irrelevant*

*Editor – remove the paragraph at P1583L36 that starts with”The WS established by a non-AP and non-PCP STA might contain …”*

Sub clause 10.2.6.2.4

P1612L1

*Discussion: Clarify rules related to using Information request and response to get WS and AW information*

*Editor – modify two last paragraphs of 10.2.6.2.4 as follows:*

In order for a STA to learn the WS and Awake Window of another STA within the BSS, the STA may send an Information Request frame to the other STA or to the AP or PCP as defined in 10.30.1 (Information Request and Response(11ad)).

If the Information Request frame is transmitted to the AP or PCP and the STA indicated in the Information

Request’s Subject Address field does not have an established WS with the AP or PCP, the AP or PCP shall set the length of the DMG(#2022) Wakeup Schedule element to 0 in the Information Response frame.

If STA in PS mode intends to change Sleep Cycle at BI Start Time within Wakeup Schedule element, the AP or PCP shall not announce the new Wakeup schedule element in beacon intervals that two’s complement (BI Start Time - lower 4 octets (TBTT))>0

**References:**

1. IEEE P802.11-REVmc/D4.0, January 2015