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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

APR - 7 1995
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of	)	
	)	
Amendment of Section 15.247(a)(1)(ii)	)	RM-8608
of the Commission'sRules on Spread	)	
Spectrum Operation	)	

COMMENTS OF APPLE COMPUTER, INC.

Apple Computer, Inc. ("Apple") hereby submits its comments in response to the Petitions for Rulemaking filed by SpectraLink Corporation ("SpectraLink") and Symbol Technologies, Inc. ("Symbol").[1]

Both SpectraLink and Symbol seek a reduction of the minimum number of hopping frequencies required for frequency-hopping spread-spectrum devices under Section 15.247 of the Rules. Specifically, SpectraLink proposes that devices operating in the 902-928 MHz band be permitted to use as few as 25 hopping channels; devices using between 25 and 50 hopping channels would be subject to a maximum peak output power of 500 mW. Symbol proposes that devices operating in the 2400-2483.5 or 5725-5850 MHz bands be permitted to use as few as 15 hopping frequencies and to operate using a higher bandwidth.

I. SPECTRALINK'S PETITION RESPONDS TO CHANGES IN THE RULES GOVERNING THE 902-928 MHZ BAND AND THE COMMISSION SHOULD TAKE PROMPT STEPS TO IMPLEMENT ITS PROPOSAL.

SpectraLink's creative petition accurately anticipated the rules adopted by the Commission that gave primary, licensed status to LMS systems in the 902-928 MHz band.[2] The Commission's decision formalized an approach for band

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1 SpectraLink Corporation Petition for Rulemaking, RM-8609 (filed January 18, 1995); Symbol Technologies, Inc. Petition for Rulemaking, RM-8608 (filed December 6, 1994). Because the SpectraLink and Symbol Petitions involve related issues, Apple is addressing the petitions jointly. To avoid confusion, however, Apple is filing an identical copy of these comments in both RM-8608 and RM-8609.

2 Report and Order, PR Docket No. 93-61 (adopted February 3, 1995).

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sharing among unlicensed Part 15 devices, multilateration LMS systems ("M-LMS"), non-multilateration LMS systems ("N-LMS"), and others.

Now that the Commission has adopted rules governing how these types of devices and systems will share the 902-928 MHz band, it is important to consider other changes that flow from this decision — in particular, changes in the occupancy requirements for Part 15 devices operating in the band. Appropriate modifications to the Part 15 rules will address the needs of Part 15 manufacturers and users, by permitting designs that are less likely to suffer interference from M-LMS systems or be required to shut down due to interference caused to M-LMS systems. Appropriate modifications would also serve the interests of M-LMS providers, by ensuring that Part 15 devices are not forced to operate in a manner that raises the risk of interference to these systems. At a minimum, Part 15 devices should be permitted (and in fact encouraged) to operate in a manner that will minimize potential interference.

Currently, Section 15.247 requires frequency hopping systems in the 902-928 MHz band to transmit on at least 50 non-overlapping channels. The minimum permitted channel spacing is 25 kHz, and the maximum permitted channel bandwidth is 500 kHz.[3] As SpectraLink points out, wideband systems operating under these rules utilize virtually the entire 902-928 MHz band and, therefore, must hop to, and transmit in, portions of the band that have been allocated to, and increasingly will be used by, M-LMS systems.

SpectraLink's proposal to reduce the required number of hops in the 902-928 MHz band, with an attendant power reduction of 3 dB for systems opting to use fewer than 50 channels to retain the same power spectral density, has substantial merit and few, if any, downside results.[4] It should be welcomed

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[3] When the spread-spectrum rules were first adopted by the Commission, the maximum allowable bandwidth of a hopping channel was 25 kHz. See Section 15.126(d) as adopted in First Report and Order, GEN Docket No. 81-413 (May 9, 1985). The rule was subsequently modified to allow 500 kHz hopping channels in the 902-928 MHz band, to provide for relatively wideband systems such as those developed by SpectraLink and many others. See Section 15.247 (a)(1)(i), as adopted in Report and Order, GEN Docket 89-354 (July 13, 1990). Without the revisions called for by SpectraLink, measures required to avoid interference from and to M-LMS would have the effect of reversing critical benefits of the Commission's action in GEN Docket 89-354.

[4] SpectraLink implies that permitting non-contiguous hopping channels would further allow for avoidance of interference. SpectraLink Petition at 6. Section 15.247 does not

both by suppliers of Part 15 devices and by LMS licensees.[5] As SpectraLink stated, the Commission should "preserve Part 15 access to the 902-928 MHz band and facilitate peaceful coexistence with wideband AVM/LMS multilateration systems."[6] SpectraLink's petition shows the way to do this and should be expeditiously granted.

II. SYMBOL'S PETITION SEEKS TO ACHIEVE IMPORTANT OBJECTIVES AND ITS PROPOSAL MERITS FURTHER STUDY IN THE CONTEXT OF AN NPRM.

Symbol's Petition seeks changes in the spread spectrum rules governing the 2400-2483.5 and 5725-5850 MHz bands in order to achieve important objectives: to harmonize U.S. standards with European standards, and to permit wireless LANs to operate at higher data rates than can be achieved under the current rules, while protecting other users of the band from increased interference.[7] Apple fully supports these goals, and believes that the Commission should take further steps to study Symbol's Petition and, in particular, the possibility of permitting manufacturers to employ wider hopping channels to support higher data rates.

Several aspects of Symbol's specific recommendation, however, require further consideration. For example, Symbol's proposal does not appear to address the risk that narrow-band implementations employing fewer hopping channels could dominate a frequency range and cause that range to appear occupied (and hence unavailable) to devices employing wideband channels. In addition, adoption of Symbol's proposal at this time could adversely affect the efforts of the IEEE 802.11 Committee to develop an industry-wide standard for wireless LANs using spread spectrum in the 2400-2483.5 MHz band. Finally, as

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require contiguity of hopping channels, and thus no rule change is required to fulfill this part of SpectraLink's model.

[5] Since the proposed rule change provides only further latitude, not further restrictions, on Part 15 devices, it will not force manufacturers who are content with the current rules to redesign their products.

[6] SpectraLink Petition at 4.

[7] Symbol's Petition also sought to respond to the Commission's proposal to auction the 2402-2417 to a licensed commercial service. This concern has been rendered moot by the Commission's decision in ET Docket No. 94-32 to preserve this band for use by Part 15 devices and Amateur operators.

currently drafted Symbol's proposed amendment of the rules would not appear to achieve Symbol's goal of higher data throughput.[8]

The Commission should also consider Symbol's request in a larger context. In particular, additional consideration should be given to the needs of non-LAN devices, to ensure that any rule changes meet the overall requirements of all users of the band.[9]

Apple supports modifying the rules to permit faster data rates, to the extent that this can be accomplished without adversely affecting other users of the bands. It is possible that a less radical change (such as permitting fewer than 75 required hopping channels, but not so few as 15, combined with constraints on minimum or maximum bandwidths or power differentials) could enable systems to deal better with ISM interference and provide for faster data rates, without creating offsetting problems. In addition, other actions taken by the Commission — including its allocation of spectrum for Data-PCS at 2390-2400 MHz, where etiquette-compliant asynchronous devices with RF bandwidths up to 10 MHz are permitted, and its proposal to develop the "millimeter wave" bands and to allocate as much as 8.5 GHz of spectrum above 40 GHz for unlicensed use — may provide some of the opportunities for high-bandwidth transmissions sought by Symbol and many others, including Apple.

CONCLUSION

For the reasons discussed herein, Apple urges the Commission to initiate a rulemaking to modify the rules governing the 902-928 MHz in order to permit spread spectrum devices operating in this band to use as few as 25 hopping channels (subject to a maximum peak output power of 500 mW for devices using between 25 and 50 channels). In addition, Apple encourages the Commission to

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[8] The proposed hopping requirement that allows each of 15 frequencies to be used for a maximum of 0.4 seconds each within a 30 second period would require the transmitter to be silent for 24 seconds in each 30 second window. Apple understands that Symbol recognizes this anomaly, and is refining its proposal to address it.

[9] This would include both other users operating under the spread spectrum rules, as well as, for example, devices operating under Section 15.249. In addition, proposals to create a new "Part 16" could influence the manner in which spectrum users' needs are best addressed.

further examine the issues raised by Symbol, with the objective of better exploiting the 2400 MHz band, particularly for higher-speed data.

Respectfully submitted,

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April 7, 1995

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing Comments of Apple Computer, Inc. was sent by first-class mail, postage prepaid, this 7th day of April, 1995, to each of the following:

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