IEEE 802.11
Wireless Access Method and Physical Specification

Title: **Proposal to change the Element format.**

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Abstract: This document proposes a different format for the "Element" field, to allow the use of short codes with less overhead, and to allow a larger parameter field in a single element.

Introduction:

In the foundation MAC an element field structure is proposed that allows for the exchange of management type information between MACs, embedded in the different frame types, so indicated by an "EP" (Element Present) control bit in the fixed header. The structure is such that future extension of the code definitions is possible, in a way that is upward compatible. Early implementations that do not understand the newly specified code can skip the element field without the need for interpretation.

Elements can be used to carry a management request or indication together with a number of parameters within specifically specified management frames like the Beacon, but they can also be piggybacked onto normal dataframes.

The current definition of the element structure requires a minimum overhead of two octets, which is considered significant for possibly frequently used elements.
In addition the current definition has a limit of the parameter size of 127 octets, which in some cases may represent a problem.

Element field applications:

Element fields are used to:
- Carry MAC information in special frames
- Piggyback MAC information on dataframes
- Future standard expansion.

When we have the ability to use a shorter element field format, then this opens the opportunity to represent sertain fields as element structures, which are only included when needed.
An example of this could be the fragment number and fragment duration field that is only needed when fragmentation is applied, while it does not have a function in non fragmented frames. If we consider further that a lasrge percentage of the frames are short frames that would not invoke fragmentation, then this already represents a significant useless overhead.

An other example would for instance be "Dynamic Transmit Power Control" discussed in [2] and [3] as a future extension of the standard. This mechanism would require as a minimum the return of an RX-level indication of the received frame in the Ack.

New "Element" field structure proposal:

An element structure is proposed that allows two types:
- A Short Element format, that only requires one octet.
- A Long Element format, that uses a minimum of two octets.
  This format can handle parameter fields up to a length of 255 octets.

bits: 1 1 3 3

M	0	SCode	Link
Octets Specific to Element (0 to 7)			

More bit M **=1: More Elements Follow**

=0: Last Element

SCode: **Short Element Code (8 Codes)**

Link (3 bits): number of subsequent octets

bits: 1 1 6

M	1	LCode
Link		
Octets Specific to Element (0 to 255)		

More bit M **=1: More Elements Follow**

=0: Last Element

LCode: **Long Element Code (64 Codes)**

Link (8 bits): number of subsequent octets

The advantage of this approach are:
- Low overhead for frequently used codes.
- Supports a larger parameter space.

A disadvantage is that less Codes are available, but a total code space of 64+8=72 elements is considered adequate. In addition, other suggestions are made to decrease the total number of different elements currently defined.

Re-organization of Element codes:

Currently a number of different elements are defined in section 4.3.1 through 4.3.11. A number of those elements could be combined into one element with a specified order of the different parameters that are now separately defined.
For instance, the Beacon interval, the DTIM Count and DTIM Period (and perhaps the Timestamp) can be combined into one element.

This contribution is not intended to be compleet, and it is suggested that a small ad-hoc group is to be formed to sort out the elements that need to be specified as part of this standard.

Allow Elements in all frame types:

Although not specifically stated, the draft standard does currently suggest that "Elements" can go into Data frames, Beacons, Request and Response frames only. To assure sufficient flexibility, elements should be allowed to go into any frame type.

A usefull restriction to this could be that elements should only go into the header of the first fragment if fragmentation is being used. This can simplify the buffer allocation and frame header interpretation that needs to be done in actual implementations.

References:

[1] "Draft Standard IEEE 802.11", P802.11 Editors P802.11-93/20b2.

[2] "The potential of Dynamic Power Control", W. Diepstraten NCR-WCND-Utrecht; July 92, IEEE P802.11-92/76

[3] "Transmit Power Control Protocol Provisions", W. Diepstraten AT&T-GIS; March94, IEEE P802.11-94/59