IEEE 802.11

Wireless Access Method and Physical Layer Specifications

Title: **Suggested Encoding for the TIM Element**

Presented by: **Johnny Zweig**
Xircom, Inc.
2041 Landings Drive
Mountain View, CA 94043
Tel: (415) 691-2500
Fax: (415) 691-1064
Email: jzweig@xircom.com

Abstract: **This paper provides a suggestion for new text for D2.0 Section 4.3.2.1.**

Action: **Adopt the text in this paper for inclusion in Section 4.3.2 of P802.11/D2.x.**

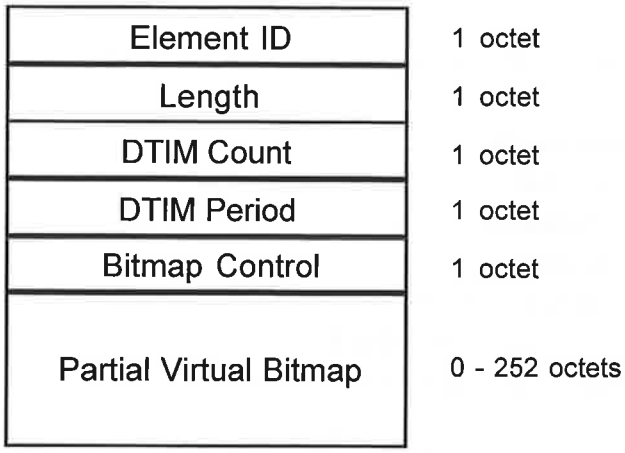
Here is my proposed text for Section 4.3.2.1 to define a simpler compression scheme for the virtual bitmap transmitted by APs inside beacons. It is based on Wim's proposal for an "uncompressed" bitmap suggested in document 95/208 (which is compressed by supressing trailing zeroes in the bitmap). This text defines the field as the smallest contiguous chunk of the bitmap consisting of an even number of even-octet-aligned octets that contains all the nonzero bits, other than bit 0 (the buffered multidestination frame indicator).

Notice that since the element consists of the element ID, length, two DTIM-related octets, a single bitmap control octet and an odd number of virtual bitmap octets, it will always be an even number of octets long.

As an example, consider an AP with broadcast frames buffered, and unicast frames for stations 803 and 808 buffered. The bits in the bitmap that are set are bit number 0 of octet 0, bit number 3 of octet 100, and bit number 0 of octet 101. N1 is 100 (since bits 1 through 799 are all 0), N2 is 102 (since bits 816 through 2015 are all 0). Thus Length will be (102 – 100) + 4 = 6, and the bitmap control field will be 101 (100, with the low-order bit set to indicate buffered multidestination traffic). The TIM element would thus consist of 8 octets whose value (in base 10) is {4, 6, C, P, 101, 8, 1, 0} where C and P are the DTIM Count and DTIM Period values, respectively.

4.3.2.1 TIM

The TIM element shall contain four fields: DTIM Count, DTIM Period, Bitmap Control and Partial Virtual Bitmap.



The Length field for this element shall indicate the length of the information field, which is constrained as described below.

The DTIM Count field shall indicate how many Beacons (including the current frame) will appear before the next DTIM. A DTIM Count of 0 shall indicate that the current TIM is a DTIM. The DTIM count field shall be a single octet.

The DTIM Period field shall indicate the number of Beacon intervals between successive DTIMs. If all TIMs are DTIMs, the DTIM Period field shall have value 1. The DTIM period field shall be a single octet.

The Bitmap Control field shall be a single octet whose low-order bit contains the Traffic Indicator bit associated with Station ID 0, and whose high-order seven bits form the Bitmap Offset subfield. The Bitmap Offset subfield is a number between 0 and 250, formed by using the Bitmap Control field with the low-order bit set to 0, and is further described below.

The traffic-indication virtual bitmap, maintained by the AP that generates a TIM, consists of 2016 bits, organized into 252 octets such that bit number N ($0 \leq N \leq 2015$) in the bitmap corresponds to bit number (N mod 8) in octet number $\lfloor N / 8 \rfloor$ where the low-order bit of each octet is bit number 0, and the high order bit is bit number 7. Each bit in the traffic-indication virtual bitmap corresponds to traffic buffered for a specific station within the BSS. If bit number N is 0, there are no unicast frames buffered for the station whose Station ID is N. If any unicast frames for that station are buffered, bit number N in the traffic-indication virtual bitmap is 1.

The Partial Virtual Bitmap field shall consist of octets numbered N1 through N2 of the traffic indication virtual bitmap, where N1 is the largest even number such that bits numbered 1 through $(N1 \times 8) - 1$ in the bitmap are all 0 and N2 is the smallest even number such that bits numbered $(N2 + 1) \times 8$ through 2015 in the bitmap are all 0. In this case, the Bitmap Offset subfield value will contain the number N1, and the Length field will be set to $(N2 - N1 + 4)$.