

IEEE P802.11
Wireless Access Method and Physical Layer Specifications

Title: Proposal to extend the Capability information field.

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Abstract:

This document proposes an extension of the currently specified Capability Information field as is used in several Management frames defined in the draft standard.

Introduction:

The currently defined management frames that deal with association, or (re)association preparation (probing) do all contain a Capability Information field that is currently defined as a one octet field, with 4 subfields assigned as follows.

Bit 0: Infrastructure BSS
Bit 1: Ad-hoc BSS
Bit 2: CF-aware
Bit 3: CF Polling Request
Bits 4 - 7: Reserved

The capability information conveyed in this field helps in determining the configuration of the network, and aids in configuring the station for communication.

The station needs to behave differently when it is to engage in an Infrastructure network versus an Ad-Hoc network. Similarly a CF capable station can configure itself, and can signal the optional PCF, what capabilities are available.

Except for the Beacon, which is transmitted at regular intervals, all other management frames that contain the Capability Information field are normally send in preparation of an association.

Proposal for the use of Bit 0 and 1

Given that an Infrastructure and an Ad-Hoc network are mutual exclusive, it could be possible to code this in one single bit. However stations that are probing for a network

with a given ESSID may not have any preference yet whether this is accomplished through an Infrastructure configuration or an Ad-Hoc configuration.

So stations that are initially probing around could have both bits at zero, indicating no preference. Then if they found a proper infrastructure they can start the association with that IS, and from then on set their IS bit in the Capability Information field.

If instead they detect an Ad-Hoc network, they can join that and indicate that in the Capability Information field.

Additional definition may be needed to allow the reconfiguration from an Ad-Hoc network to an IS network, when a station joins that network that is AP Capable as indicated in one of the proposed Capability Information fields.

Proposal to expand Capability Information Subfields

There is more information that should be shareable to aid in the configurability of a station. Furthermore a distinction could be made for AP specific capabilities, and station specific capabilities.

The following are a number of capability information candidates, that would be beneficial:

- | | |
|---------------------|---|
| 1- TBS capable | Time Bounded Service supported |
| 2- AP capable | For stations to consider an IBSS alternative |
| 3- DS connected | |
| 4- Power Save / CAM | AP can make a distinction for SID assignment. |
| 5- via WDS | |
| 6- WEP capable | |

TBS Capability:

- This field can indicate whether a station or AP does support the optional TBS service. Please note that when a station is PCF capable, then that does not necessarily mean that the station is able to support Time Bounded Services.

AP Capable:

- This field can be beneficial to determine whether an Ad-Hoc network or an IBSS with a null-DS configuration could be formed. This alternative is of particular interest since an Ad-Hoc network does no longer provide support for Power Save stations. Forming an IBSS instead could be very interesting for stations that prefer to operate in Power Save Mode if possible.

DS Connected:

- This indication is very usefull to distinguish an IBSS (single BSS without DS connection) from an Infrastructure network that has a DS attached.

The advantage is that it can indicate to the station that no Roaming is needed, so that a station does not spend time, power and medium bandwidth searching for other BSS's in the same ESS.

Power Save / CAM

- With this field a station can indicate whether it prefers to operate in Power Save Mode, or whether it is a Continuous Active Mode (CAM) station. Whether a station is indeed operating in Power Save Mode or not is dependent on the Ad-Hoc versus Infrastructure network configuration.

This field can aid an AP in efficiently assigning SID values, such that a station that does indicate to use the CAM mode can be assigned large SID values, such that available low linear code values can be reserved for stations that wants to operate in Power Save mode. This will improve the efficiency of the TIM field in a Beacon.

Via WDS

- With this field an AP can identify to association candidates whether the attached DS is a WDS, or whether the wired DS is via a WDS.

This may give a station the option to decide which is the preferred AP to associate with, given that more than one candidate AP has been found during the probing procedure. A station could expect better performance when it associates itself with an AP which is directly connected to a wired DS rather than a Wireless DS (WDS), at least when the direct DS connected AP has an acceptable link quality. Furthermore it would save bandwidth.

For configurations that can have multiple WDS segments it would be beneficial to get an indication how many WDS segments are there till the wired DS. This again would allow for delay and bandwidth use optimization decisions during association.

WEP Capable

- This field can indicate whether the optional 802.11 WEP capability is implemented in the station or AP.

Conclusion:

This paper has identified additional use of the Capability Information Field, and has identified the need, and provided additional definition of currently defined bits.

It is therefore proposed to increase the field to two octets, and define the additional fields as proposed.

