

IEEE P802.11
Wireless Access Method and Physical Layer Specifications

Title: Proposal to include a “Resource Load” indication in a Beacon frame.

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Abstract:

This document proposes to add a “Resource Load” field in the Beacon, which can be used to balance the load over different BSS’s, in cases where there is sufficient overlap.

Introduction:

Within 802.11 a station is making a decision with which AP it wants to associate. The algorithm used for this decision, and the information that is used by a station to determine which AP it should associate with is not specified within the standard, and will be implementation specific.

In general the station is expected to use applicable link quality information from the PHY (Quality, Rx_Level), which it derives during reception of Beacons or Probe Responses during a passive or active scanning cycle.

However there is currently no indication that gives information about the network load at the particular AP, nor any information about possible resource limitations in the AP.

So in area’s with a lot of overlap, a large population of the stations may all end up using the same AP, whereby performance can suffer, due to the relative high load on the medium, and the AP resources.

In the past Chris Zegelin has suggested a “Load parameter” in the Beacon, and this idea was achieved with great sympathy.

This contribution intends to revive that idea by proposing a “Resource Load” field in the Beacon and Probe Response frames.

“Resource Load” field proposal

The proposal is to include a “Resource Load” field in the Beacon and Probe Response frames, in which the AP can indicate what the relative load is on its resources.

- One of the components could be the Wireless medium Load at the AP, which is an indication of the channel occupancy by calculating the Medium Busy/Free ratio as indicated by the CCA of the AP PHY.
- An other component could be the actual amount of frames per time unit that an AP is handling on the wireless side.
- A possible component could be storage resource availability in the AP.
- And it could be that the load on the DS side is a factor taken into account by the AP.

It is not the intention to define what factors should be included.

The idea is that AP's can indicate by a parameter between 0 and 255, what their relative Resource Load is, so that stations can make this part of their "Roaming decision", which can result in better leveling of the load between AP's.

The value of this parameter in the Beacon would change over time, but should represent an averaged indication over some time, of all resource load factors involved.

In general a low level would indicate a healthy situation in which stations could expect sufficient performance provided that its link quality with the AP is sufficient.

A high value should discourage a station to use this resource unless he does not have sufficient alternatives available.

The following indicates what the changes are to section 4 to incorporate the suggested changes.

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	Resource Load	
6 5	ESS ID	
7 6	Supported Rates	
8 7	FH Parameter Set	1
9 8	CF Parameter Set	2
10 9	DTIM	
11 10	TIM	

4.2.3.9. Probe Response Frame Format

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

Order	Information	Note
1	Timestamp	
2	Beacon Interval	
3	Regulatory Domain	
4	Capability Information	
5	Resource Load	
65	ESS ID	
76	Supported Rates	
87	FH Parameter Set	1
98	CF Parameter Set	2

The following description should be added to section 4.4

4.4.x.y Resource Load parameter

The resource Load parameter field is a single octet with a value between 0 and 255, indicating in a generic way what the relative load is of the resources as experienced by the AP.

A high value of this parameter should discourage stations to use this resource, when they have acceptable alternative links with other AP's available.

