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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Before the
Federal Communications Commission
Washington DC 20554

ET Doc. 99-231

In the Matter of	)	
	)	
Wi-LAN, Inc.,	)	File No. _____
Application for Certification of an Intentional	)	
Radiator Under Part 15 of the Commission's	)	
Rules, FCC ID K4BAP01	)	

TO: Chief, Office of Engineering and Technology

PETITION FOR RECONSIDERATION AND
ALTERNATIVE REQUEST FOR WAIVER

Mitchell Lazarus
FLETCHER, HEALD & HILDRETH, P.L.C.
1300 North 17th Street, 11th Floor
Arlington, VA 22209
703-812-0440
Counsel for Wi-LAN, Inc.

May 26, 2000

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List A B C D E

Table of Contents

		Page
I.	SUMMARY	1
II.	ALTERNATIVE REQUEST FOR WAIVER	3
III	BACKGROUND	3
IV.	DISCUSSION	4
	A. The Device Meets the Criteria in the Commission's Rules for a Direct Sequence Spread Spectrum System	4
	B. Processing Gain Exhibited by the Device Satisfies the Commission's Requirements	7
	C. Prior Denials of Other Applications Are Irrelevant to This Proceeding	9
V.	CONCLUSION	10

ANN BAVENDER*
ANNE GOODWIN CRUMP
VINCENT J. CURTIS, JR.
PAUL J. FELDMAN
FRANK R. JAZZO
ANDREW S. KERSTING
EUGENE M. LAWSON, JR.
SUSAN A. MARSHALL*
HARRY C. MARTIN
RAYMOND J. QUIANZON
LEONARD R. RAISH
JAMES P. RILEY
ALISON J. SHAPIRO
KATHLEEN VICTORY
JENNIFER DINE WAGNER*
HOWARD M. WEISS
ZHAO XIAOHUA*

*NOT ADMITTED IN VIRGINIA

FLETCHER, HEALD & HILDRETH, P.L.C.
ATTORNEYS AT LAW
11th FLOOR, 1300 NORTH 17th STREET
ARLINGTON, VIRGINIA 22209-3801

(703) 812-0400
TELECOPIER
(703) 812-0486
INTERNET
www.fhh-telcomlaw.com

RETIRED MEMBERS
RICHARD HILDRETH
GEORGE PETRUTSAS

CONSULTANT FOR INTERNATIONAL AND INTERGOVERNMENTAL AFFAIRS
SHELDON J. KRYS
U. S. AMBASSADOR (ret.)

OF COUNSEL
EDWARD A. CAINE*
DONALD J. EVANS*
MITCHELL LAZARUS
EDWARD S. O'NEILL*

WRITER'S DIRECT

703-812-0440
lazarus@fhh-telcomlaw.com

May 26, 2000

BY HAND DELIVERY
Ms. Magalie Salas, Secretary
Federal Communications Commission
445 12th Street SW, Room TW-B204
Washington DC 20554

Re: Wi-LAN, Inc., Application for Certification of an Intentional Radiator Under Part 15 of the Commission's Rules, FCC ID K4BAP01

File No. _____

FCC LABORATORY
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Dear Ms. Salas:

On behalf of Wi-LAN, Inc. (Wi-LAN), pursuant to Sections 1.106 and 2.923 of the Commission's Rules, I enclose for filing the original and four copies of a "Petition for Reconsideration and Alternative Request for Waiver" in the above-referenced proceeding.

Wi-LAN asks the Office of Engineering and Technology to reverse its denial of certification of a spread spectrum transmitter, inasmuch as the device complies in full with all applicable rules.

Ironically, in these days of congested spectrum, OET faulted the device mainly for its higher-than-usual spectrum efficiency. This is not a disqualification under the Rules.

Because Wi-LAN will be seriously harmed in the marketplace by even a short additional delay in certification, Wi-LAN asks the Commission to immediately grant relief on its own motion pursuant to Section 1.108. Alternatively, the Commission should grant certification expeditiously, without public notice, and in advance of a written order. If prompt action is not possible, then W-LAN urgently requests a waiver pending resolution of the proceeding.

Kindly date-stamp and return the extra copy of this cover letter.

If there are any questions about this filing, please call me at the number above.

Respectfully submitted,

Mitchell Lazarus
Counsel for Wi-LAN, Inc.

ML:deb

cc: Service List
William C. Hews
Ramesh Uppal
Eric Godberson
Wi-LAN, Inc.

Before the
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TO: Chief, Office of Engineering and Technology

PETITION FOR RECONSIDERATION AND
ALTERNATIVE REQUEST FOR WAIVER

Pursuant to Sections 1.106 and 2.923 of the Commission's Rules, Wi-LAN, Inc, (Wi-LAN) seeks reconsideration of the Commission's denial of the above-captioned application (Application) for certification of a spread spectrum product (Device).[1] The Commission denied the Application by letter dated May 12, 2000 (copy attached).

For the reasons stated below, Wi-LAN asks the Commission to reverse its decision and grant the Application. If the Commission cannot do so promptly, then Wi-LAN requests a waiver to permit marketing of the Device pending this proceeding.

I. SUMMARY

The Application meets all applicable requirements in the Commission's Rules. ***None of the stated grounds for denial appears in the Rules.*** The denial of an application for violation of conditions outside the Rules is arbitrary and capricious.

More specifically, the May 12 denial letter refers to two violations: that the Device occupies less bandwidth than other direct sequence systems, and that it does not use a classic

---

[1] The Application was filed on February 17, 2000, and supplemented at the Commission's request on April 18 and May 9, 2000.

correlator to collapse the spread waveform. The Rules do not mention either of these criteria. Although spectrum inefficiency and classic corellators may have been typical of spread spectrum systems in the past, that hardly justifies treating them as regulatory requirements now. The high-speed CCK modulation does not meet either of these conditions, although it has been certified by the Commission, so that invoking the conditions here is unreasonably discriminatory.

The Rules specify technology-neutral requirements for spread spectrum systems, such as energy distribution and processing gain. Wi-LAN's product complies with these in full. Its only apparent fault, in the Commission's eyes, is more efficient performance than its predecessors. It is particularly ironic that the Commission disqualifies the Device for improved spectrum efficiency at time when spectrum resources are becoming scarce and congested.

The May 12 letter cites prior denials as precedent for the decision. This is wholly improper. None of the prior applications is identified. Even if they were, the Commission's own confidentiality rules would bar Wi-LAN from access to those applications. Wi-LAN is confident that the prior applications cannot have presented the same technology, because the modulation techniques implemented in the Device are protected by Wi-LAN's U.S. patents. But Wi-LAN is denied the information needed to make that case, so any reliance on the precedents violates elementary due process. In any event, even if the prior applications had been similar on the facts, their denial still could not justify an unlawful decision here.

Urgency. The Device is approved for marketing in Canada and Europe. In today's competitive global marketplace, even a short delay in U.S. certification can seriously damage an applicant. Additional delays pending reconsideration of an unwarranted denial compound the detriment. To minimize unfair harm, Wi-LAN asks the Commission to summarily approve the

Application on its own motion pursuant to Section 1.108.[2] In the alternative, Wi-LAN notes that no other party will be adversely affected by a grant of the Application and, to achieve an expeditious result, asks the Commission to act without public notice.[3] Moreover, if the Commission intends to prepare an order pursuant to Section 1.106(j), it should not withhold grant of the Application while doing so.

II. ALTERNATIVE REQUEST FOR WAIVER

If the Commission is unable to act promptly on reconsideration, Wi-LAN respectfully requests a waiver pursuant to Section 1.3 to permit marketing of the Device pending resolution of this Petition. The grounds for waiver are same as for reconsideration, as set forth below.

III. BACKGROUND

As described in the Application and supplemental filings, the Device uses a modulation Wi-LAN calls "Wideband Orthogonal Frequency Division Multiplexing," or W-OFDM. This modulation spreading technique combines the desirable attributes of high resistance to interference, as demonstrated by its processing gain, and high data throughput. Wi-LAN holds U.S. patents on W-OFDM.[4]

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[2] The Commission can take this action through June 12, 2000, which is the 30th day after the May 12 letter. Alternatively, the Commission can extend the 30-day limit pursuant to Section 1.3.

[3] Moreover, public notice would necessarily entail disclosure of information related to the application that is presently protected from disclosure pursuant to Section 0.457(d)(1)(ii).

[4] Specifically, Wi-LAN holds two U.S. patents for W-OFDM as spread spectrum: No. 5,282,222, *Method and Apparatus for Multiple Access between Transceivers in Wireless Communication using OFDM Spread Spectrum*; and No. 5,555,268, *MultiCode Direct Sequence Spread Spectrum*. The second patent links to the first because W-OFDM is a special case of MC-DSSS, as described and shown in the patent documents.

The Commission's letter of May 12 states three grounds for denying the Application:

1. that the Device does not meet the definition of a direct sequence spread spectrum (DSSS) system, as specified in Section 2.1 of the Commission's Rules, in that it minimizes the occupied bandwidth necessary to send the information transmitted;

2. that the Device does not use a classic correlator used to collapse the spread waveform; and

3. that the Commission's denial of the Application is consistent with its denials of other applications describing OFDM type systems.

None of these grounds is supported by the Commission's Rules. To the contrary, the Device complies in full with all applicable Rules and qualifies for certification.

IV. DISCUSSION

A. The Device Meets the Criteria in the Commission's Rules for a Direct Sequence Spread Spectrum System.

The Commission's May 12 letter states:

> [W]e disagree with your conclusion that [the Device] meets the definition of a Direct Sequence Spread Spectrum System (DSSS system), as specified in Section 2.1. It definitely does not meet the intent of the definition of a DSSS system. By nature, a DSSS emission utilizes an occupied bandwidth much greater than the bandwidth necessary to transmit the information. An OFDM type emission, on the other hand, does just the opposite, by minimizing the occupied bandwidth necessary to send the information transmitted.

Section 2.1, cited in this passage, provides:

> *Direct Sequence Systems.* A spread spectrum system in which the carrier has been modulated by a high speed spreading code and an information data stream. The high speed code sequence dominates the "modulating function" and is the direct cause of the wide spreading of the transmitted signal.[5]

---

[5] 47 C.F.R. Sec. 2.1.

Wi-LAN's Device satisfies the plain wording of this definition.[6] The Commission does not dispute this directly, but instead charges Wi-LAN for failure to meet what the Commission calls the "intent" of the definition. Specifically, the Commission claims that a DSSS system "by nature" uses more spectrum than necessary -- *i.e.*, that a DSSS system is inherently spectrally inefficient. From there, the Commission disqualifies the Device for its efficiency.

Nothing in the Commission's Rules requires a DSSS system to be spectrally inefficient. Certainly nothing in the definition of "direct sequence system," quoted above, requires it. Neither the 1985 order that adopted the definition,[7] nor the 1997 order that revised it to its present form,[8] links the definition to spectrum inefficiency.[9] It is true that early spread spectrum systems tended to be spectrally inefficient, and this property may have become part of the engineering folklore. But the Commission must grant or deny applications in accordance with the Rules, not the prevailing preconceptions. A system qualifies for certification if it meets the

---

[6] The Device likewise complies with the Commission's definition of a spread spectrum system: "an information bearing communications system in which: (1) Information is conveyed by modulation of a carrier by some conventional means, (2) the bandwidth is deliberately widened by means of a spreading function over that which would be needed to transmit the information alone. (In some spread spectrum systems, a portion of the information being conveyed by the system may be contained in the spreading function.)" *Id.*

[7] Spread Spectrum and Other Wideband Emissions, 101 F.C.C.2d 419 (1985).

[8] Spread Spectrum Transmitters, 12 FCC Rcd 7488 (1997). Because the 1985 definition had been overtaken by technological change, the 1997 order eliminated ties to specific spreading techniques and rephrased the definition into a more general form. *See id.*, 12 FCC Rcd at 7507.

[9] The closest that either document comes is an early footnote reference to the possible advantages of the "spreading or dilution of the *energy* in spread spectrum systems over a wide bandwidth." Spread Spectrum and Other Wideband Emissions, 101 F.C.C.2d at 419 n.1. The Device's compliance with rules on energy spreading is not in question. At issue, rather, is the spreading of the information transmitted.

definitional requirements of Sections 2.1, along with the energy distribution, processing gain, and other technical requirements of Section 15.247. The notion in the May 12 letter that a DSSS system must occupy a "much greater" bandwidth than otherwise simply has no regulatory basis.[10]

The hallmark of spread spectrum is the ability to maintain a low threat of interference to other users and robustness in the face of incoming interference, while achieving a useful range and throughput. The low threat of interference results from energy distribution over a wide band of frequencies. This has nothing to do with data rates. Robustness against interference is the quality measured by processing gain. In the past, perhaps, designers had to sacrifice throughput to achieve adequate processing gain. But technology has advanced. Wi-LAN engineers have found a way to meet the Commission's requirements while increasing throughput beyond the levels formerly considered achievable. ***In a time of pressing spectrum shortage, it is odd to see the Commission reject an otherwise compliant product primarily because it is spectrum efficient.***

The standard textbook in the field supports Wi-LAN's position. Wi-LAN's design uses error correction coding to make a higher payload far more tolerant of interference. The net effect is to maintain processing gain despite the increased throughput. Robert Dixon's textbook expressly considers this class of techniques to be an example of spread spectrum, notwithstanding that more information is transmitted over a given frequency range:

> It is worthy of note that another technique exists that trades bandwidth for bit-error-rate improvement. To wit: error correction coding, in which

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[10] In any event, the Commission overlooks the criterion of "much greater" bandwidth when it certifies CCK implementations. These typically operate at 11 Mbps over only 22 MHz of null-to-null bandwidth of the main lobe, yielding a spectrum efficiency of 0.5 bits/sec/Hz.

> parity is added to data for the purpose of detecting or correcting errors in the composite data-plus-parity stream. The parity, however, increases the overall transmission rate, thereby increasing the bandwidth of the transmitted signal. ***Error correction coding could therefore be considered to be a form of spread spectrum, even though the bandwidth employed is usually much less than with other spread spectrum methods.***[11]

In short, the Device qualifies as a DSSS system under the Commission's rules. The Commission could have, but did not, choose to define spread spectrum by setting an upper bound on spectrum efficiency.[12] Instead, it opted for the wiser course of specifying characteristics that give spread spectrum its unique ability to coexist with other users: energy distribution and processing gain. That regulatory strategy freed the industry to maximize benefits to the public, while maintaining the band-sharing advantages of spread spectrum transmission. Wi-LAN should not now be penalized for its success.

B. Processing Gain Exhibited by the Device Satisfies the Commission's Requirements.

The Commission's May 12 letter states:

> In addition, processing gain, as it is specifically defined in Section 15.247(e), is the gain realized by the spreading/despreading function, after the received signal is filtered to the information bandwidth. Implied is a classic correlator used to collapse the spread waveform. The fact that an OFDM type system is capable of passing a CW jamming margin test does not make it a DSSS system.

Section 15.247(e), cited in this passage, provides:

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[11] Robert C. Dixon, Spread Spectrum Systems with Commercial Applications at 9 (3rd ed. 1994) (emphasis added).

[12] Just last year, the Commission declined to prohibit direct sequence systems using fewer than 10 chips/symbol. Spread Spectrum Devices, 14 FCC Rcd 13046, 13050 at para. 13 (1999) (Notice of Proposed Rule Making).

> (e) The processing gain of a direct sequence system shall be at least 10 dB. The processing gain represents the improvement to the received signal-to-noise ratio, after filtering to the information bandwidth, from the spreading/despreading function. The processing gain may be determined using one of the following methods: . . . . [13]

The rule section goes on to describe the two approved tests for processing gain. One of those is the CW jamming margin test that qualifies Wi-LAN's Device.[14]

Wi-LAN does not dispute the first sentence quoted above from the Commission's letter, which defines processing gain. This language tracks the Rule. The second sentence, however -- the implied requirement of a classic correlator to collapse the spread waveform -- has no basis in the Rules. Again, the use of a classic correlator may once have been commonplace in spread spectrum design, and so may have become closely associated with DSSS systems. But that is a matter of engineering choice, not Commission regulation. Indeed, considering that routinely-certified 11 Mbps CCK systems do not use classic correlators, it is unclear why the Commission raises the issue here.

Finally, the May 12 letter states, "The fact that an OFDM type system is capable of passing a CW jamming margin test does not make it a DSSS system." We respectfully disagree.

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[13] 47 C.F.R. Sec. 15.247(e).

[14] "As measured using the CW jamming margin method: a signal generator is stepped in 50 kHz increments across the passband of the system, recording at each point the generator level required to produce the recommended Bit Error Rate (BER). This level is the jammer level. The output power of the intentional radiator is measured at the same point. The jammer to signal ratio (J/S) is then calculated, discarding the worst 20% of the J/S data points. The lowest remaining J/S ratio is used to calculate the processing gain, as follows: Gp = (S/N) o + Mj + Lsys, where Gp = processing gain of the system, (S/N) o = signal to noise ratio required for the chosen BER, Mj = J/S ratio, and Lsys = system losses. Note that total losses in a system, including intentional radiator and receiver, should be assumed to be no more than 2 dB." 47 C.F.R. Sec. 15.247(e)(2).

The fact that the Device passes a CW jamming margin test establishes that it meets the Commission's processing gain requirements. That fact, combined with the Device's meeting the other requirements in the Rules, does qualify it as a DSSS system eligible for certification.

C. Prior Denials of Other Applications Are Irrelevant to This Proceeding.

The May 12 letter states:

> This decision is consistent with the denial of other requests for OFDM type systems to be authorized under Section 15.247 as DSSS systems.

The Commission's reliance on precedent is troubling, because Wi-LAN is procedurally barred from challenging the cited precedents. A denied application for certification never becomes public.[15] Because Wi-LAN's patents make it unlawful for anyone else to manufacture a product using similar modulation techniques, the prior applications were very likely different in significant respects. But Wi-LAN has no way to make that case -- no opportunity to confirm that the facts support a good-faith argument that the precedents are unsound. For the Commission to rest its decision on papers available to the Commission, but not to Wi-LAN, not only violates principles of fundamental fairness, but threatens public confidence in the decision-making process. The Commission cannot support this denial with earlier ones unless it spells out the technical parallels in detail -- but its doing so might violate confidentiality obligations to other applicants.

Even if the precedents were squarely on point, however, they still could not justify an unlawful decision. We have shown that the Device complies with all applicable Rules, and

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[15] 47 C.F.R. Sec. 0.457(d)(1)(ii).

therefore is entitled to certification. Even a long string of prior denials cannot properly bar the immediate grant of the Application at issue here.

V. CONCLUSION

The Commission's grounds for denial of Wi-LAN's Application have no support in the Rules. The Application satisfies applicable requirements and qualifies for immediate certification.

As a matter of policy, the Commission should actively encourage development of technology that improves service to the public, promotes competition, and uses spectrum efficiently, all while maintaining full compliance with the technical rules governing spread spectrum.

Because further delay will multiply the economic harm to Wi-LAN, it asks the Commission to immediately grant certification on its own motion pursuant to Section 1.108.

Alternatively, Wi-LAN asks the Commission to grant certification expeditiously, without public notice, and in advance of a written order on reconsideration.

If prompt action is not possible, then Wi-LAN requests a waiver pending resolution of the proceeding, on the same grounds set out above.

Respectfully submitted,

Mitchell Lazarus
FLETCHER, HEALD & HILDRETH, P.L.C.
1300 North 17th Street, 11th Floor
Arlington, VA 22209
703-812-0440
Counsel for Wi-LAN, Inc.

May 26, 2000

TECHNICAL CERTIFICATION

I have read the foregoing Petition for Reconsideration of Wi-LAN, Inc.

I certify that the technical statements therein are true and correct to the best of my knowledge and belief.

Ramesh Uppal 26 May 2000

(signed) (date)

Ramesh Uppal, Vice President -- Technology
Wi-LAN, Inc.
300, 801 Manning Road NE
Calgary, Alberta, Canada T2E 8J5
403-273-9133
rameshu@wi-lan.com

FEDERAL COMMUNICATIONS COMMISSION
Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

May 12, 2000

Wi Lan Inc
300-801 Manning Road NE
Calgary, Alberta Canada T2E

Attention: Eric Godberson

Re: Application dated February 17, 2000 and received February 17, 2000
Equipment Class: DSS-Part 15 Spread Spectrum Transmitter
Applicant Name: Wi Lan Inc
FCC ID: K4BAP01

Gentlemen:

The application referenced above is hereby DENIED in accordance with Section 2.919 of the Commission's Rules.

After reviewing the technical description of the EUT, we disagree with your conclusion that it meets the definition of a Direct Sequence Spread Spectrum System (DSSS system), as specified in Section 2.1. It definitely does not meet the intent of the definition of a DSSS system. By nature, a DSSS emission utilizes an occupied bandwidth much greater than the bandwidth necessary to transmit the information. An OFDM type emission, on the other hand, does just the opposite, by minimizing the occupied bandwidth necessary to send the information transmitted.

In addition, processing gain, as it is specifically defined in Section 15.247(e), is the gain realized by the spreading/despreading function, after the received signal is filtered to the information bandwidth. Implied is a classic correlator used to collapse the spread waveform. The fact that an OFDM type system is capable of passing a CW jamming margin test does not make it a DSSS system.

This decision is consistent with the denial of other requests for OFDM type systems to be authorized under Section 15.247 as DSSS systems.

You are cautioned that importation and marketing of equipment in the United States bearing the referenced FCC Identifier is prohibited by Section 2.803 of our rules. Violation of this regulation may subject you to penalties provided in Sections 501 and 502 of the Communications Act of 1934, as amended. If you have questions concerning this matter, please contact me at (301) 362-3024.

Sincerely,

Joe Dichoso

Joe Dichoso
Electronics Engineer
Equipment Authorization Branch

CERTIFICATE OF SERVICE

I, Deborah N. Lunt, a secretary for the law firm of Fletcher, Heald & Hildreth, P.L.C., hereby certify that a true copy of the foregoing "Petition for Reconsideration and Alternative Request For Waiver" was hand delivered this 26th day of May, 2000, to the following:

Chairman William E. Kennard
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Commissioner Harold Furchtgott-Roth
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Commissioner Michael Powell
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Commissioner Susan Ness
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Commissioner Gloria Tristani
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Dale N. Hatfield, Bureau Chief
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W., Room 7C-155
Washington, D.C. 20554

Michael J. Marcus
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W., Room 7-C140
Washington, D.C. 20554

Julius P. Knapp, Chief
Policy & Rules Division
Federal Communications Commission
445 12th Street, S.W., Room 7B-133
Washington, D.C. 20554

Karen E. Rackley, Chief
Technical Rules Branch
Federal Communications Commission
445 12th Street, S.W., Room 7A-161
Washington, D.C. 20554

John A. Reed
Senior Engineer
Technical Rules Branch
Office of Engineering and Technology
Federal communications Commission
445 12th Street, S.W., Room 7A-140
Washington, DC 20554

Kenneth R. Nichols*
Chief, Laboratory Division
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

David L. Means*
Chief, Technical Research Branch
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

Richard Fabina*
Chief, Equipment Authorization Branch
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

Joe Dichoso*
Electrical Engineer
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

Gregory M. Czumak*
Electrical Engineer
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

Deborah N. Lunt

*By Federal Express