IEEE P802.11
Wireless Access Method and Physical Layer Specifications

Title: Proposal to correct the DTIM and TIM elements defined in section 4.

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Abstract:
This document proposes a change of the currently specified DTIM and TIM fields used in Beacon frames. The intend is to improve consistency, remove current limitations, and correct errors.

Introduction:

The following comments apply for the currently specified DTIm and TIM element fields.

Section 4.4.2.1 DTIM
The current name is very misleading. It suggests that in itself it is only present in a DTIM, and therefore it is made an element, whereas the element should be in every Beacon, because the DTIM count says howmany Beacons before the next DTIM.
A better name would be to call this element the "TIM Type" element, but sinse it is in every Beacon it could be a fixed "TIM Type" field.

The following solutions are possible:
1- Make the DTIM Period and DTIM count fixed fields in Beacons.
2- Include the two parameters as the first two octets of the TIM element.

Consideration:
Currently the format of the Beacon frame and Probe response frame are the same except for the DTIM and TIM elements at the end of the frame. This makes a lot of sense, so that an AP can in response to the Probe Request, just send out the information of the last Beacon except for the DTIM/TIM elements.
It is therefore suggested to combine the information of the DTIM and TIM elements, such that the DTIM Period and DTIM count appear as the first two parameters in the TIM element.

Section 4.4.2.2 TIM

There are a number of problems with this section:

1- The suggested encoding scheme allows only 512 stations, and is not extendable, as currently described.
2- An SID of zero encoding should be possible to indicate BC/MC traffic. The definitions are currently not sufficient clear.
3- The Block description is ambiguish, and the formula used is not correct.
4- It is unclear when Block ID's need to be specified, if there is for instance no traffic buffered.
5- The Block Identifier figure does not follow the octet representation conventions as specified in section 1.5.

The following solution is suggested:

- To allow more stations, the number of block groups should not be limited to 8. The limit is then driven by the number of Bytes that can be encoded into one element, which would be INT(255/9)=28 block groups, providing a total of 28*8*8 - 1=1791 stations. If a higher limit of stations per BSS are desired, then additional TIM elements can be specified. No new Element_ID is needed, when the total "virtual bitmap" is represented as the concatenation of the multiple Block Groups in each subsequent TIM element.
- With G = 1 to Maxgroups, N = 1 to 8 (MaxBlock), M = 0 to 7 (Station/block). SID = M + 8*(N-1) + (G-1)*64.
  The maximum number of groups within one TIM element is 28 Block Groups, which is determined by the maximum length of an element.
- Update the Block Identifier figure.

The following is current section 4 text marked where possible with the changes suggested, intended as input for the editors..

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4.2.3.1. BEACON Frame Format

The Frame Body of a Management frame of Subtype Beacon shall contain the following information:

Order	Information	Note
1	Timestamp	
2	Beacon Interval	
3	Regulatory Domain	
4	Capability Information	
5	ESS ID	
6	Supported Rates	
7	FH Parameter Set	1
8	CF Parameter Set	2
~~9~~10	TIM	

Notes:

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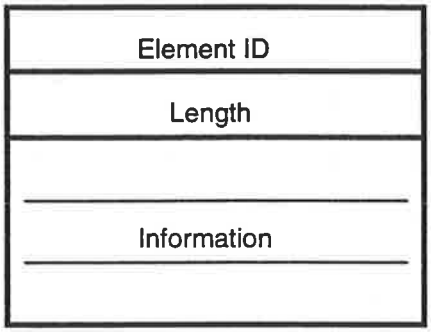
4.4.2 Information Elements

Elements are defined to have a common general format consisting of a one-octet Element ID field, a one octet length field and a variable-length element-specific information field. Each element is assigned a unique Element ID as defined in this specification. The length field shall specify the number of octets in the information field.

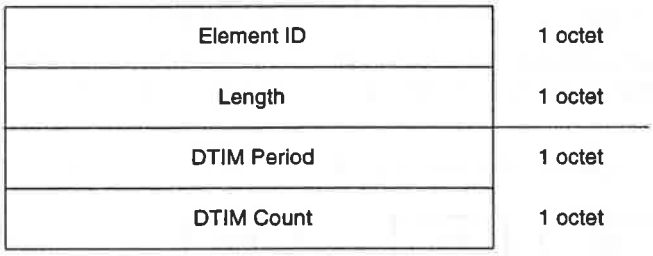


The set of valid elements is defined below.

Information Element	Element ID
ESSID	0
Supported Rates	1
FH Parameter Set	2
CF Parameter Set	3
TIM	~~4~~5
Challenge Text	~~5~~6

~~4.4.2.1 DTIM~~

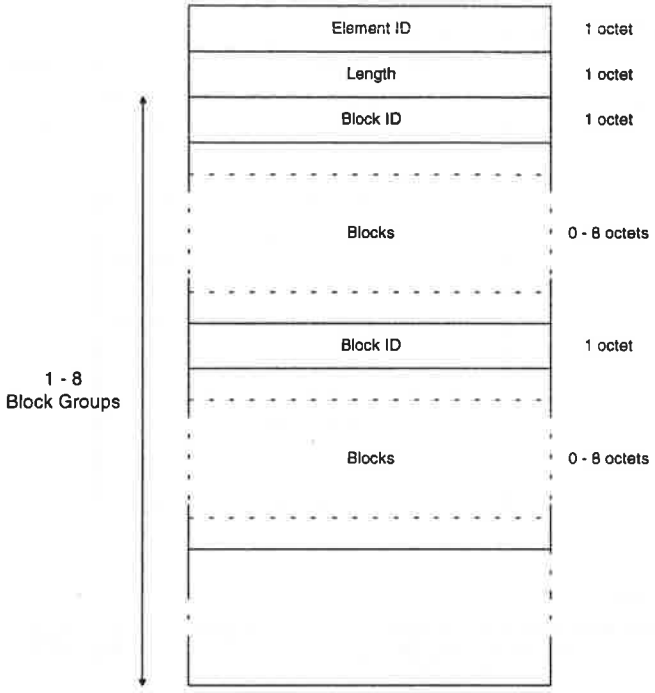
~~The DTIM element shall contain two fields DTIM Count and DTIM Period.~~



~~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.~~

4.4.2.2 Traffic Indication Map (TIM)



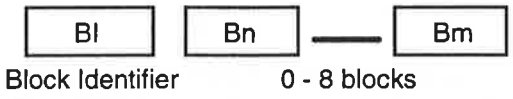
UPDATE FIGURE to add DTIM period and DTIM count (Can't update the Visio drawing).

UPDATE FIGURE to show that one TIM can contain as many as 28 Block Groups.

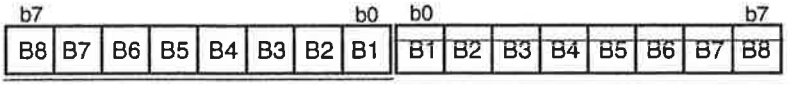
The TIM Element information field shall contain between one and a maximum of twenty eight *block groups*, with each block group consisting of a *block identifier* followed by 0 to 8 one-octet *blocks*. Each bit within a block shall indicate whether a frame is currently buffered for a station with a particular Station ID. There is a one-to-one mapping between the bits in a *virtual bit map* and the station IDs. The virtual bit map is maintained within the access point; the actual transmitted TIMs are ~~is~~ a compressed representation of the virtual bit map. If multiple TIMs are in one Beacon, then the concatenated Block group information of all TIMs within the same Bacon frame will represent the *virtual bit map*.

The TIMs do contain compressed information of the *virtual bit map*, such as to represent the largest SID of the station that currently has traffic buffered in the AP. So if no traffic is pending at all, then there will be no Block ID's present.

Block Group: Consists of a Block Identifier followed by from 0 to 8 Blocks.



BI: Block Identifier (1 octet)



Bit N (N = 1..8) 0 = Nth block in this group is absent
1 = Nth block in this group is present

Block (8 bits) Each bit corresponds to a specific station within the block. If this block represents the Nth block within the virtual bit map, of Block Group G, then Bit M within the block shall correspond to the station with Station ID equal to
(G-1)* 64 + 8*(N-1) + M.
Bit = 1: There is a frame pending for this station

Bit = 0: There is no frame pending for this station.