IEEE P802.11
Wireless Access Method and Physical Layer Specifications

Title: Changes to Draft Standard to implement Doc IEEE P802.11-94/247

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Abstract:

This document contains the required changes to Document P802.11-93/20B3 in order to support the recommendations of Document P802.11-94/247.

Introduction

The document is divided into two main sections, the first one describes the required changes to the draft, while the second section contains the appropriatte draft paragraph with the changes marked as underlined for new text.

Section 1. Changes Descriptions.

1. Add Definitions (Paragraph 1.2)

ESS_BASIC_RATE_SET:

A set of rates that all the stations on the given ESS are required to be capable to **receive**. According to the PHYs definitions the default ESS BASIC RATE SETs for the different PHYs will be:

For DS: {1,2}
For FH: {1}
For IR: {1,2}

Note that this value is preset for all stations in the ESS.

STATION_BASIC_RATE:

A value belonging to the ESS BASIC RATE SET, that is used by the station for specific **transmissions** (it could change dynamically, for example the Station Basic Rate on the IR depends on the Power Consumption Mode of the Station).

EXTENDED_RATE_SET:

The set of rates beyond the BASIC_RATE_SET that a station supports. This can be a speed that is defined in future PHY standards.

2. Add note specifying IFS independence of Bit Rate (Paragraph 5.2.4)

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It should be noticed that the different IFSs are independent of the station bitrate, and are fixed per each PHY (even in Multi-rate capable PHYs), .

3. Add introduction of MultiRate support on Paragraph 5.2. (Distributed Coordination Function)

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The basic medium access protocol allows for stations supporting different set of rates to coexist, this is achieved by the fact that all stations are required to be able to receive any frame transmitted on a given set of rates, and must be able to transmit at (at least) one of these rates. All Multicast, Broadcast and Control frames (RTS, CTS and ACK) are always transmitted at one of this mandatory rates. This set of restrictions will assure that the Virtual Carrier Sense Mechanism described above will still work on multiple rate environments.

4. Add MultiRate Support Chapter (between 5.6 and 5.7)

The following set rules must be followed by all the stations to assure coexistance and interoperability on MultiRate Capable PHYs.

All Control Frames (RTS, CTS and ACK) are transmitted on the STATION_BASIC_RATE (which as specified before belongs to the ESS_BASIC_RATE) so they will be understood by all the stations in the ESS.

All Multicast and Broadcast Frames are transmitted on the STATION_BASIC_RATE, regardless of their type.

Unicast Data and/or Management Frames are sent on any available transmit rate. The algorithm for selecting this rate is implementation dependent and is beyond the scope of this standard.

5. Duration Field Definition (Paragraph 4.1.2.5)
[Note: The duration field is pretty vague, it should be better specified regardless of this proposal].

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The duration is specified in microsecond units.

6. Supported_Rate Element Definition (Paragraph 4.4.27)

4.4.27. Supported Rates
This field specifies all the rates in which this station is capable to receive. It is encoded as a variable number of octets where each octet describes a single supported rate in units of 100 KBit/s (e.g. a 1 Mbps rate will be encoded as 0x0A). The element-specific field length ia a variable number of octets.

7. Add Supported_Rate Element to Management Frames

Specify that the Supported_Rate Element may be included in the Association Request/Response and the Probe Request/Response

Section 2. Updated Draft

Paragraph 1.2.

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Basic Service Area (BSA). The area within which members of a basic service set can communicate.

Basic Service Set (BSS). A set of stations controlled by a single coordination function.

ESS Basic Rate Set: A set of rates that all the stations on the given ESS are required to be capable to receive. According to the PHYs definitions the default ESS Basic Rate Sets for the different PHYs will be:

For DS: {1,2}

For FH: {1}

For IR: {1,2}

Note that this value is preset for all stations in the ESS.

Channel. An instance of medium use for the purpose of passing protocol data units that can coexist with other instances of medium use.

single channel	n-channel
1-narrowband channel	FDM channels
DSS with 1 code	DSS with CDMA

Confidentiality. The property of information that is not made available or disclosed to unauthorized individuals, entities or processes.

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Distribution System Services (DSS). The set of services provided by the distribution system which enable the MAC to transport MAC service data units between basic service sets within an extended service set.

Extended Rate Set: The set of rates beyond the Basic Rate Set that a station supports. This can be a speed that is defined in future PHY standards.

Extended Service Area (ESA). The area within which members of an extended service set can communicate. An extended service area is larger or equal to a basic service area.

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Station (STA). Any device which contains an 802.11 conformant MAC and PHY interface to the wireless medium.

Station Basic Rate: A value belonging to the ESS Basic Rate Set, that is used by the station for specific transmissions (it could change dynamically, for example the Station Basic Rate on the IR depends on the Power Consumption Mode of the Station).

Station Services (SS): The set of services which support transport of MSDUs between Stations within a ESS.

5.2. Distributed Coordination Function

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This parameter is a manageable object and can be set on a per station basis. This mechanism allows stations to be configured to use RTS/CTS either always, never or only on frames longer then a specified payload length.

Although a station can be configured not to initiate RTS/CTS to transmit its frames, every station shall respond to the duration information in the RTS/CTS frames to update its virtual Carrier Sense mechanism, and respond with a proper CTS frame in response to an addressed RTS frame.

The basic medium access protocol allows for stations supporting different set of rates to coexist, this is achieved by the fact that all stations are required to be able to receive any frame transmitted on a given set of rates, and must be able to transmit at (at least) one of these rates. All Multicast, Broadcast and Control frames (RTS, CTS and ACK) are always transmitted at one of this mandatory rates. This set of restrictions will assure that the Virtual Carrier Sense Mechanism described above will still work on multiple rate environments.

5.2.4. Inter-Frame Space (IFS)

The time interval between frames is called the inter-frame space. A STA shall determine that the medium is free through the use of the carrier sense function for the interval specified. Three different IFS are defined so as to provide a corresponding number of priority levels for access to the wireless media.

It should be noticed that in Multi-rate capable PHYs, the different IFSs are independent of the station bitrate, and are fixed per each PHY.

5.7. Multi Rate PHYs Support

Some PHYs provide Multi Rate Capabilities, in order to assure coexistance and interoperability of stations working at different rates, the following set of rules must be obeyed:

All Control Frames (RTS, CTS and ACK) are transmitted on the Station Basic Rate (which is defined as belonging to the ESS Basic Rate Set), so all the stations belonging to the ESS will be able to decode the relevant information.

All Multicast and Broadcast Frames are transmitted on the Station Basic Rate, regardless of their type.

Unicast Data and/or Management Frames are sent on any available transmit rate. The algorithm for selecting this rate is implementation dependent and is beyond the scope of this standard.

4.1.2.5. Duration

The Duration field is a 16-bit field. It shall be used to distribute a value that shall update the Network Allocation Vector in stations receiving the frame. The duration is expressed in microsecond units.

4.4.26. Hop Timing

This field shall provide a time reference to the station regarding the current hop sequence. The first field is a 32 bit time in microseconds from the beginning of the hop pattern to the time reference of the frame that includes this element. The second field is a 32 bit time in microseconds for the length of a hop. The element specific field length is eight octets.

4.4.27. Supported Rates

This field specifies all the rates in which this station is capable to receive. It is encoded as a variable number of octets where each octet describes a single supported rate in units of 100 KBit/s (e.g. a 1 Mbps rate will be encoded as 0x0A). The element-specific field length ia a variable number of octets.

4.2.3.4. Association Request Frame Format

The Frame Body shall consist of the privacy algorithm number, and the Supported Rates

4.2.3.5. Association Response Frame Format

The Frame Body shall consist of a status value, an error indication, the station ID (SID) assigned and the AP's Supported Rates

4.2.3.8. Probe Request Frame Format

The Frame Body shall consist of the Supported Rates Element.

4.2.3.9. Probe Response Frame Format

The Frame Body shall consist of time stamp, weight , beacon interval, DTIM Period, DTIM Count, channel sync information, ESS ID, and the Supported Rates.