EXHIBIT K – Technical Report

FCC ID# PD9AP2011BWLAN

Measurement/Technical Report

Intel Corporation

Intel Pro / Wireless 2011 LAN PC Card

FCC ID: PD9AP2011BWLAN

August 6, 2001

This report concerns (check one): Original Grant__X__ *Class II Change*____	
Equipment Type: Unlicensed Spread Spectrum Transmitter	Rule Part: 47 CFR 15.247
Deferred grant requested per 47 CFR 0.457 (d)(1)(ii)?	Yes_____ no__X__
If yes, defer until:	_____N/A_____ date
Intel Corporation agrees to notify the Commission by:	_____N/A_____ date
of the intended date of announcement of the product so that the grant can be issued on that date.	
Transition Rules Request per 15.37:	yes_____ no__X__
If no, assumed Part 15, Subpart C for intentional radiators – new 47 CFR [10-1-92] provision.	
Report prepared by:	Northwest EMC, Inc. 22975 NW Evergreen Pkwy., Ste 400 Hillsboro, OR 97124 (503) 844-4066 fax: (503) 844-3826
Report No. INTE4402	

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1.0 General Information

1.1 Product Description

Manufactured By ..... Intel Corporation

Address ..... 15250 Avenue of Science, SN1-02, San Diego, CA 92128 USA

Test Requested By:..... Yogendra (Yogi) Shah

Model.....Intel Pro / Wireless 2011 LAN PC Card

FCC ID PD9AP2011BWLAN

Serial Number(s) ..... none

Date of Test.....August 3, 6, 2001

Job Number.....INTE4402

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1.1 Product Description con't

The Equipment Under Test (EUT) is the Intel Corporation Intel Pro / Wireless 2011 LAN PC Card It operates from 2412 to 2462 MHz (center frequency to center frequency), with a peak output power of 60 mW. It is a spread spectrum transmitter that utilizes direct sequence techniques. This transmitter will only be used in a wireless LAN access point as a mobile transmitter.

This transmitter was originally certified by Symbol under FCC ID: H9PLA4131M on 7/25/01. Then an additional grant was issued to Intel under FCC ID: PD9AP2011BWLAN on 8/27/01. The Intel application included letters from both Intel and Symbol that attested the transmitters were electrically identical, and the original test results continue to be representative. For quick reference, those same letters are included again in this Class II permissive change application.

A new attestation letter is supplied from Intel stating that the transmitter continues to be electrically identical to the originally certified equipment. Intel also states that the original test results are applicable and representative of the device. The only change is the addition of the new antenna – the Centurion CAF28915 dipole antenna.

The Intel Pro/Wireless 2011 LAN PC Card can be configured with two antennas of the same type, but it is impossible for the transmitter to simultaneously broadcast from both antennas. The output is switched between the two antennas. This technical report and associated spurious emissions data are supplied with this Class II application in support of the Centurion CAF28915 dipole antenna.

1.2 Related Submittals/Grants

Radio was previously granted certification to Symbol under FCC ID: H9PLA4131M on 7/25/01. Then an additional grant was issued to Intel under FCC ID: PD9AP2011BWLAN on 8/27/01.This application is a Class II permissive change to the Intel grant to authorize the use of a new antenna (documented in this application - Centurion CAF28915 dipole antenna)

1.3 Tested System Details

EUT and Peripherals

Item	FCC ID	Description and Serial No.
EUT	PD9AP2011BWLAN	Intel Corporation, Intel Pro / Wireless 2011 LAN PC Card, Spread Spectrum Transmitter, S/N none
Notebook PC	N/A (DoC)	IBM ThinkPad Notebook PC, S/N 78-HKYY6 10/00
AC Adapter for PC	N/A	IBM AC Adapter, P/N 02K6669, S/N 11S02K6657Z1Z0ZA084446

Cables

Cable Type	Shield	Length (meters)	Ferrite	Connection Point 1	Connection Point 2
AC Power	No	2	No	AC Adapter for PC	AC mains
DC Power	No	1	1	AC Adapter for PC	DC input of PC
Two RG316 Coax Cables	Yes	11 inches	No	EUT	Antennas

1.4 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4 (1992) and FCC 97-114. Radiated testing was performed at an antenna to EUT distance of 3 meters, from 30 MHz to 10 GHz, and at 1 meter from 10 GHz to 25 GHz.

1.5 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data is located at

Northwest EMC, Inc.
22975 NW Evergreen Pkwy., Ste 400
Hillsboro, OR 97124
(503) 844-4066
Fax: 844-3826

The semi-anechoic chamber, and conducted measurement facility is located in Hillsboro, OR, at the address shown above. This site has been fully described in a report filed with the FCC (Federal Communications Commission), and accepted by the FCC in a letter maintained in our files.

Northwest EMC, Inc. is recognized under the United States Department of Commerce, National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. NVLAP Lab Code: 200059-0.

3.0 System Test Configuration

3.1 Justification

3.1.1 Operating Modes

All operating modes of the EUT were investigated. During spurious emissions testing, the carrier was modulated with a PRBS signal at the maximum data rate. In this configuration, the EUT was tested at low, mid, and high transmit frequencies.

3.1.2 Test Configuration

This technical report and associated data are intended to document compliance of the Centurion CAF28915 dipole antenna. The EUT will be installed in a wireless LAN access point. However, due to software constraints, the radio could not be put into a continuous transmit mode when installed in the access point. The test software is designed to work only in a personal computer. Therefore, a laptop with a compatible PC Card slot was used as the host device. The antennas, all of the antenna coax, and a portion of the card were exposed. During radiated emissions testing, the antennas and laptop were oriented in all three orthogonal axes to maximize the level of emissions. Due to the lack of shielding, it was determined that the laptop presented a much worse-case condition for the operation of the EUT than the shielded access point it will be used in.

3.2 EUT Exercise Software

The test software files used to exercise the EUT are: T24_310i.exe, CL.exe, and CF.exe. It is engineering developmental software designed to provide manual control over the transmitter functions. The software operates on a laptop computer in a DOS environment and commands the EUT via the PC Card slot on the computer.

The EUT firmware is v3.00-07.

The carrier was modulated by a PRBS at a maximum data rate to create worse case emissions.

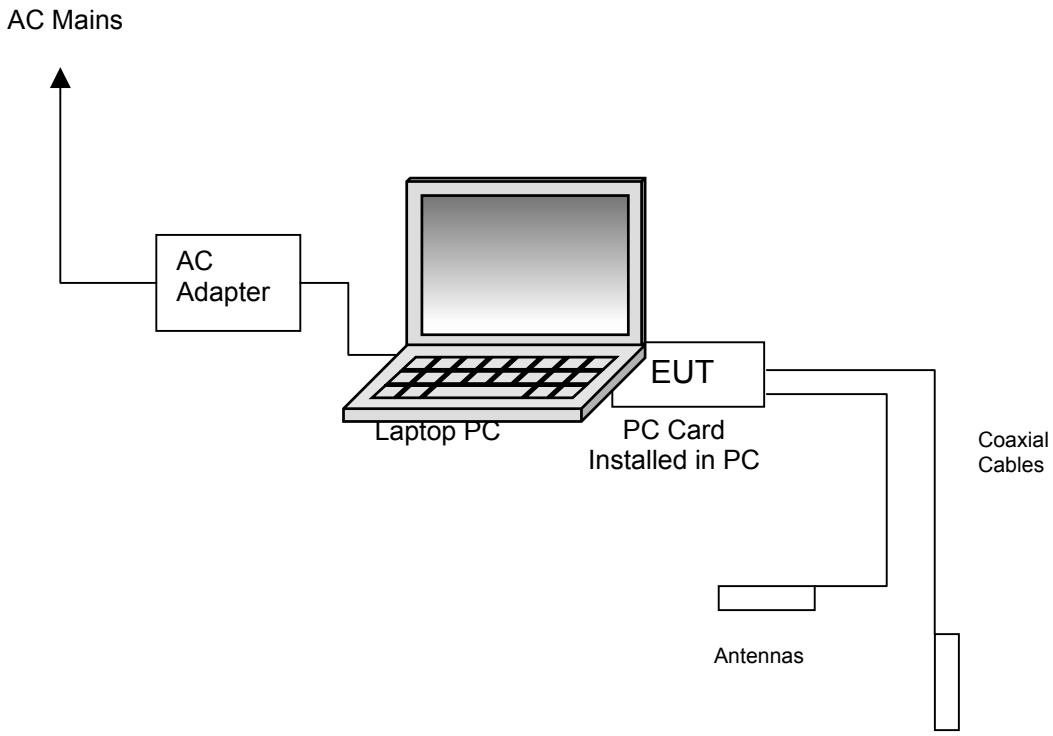
3.3 Special Accessories

None

3.4 Equipment Modifications

None.

Figure 3.1: Configuration of Tested System



4.0 Antenna Requirement

Per 47 CFR 15.203, the EUT uses antennas that are designed to ensure that no other antennas other than those supplied by Intel will be used with the device. The panel mount connector on the antenna coax is a reverse-polarity BNC connector. The transmitter and antenna coax are installed inside the access point at the factory. They are not user accessible.

Details about the antenna may be referenced in exhibit "B", file name "Antenna Information.pdf", and in exhibit "E", file name "External Photos.pdf"

4.1 Antenna Information

Per 47 CFR 15.204 (c), a list of antennas tested with the EUT is provided. The type, manufacturer, model number, and gain with reference to an isotropic radiator is given.

Details about the antenna may be referenced in exhibit "B", file name "Antenna Information.pdf"

4.2 De Facto EIRP Limit

Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36dBm. The peak output power of the EUT is approximately 17.8 dBm, and the maximum gain of the antenna to be used with the EUT is +3.3 dBi. Therefore, the EUT's maximum EIRP is +21.1 dBm.

4.3 RF Exposure Compliance Requirements

Per 47 CFR 15.247 (b)(4), the EUT meets the requirement that it be operated in a manner that ensures the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines (ref . 47 CFR 1.1307, 1.1310, 2.1091, and 2.1093. Also OET Bulletin 65, Supplement C).

The EUT will be used only in a wireless LAN access point and can therefore be considered a mobile transmitter per 47 CFR 2.1091.

The EUT supports the use of only one antenna at a time. Although the EUT can be configured with two antennas of the same type, it is impossible for the transmitter to simultaneously broadcast from both antennas. The output is switched between the two antennas. The antennas attach to reverse-polarity BNC connectors that are panel-mounted on the shielded access point enclosure. The transmitter and antenna coax are installed inside the access point at the factory. They are not user accessible.

The MPE estimates are as follows:

Table 1 in 47 CFR 1.1310 defines the maximum permissible exposure (MPE) for the general population as $1mW/cm^2$. The distance from the EUT's transmitting antenna where the exposure level reaches the maximum permitted level is calculated using the general equation:

$$S = (PG)/4\pi R^2$$

Where: S = power density ($1mW/cm^2$ maximum permitted level)
P = power input to the antenna (60 mW)
G = linear power gain relative to an isotropic radiator (3.3 dBi = numeric gain of 2.14)
R = distance to the center of the radiation of the antenna

Solving for R, the $1mW/cm^2$ limit is reached 3.2 cm or closer to the transmitting antenna. Therefore, no warning labels, no RF exposure warnings in the manual, or other protection measures are required to be used with the EUT.

4.4 Spurious Radiated Emissions

The field strength of any spurious emissions or modulation products that fall in a restricted band, as defined in 47 CFR 15.205, was measured. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned from 30 MHz to 25 GHz.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

4.4.1 Results

The peak level complies with the limits specified in 47 CFR 15.35 (b). The average level (taken with a 10Hz VBW) complies with the limits specified in 15.209.

The final radiated data may be referenced in Exhibit "J", file name "Radiated Spurious Emissions.pdf".

5.0 Field Strength Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured level. The basic equation with a sample calculation is as follows:
FS = RA + AF + CF - AG

where : FS = Field Strength

RA = Measured Level

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/meter.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBuV/meter
Level in uV/m = Common Antilogarithm [(32 dBuV/m)/20] = 39.8 uV/m

5.1 Measurement Bandwidths

Resolution Bandwidth

Peak Data

150 kHz - 30 MHz .....10 kHz
30 MHz - 1000 MHz .....100 kHz
1000 MHz - 25000 MHz .....1000 kHz

Quasi-peak Data

150 kHz - 30 MHz .....9 kHz
30 MHz - 1000 MHz .....120 kHz

Average Data.

1000 MHz - 25000 MHz .....1000 kHz

Video Bandwidth

The video bandwidth was greater than or equal to the resolution bandwidth for all measurement data except average measurements:

Average Data.

1000 MHz - 25000 MHz .....10 Hz

6.0 Measurement Equipment

Instrument	Manufacturer	Model	Serial No	Cal Due
Spectrum Analyzer	Hewlett-Packard	8566B	2747A05213	02/19/2002
Pre-Amplifier	Amplifier Research	LN1000A	25660	12/04/2001
Antenna, Biconilog	EMCO	3141	9906-1146	12/14/2001
Antenna, Horn	EMCO	3115	9804-5441	07/17/2002
Pre-Amplifier 0.5-18 GHz	Miteq	AMF-4D-005180-24-10P	621707	07/07/2002
Spectrum Analyzer	Tektronix	2784	B010105	03/18/2002
Pre-Amplifier 18-26 GHz	Miteq	JSD4-18002600-26-8P	577858	04/10/2002
Antenna, Horn	EMCO	3160-09	9911-1189	01/15/2003
High Pass Filter	RLC Electronics	-100-4000-5-R	0430	04/10/2002