IEEE 802.11
Wireless Access Method and Physical Layer Specifications

Title: **Regulatory Document References for the Frequency Hop PHY**

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Abstract: This submission proposes text changes to regulatory references in the frequency hop PHY section of the draft. This submission was prepared per the FH PHY sub-group's request.

Introduction:

Regulatory references are distributed throughout the FH PHY PMD specification. This submission was prepared in response to various letter ballot comments that regulatory information should be consolidated in an introductory paragraph in the PMD.

Note that the text of the draft standard has been modified and issued in document 95-76. The proposed changes are currently undergoing letter ballot. Since 95-76 contains significant changes in the sections referenced below, this submission is based upon 95-76 rather than the draft. If 95-76 is not approved by the letter ballot, the author proposes that the changes made to these sections in 95-76 be adopted within the draft, as modified below.

Summary of Proposed Changes

1. An introductory paragraph is added at the beginning of the PMD section.

2. Minor revisions are proposed for sections 10.6.5., 10.6.6, 10.6.8, and 10.6.9.

Proposed Text

(NEW) 10.6.1.2 Regulatory Requirements

Wireless LANs implemented in accordance with this standard are subject to equipment certification and operating requirements established by Regional and National regulatory authorities. The PMD specification establishes minimum technical requirements for interoperability, based upon established regulations for Europe, Japan, and the USA at the time of the draft. Requirements that are subject to local geographic regulations are annotated within the PMD specification. Regulatory requirements that do not affect interoperability are not addressed within this standard. Implementers are referred to the following regulatory sources for further information. Operation in countries within Europe, or other regions outside Japan or North America, may be subject to additional or alternative National regulations.

Europe:

Approval Standards: European Technical Standards Institute

Documents: ETS 113-300, ETS 113-339

Approval Authority: National Telecommunications Agencies

Japan:

Approval Standards: Research and Development Center for Radio Communications (RCR)

Documents: RCR STD-33

Approval Authority: Ministry of Telecommunications (MKK)

North America:

Approval Standards: Department of Communications (DOC), Canada

Documents: GL36

Federal Communications Commission (FCC) , USA

Documents: CFR47, Part 15, Sections 15.205, 15.209, 15.247.

Approval Authority: DOC (Canada); FCC (USA)

Notes:

1. Canadian requirements are based on US requirements. Should North America be substituted for USA elsewhere in the draft?

10.6.5 Occupied Channel Bandwidth

Replace current text with:

Occupied channel bandwidth shall meet all applicable local geographic regulations for 1 MHz channel spacing.

10.6.6 Minimum Hop Rate

The ~~rate at which the~~ PMD entity <u>will hop at a rate</u> ~~is required to hop~~ is governed by the MAC. ~~Since the MAC must have the ability to maximize the use of each hop interval, the MAC must tell the PMD when to hop, thus defining the system hop rate.~~ The minimum hop rate~~, on the other hand,~~ will be governed by the regulatory authorities. <u>Minimum hop rate is a managed object with a default value of 2.5 hops/second.</u>

~~. The minimum hop rate is specified by the number of channels visited divided by the total time spent on each of these channels. For the U.S.A., Part 15.247 of the Rules of the FCC states that a PMD must visit at least 75 channels in a 30 second period:~~

$$\frac{\text{Number of Channels}}{\text{Total Dwell Time}} = \frac{75\ (\text{channels})}{30\ (\text{seconds})} = 2.5\ \text{hops/second in}$$

10.6.8 Unwanted Emissions

Conformant PMD implementations of this FHSS standard shall limit the emissions that fall outside of the operating frequency range, defined in Table 10-10 of Section 10.6.2, to the geographically applicable ~~regulations~~ limits. ~~For the U.S.A., the Rules of the FCC parts 15.247, 15.205 and 15.209 are the applicable regulations that govern these emissions. For Japan, RCR STD-33 and for Europe, ETS 300 328, are the applicable regulations.~~

10.6.9 Modulation

<u>The PMD shall be</u> ~~It is~~ capable of operating using 2 level Gaussian Frequency Shift Key (GFSK) modulation with a nominal bandwidth bit-period (BT)=0.5. The PMD <u>shall</u> accept~~s~~ symbols from the set {{1},{0}} from the PLCP. The symbol {1} <u>shall be</u> ~~is~~ encoded with a peak deviation of (+f), giving a peak transmit frequency of (F_c+f), which is greater than the carrier center frequency (F_c). The symbol {0} <u>shall be</u> ~~is~~ encoded with a peak frequency deviation of (-f), giving a peak transmit frequency of (F_c-f).

The <u>peak</u> frequency deviation, as shown in <u>Figure</u> 10-16 below shall be greater than 110 kHz relative to the nominal center frequency F_c. F_c is the <u>average</u> center frequency of the last 8 bits of the preamble prior to the unique word. The deviation <u>shall</u> ~~is to~~ be measured mid symbol. <u>Maximum deviation is not specified, but modulation is subject to the occupied bandwidth limits of 10.6.5.</u>

The zero crossing error shall be less than +/- 1/8 of a symbol period. The zero crossing error is the time difference between the ideal symbol periods and measured crossings of F_c. This is illustrated in Figure 10-16 below.

References

1. <u>DOC: IEEE P802.11-95/76</u>, FH PHY Proposed Revisions to Section 10, Dean Kawaguchi, Ed Geiger, Jim Renfro, Jerry Loraine, Editors. March 1995

2. <u>P802.11/D1 Draft Standard IEEE 802.11</u>. Sections 10.