

**15.247 Certification
FCC ID: EAVAWNIP2458C**

EMI TEST REPORT

On

WAVENET IP 2458 CENTRAL ROUTER

Prepared for

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Prepared by

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**Test Report Number: A801006
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1.0 TEST FACILITY

Name: Electronic Compliance Laboratories

Location: 1249 Birchwood Dr.
Sunnyvale, CA 94089

Site Filing: A site description is on file at the Federal Communications
Commission
P.O. Box 429
Columbia, MD 21045

NVLAP LAB CODE: 200089

Types of Sites: Open Field Radiated and Indoor Screen Room (Line
Conducted). All sites are constructed and calibrated to
meet ANSI C63.4-1994 requirements.

2.0 TEST EQUIPMENT

Description	Manufacturer	Model	SN
Spectrum Analyzer	HP	8564E	3741A00986
EMI Receiver	HP	8546A	3325A00137
Spectrum Analyzer	HP	8563A	3137A01183
Preamplifier	HP	8447F	3113A05849
Preamplifier	HP	8449B	3008A00527
LISN	EM	ANS-25/2	2532
Biconical Antenna	EM	EM 6912	414
Log Periodic Ant	EM	EM 6950	311
Double Ridge Horn	EM	EM 6961	6231
Filter BP 1.2-45 GHz	FSY	HM 1160-1155	001
Filter BP 4-10 GHz	FS4	HM 2950-1565	001
Filter BP 10-18 GHz	FSW	HP 8601- 7SS	001

3.0 EUT

WAVENET IP 2458 CENTRAL ROUTER
M/N:WaveNet IP 2458
S/N: 2-C
FCC ID: EVAWNIP2458C

4.0 SUPPORT EQUIPMENT

Laptop Toshiba T1900S S/N 11453067
Laptop Power Supply
Power Supply for EUT 110V 60 Hz to 24VAC

5.0 EQUIPMENT CONFIGURATION

All of the equipment and cables were placed in worst case positions to maximize emissions.

Interconnecting cables were of the type and length specified in the individual equipment requirements.

Grounding was in accordance with the manufacturer requirements and conditions for intended use.

6.0 SUMMARY OF TESTS

The WAVENET IP 2458 CENTRAL ROUTER is a Wireless Point to Multipoint data communications System with a low power frequency hopping spread spectrum (FHSS) radio system transmitting in the 2400-2483.5 MHz band and receiving in the 5725-5850 MHz band. Tests were performed with four different pairs of antennas. Test firmware resident in the EUT and was used to do the test.

6.1 15.247(a)(1) FREQUENCY HOPPING SYSTEMS

WAVENET IP 2458 CENTRAL ROUTER uses 79 channels, each 1 MHz wide. The system hops over one of 26 pseudorandom sequences. On average, each channel is used equally. Please refer to "WaveNet IP System Description attached to this submission for more details.

6.1.1 15.247(a)(1)(ii) CHANNEL UTILIZATION

A spectrum analyzer plots labeled "Channel UTILIZATION". The total number of channels is 79. The channels used have nominal center frequencies of 2403 through 2481 MHz. Three spectrum analyzer MAX HOLD plots labeled "BANDWIDTH" show the 20 dB bandwidth of the hopping channel to be < 1 MHz (.998 / .993 / 1.00 MHz) at the low/midband/high frequencies of 2.403/2.442/2.481 GHz. **Test Plots are shown in Appendix A.**

Zero span spectrum analyzer plot labeled "DWELL TIME" shows Worst case transmission time in a given slot: 40 msec dwell-time elapsed time, <100 %
Maximum allowed: 400 msec.

Test Data in Appendix A.

6.1.2 15.247(b) MAXIMUM PEAK OUTPUT POWER

The three spectrum analyzer plots labeled " POWER OUT" show the maximum power of the hopping channel to be 24.3 dBm or 240 mW. The EUT was made to transmit uninterrupted random data on each of the low/mid/high channels. **Test Plots are shown in Appendix A.**

The output was taken from an N connector, through 3 feet of RG 142 cable, to Spectrum Analyzer set on Max Hold with no additional attenuation.

Power = 23.5 dBm (peak reading) +0.8dB cable loss = +24.3dBm / 240 mW EIRP

Limit: +30 dBm / 1 W maximum power

1. Decibel DB906S 8 dBi omni (tested as a pair with Radio Waves OMN-H-5-8 8, dBi OMNI as receiver antenna)
2. Decibel DB977H90 16 dBi 90° panel (tested as a pair with Radio Waves SEC-H-5-16-90, 16 dBi 90° sector, as receiver antenna)
3. Radio Waves SPI-2/5 14 dBi @ 2.4 GHz, Dual band 1' Parabolic
4. Radio Waves SP2-2/5 dual band 21 dBi @ 2.4 GHz 21 dBi 2' Parabolic

Decibel BB906S Omnidirectional Antenna
EIRP= 24.3 (peak power) + 8 (peak gain) = 32.3 dBm/1.7W
Limit 36 dBm/ 4 Watts

Decibel DB977H 90 Panel Antenna
EIRP= 24.83 + 16 = 40.3 dBm/ 6.7W

Radio Waves SPI-2.5 1' Parabolic Directional Antenna
EIRP= 24.3 + 14 = 38.3 dBm/ 6.7W

Radio Waves SP2-2/5 2' Parabolic Directional Antenna
EIRP=24.3 + 21 = 45.3 dBm/ 33.8W

Note: Transient spikes that appear on Power Out plots are due to the hopping of the frequency synthesizer. The test software used does not key-off the transmitter when it hops. For this test, the transmitter was continuously hopping to the same channel, and transient occurred each time the synthesizer was reloaded.

In actual operation the frequency transients do not occur as the transmitter is turned back on after the synthesizer has had time to stabilize on the new channel frequency.

6.1.3 **15.247(c) OUT OF BAND EMISSIONS**

The spectrum analyzer plots titled "" OUT OF BAND - BAND EDGES" shows the output spectrum of the EUT while hopping one of the pseudorandom sequences and continuously transmitting packetized data. The analyzer was placed in MAX HOLD mode, and individual sweeps were recorded continually for 10 minutes with the same spectrum analyzer connection as was used for peak output power. The resultant plot shows that the EUT emissions remain inside the 2400 - 2483.5 MHz band when measured in ≥ 100 kHz bandwidth during operation.

The spectrum analyzer plots labeled "OUT OF BAND <1GHz ", " OUT OF BAND 1 -2.75 GHz", and "OUT OF BAND 2.75 - 26.5 GHz" show that emissions measured in ≥ 100 kHz bandwidth are more than 20 dB below the highest level of the desired power outside of the 2400 - 2483.5 MHz band. **Test Plots are shown in Appendix A.**

6.1.4 **15.203 ANTENNA REQUIREMENT**

The unit requires professional installation and is therefore exempt from the requirements of 15.203. This product has a standard N type Antenna connector to provide a coupling to the intentional radiator. See the WaveNet IP 2458 System description for justification of professional installation.

6.1.5 15.205 RESTRICTED BAND RADIATION LIMITS

The EUT was placed on a wooden table resting on a turntable. The wooden table was approximately 1 meter above the groundplane of the 3 meter test site. The search antenna was moved in to 1 meter when necessary to improve the noise floor, and the appropriate range factor was applied. While the EUT was transmitting uninterrupted random data on each of the low/mid/high channels and with the spectrum analyzer on MAX HOLD, the turntable was rotated, and the search antenna raised and lowered in an attempt to maximize the received radiated emission level. **Test results are attached in Appendix B** in tabular form showing that no spurious signals were detected above the 74 dBuV/m peak/54dBuV/m average limits. Peak measurements were made with a RBW and VBW = 1Mhz. Average measurements were made with a RBW = 1 MHz and a VBW = 10 Hz.

6.1.6 15.207 AC LINE CONDUCTED EMISSIONS

The RF line conducted levels for emissions in the 0.45 - 30 MHz band must not exceed 250 μ V when measured with a LISN. Attached graphs and tabular data show that emissions are below the 250 μ V (48 dB μ V) maximum allowed level. **Test Data is in Appendix C.**

6.1.7 15.209 RADIATED EMISSIONS

with The attached table shows that the Class A radiated limits from 30 - 1000 MHz are not exceeded by the EUT. The EUT was operating normally a combination of transmission and reception and hopping one of the fifteen pseudorandom sequences during this test. The EUT was placed near one edge of a wooden table resting on a turntable. The wooden table was approximately 1 meter above the groundplane of the 3 meter test site. The search antennas were located at 3 meters. Measurements were made in accordance with ANSI C63.4-1994. **Test Data is in Appendix D.**

Electronic Compliance Laboratories

Chris Byleckie

Date
Technical Director

APPENDIX A
SPREAD SPECTRUM PLOTS

The Plots For This Report Are In A Separate File

APPENDIX B
RESTRICTED BAND DATA

EUT:		WAVENET 2458		CUSTOMER NAME:		WIRELESS				
RULE PART:		15.247		WORK ORDER:		8092101				
				FILE:		8092101A				
ANTENNA:		HORN		ATTN dB		0				
POLARIZATION:		VERT		DUTY dE		0				
MODULATION TYPE:				HP IL dB		0				
TESTED BY:		SHAWN		DIST dB:		0				
COMMENT:		DB977H90 14dBi DIR ANTENNA								
FREQ.	READING		Pk	A.F.	Cbl	FLTR	AMP	TOTAL,	LIMIT	DELTA
MHz	dB(uV)	NF	or Av	dB	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB
2403										
4806.00	45.00		Pk	31.4	-7.0	-0.4	35.0	48.8	74.0	-25.2
4806.00	34.20		Avg	31.4	-7.0	-0.4	35.0	38.0	54.0	-16.0
7209.00	47.00	*	Pk	34.5	-10.6	-0.5	35.5	57.1	74.0	-16.9
7209.00	31.00	*	Avg	34.5	-10.6	-0.5	35.5	41.1	54.0	-12.9
96120.00	47.30	*	Pk	36.8	-13.0	-0.5	35.5	62.1	74.0	-11.9
96120.00	25.80	*	Avg	36.8	-13.0	-0.5	35.5	40.6	54.0	-13.4
12015.00	46.00	*	Pk	39.0	-13.6	-0.5	34.3	64.8	74.0	-9.2
12015.00	27.00	*	Avg	39.0	-13.6	-0.5	34.3	45.8	54.0	-8.2
14418.00	42.20	*	Pk	41.8	-14.5	-0.5	34.3	64.7	74.0	-9.3
14418.00	25.20	*	Avg	41.8	-14.5	-0.5	34.3	47.7	54.0	-6.3
16821.00	43.30	*	Pk	38.8	-16.8	-0.5	34.3	65.1	74.0	-8.9
16821.00	26.20	*	Avg	38.8	-16.8	-0.5	34.3	48.0	54.0	-6.0
2442										
4884.00	45.30		Pk	31.4	-7.0	-0.4	35.0	49.1	74.0	-24.9
4884.00	34.00		Avg	31.4	-7.0	-0.4	35.0	37.8	54.0	-16.2
7326.00	46.10	*	Pk	34.5	-10.6	-0.5	35.4	56.3	74.0	-17.7
7326.00	32.80	*	Avg	34.5	-10.6	-0.5	35.4	43.0	54.0	-11.0
97680.00	46.50	*	Pk	36.8	-13.0	-0.5	35.3	63.5	74.0	-10.5
97680.00	25.30	*	Avg	38.6	-13.0	-0.5	35.3	48.0	54.0	-6.0
12210.00	40.50	*	Pk	39.0	-13.6	-0.5	34.3	64.8	74.0	-9.2
12210.00	23.30	*	Avg	39.0	-13.6	-0.5	34.3	45.8	54.0	-8.2
14652.00	41.80	*	Pk	41.9	-15.5	-0.5	34.3	64.7	74.0	-9.3
14652.00	23.50	*	Avg	41.9	-15.5	-0.5	34.3	47.7	54.0	-6.3
17094.00	42.80	*	Pk	41.9	-16.9	-0.5	34.3	65.1	74.0	-8.9
17094.00	24.20	*	Avg	41.9	-16.9	-0.5	34.3	48.0	54.0	-6.0
2481										
4962.00	49.00	*	Pk	31.4	-7.0	-0.4	35.0	52.8	74.0	-21.2
4962.00	34.20	*	Avg	31.4	-7.0	-0.4	35.0	38.0	54.0	-16.0
7443.00	48.70	*	Pk	34.5	-10.6	-0.5	35.4	58.9	74.0	-15.1
7443.00	34.30	*	Avg	34.5	-10.6	-0.5	35.4	44.5	54.0	-9.5
9924.00	48.70	*	Pk	36.8	-13.0	-0.5	35.5	63.5	74.0	-10.5
9924.00	33.20	*	Avg	36.8	-13.0	-0.5	35.5	48.0	54.0	-6.0
12405.00	46.20	*	Pk	39.0	-13.6	-0.5	34.3	65.0	74.0	-9.0
12405.00	30.00	*	Avg	39.0	-13.6	-0.5	34.3	48.8	54.0	-5.2
14886.00	41.50	*	Pk	41.9	-15.5	-0.5	34.3	65.1	74.0	-8.9
14886.00	26.20	*	Avg	41.9	-15.5	-0.5	34.3	49.8	54.0	-4.2

EUT:		WAVENET 1P 2458		CUSTOMER NAME:		WIRELESS				
RULE PART:		15.247		WORK ORDER:		8092101				
				FILE:		8092101B				
ANTENNA:		HORN		ATTN dB 0						
POLARIZATION:		VERT		DUTY dB 0						
MODULATION TYPE:				HP IL dB 0						
TESTED BY:		SHAWN		DIST dB: 0						
COMMENT:		DB906S.-T 6dBd OMNI ANTENNA								
FREQ.	READING		Pk	A.F.	Cbl	FLTR	AMP	TOTAL,	LIMIT	DELTA
MHz	dB(uV)	NF	or Av	dB	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB
2403										
4806.00	46.00		Pk	31.4	-7.0	-0.4	35.0	49.8	74.0	-24.2
4806.00	34.30		Avg	31.4	-7.0	-0.4	35.0	38.1	54.0	-15.9
7209.00	47.00	*	Pk	34.5	-10.6	-0.5	35.5	57.1	74.0	-16.9
7209.00	26.50	*	Avg	34.5	-10.6	-0.5	35.5	36.6	54.0	-17.4
96120.00	46.50	*	Pk	36.8	-13.0	-0.5	35.5	61.3	74.0	-12.7
96120.00	26.40	*	Avg	36.8	-13.0	-0.5	35.5	41.2	54.0	-12.8
12015.00	45.30	*	Pk	39.0	-13.6	-0.5	34.3	64.1	74.0	-9.9
12015.00	26.10	*	Avg	39.0	-13.6	-0.5	34.3	44.9	54.0	-9.1
14418.00	42.00	*	Pk	41.8	-14.5	-0.5	34.3	64.5	74.0	-9.5
14418.00	25.30	*	Avg	41.8	-14.5	-0.5	34.3	47.8	54.0	-6.2
16821.00	42.60	*	Pk	38.8	-16.8	-0.5	34.3	64.4	74.0	-9.6
16821.00	25.80	*	Avg	38.8	-16.8	-0.5	34.3	47.6	54.0	-6.4
2442										
4884.00	46.30		Pk	31.4	-7.0	-0.4	35.0	50.1	74.0	-23.9
4884.00	35.00		Avg	31.4	-7.0	-0.4	35.0	38.8	54.0	-15.2
7326.00	46.30	*	Pk	34.5	-10.6	-0.5	35.4	56.5	74.0	-17.5
7326.00	31.80	*	Avg	34.5	-10.6	-0.5	35.4	42.0	54.0	-12.0
97680.00	45.90	*	Pk	36.8	-13.0	-0.5	35.3	63.5	74.0	-10.5
97680.00	26.00	*	Avg	38.6	-13.0	-0.5	35.3	48.0	54.0	-6.0
12210.00	41.20	*	Pk	39.0	-13.6	-0.5	34.3	64.8	74.0	-9.2
12210.00	24.00	*	Avg	39.0	-13.6	-0.5	34.3	45.8	54.0	-8.2
14652.00	42.00	*	Pk	41.9	-15.5	-0.5	34.3	64.7	74.0	-9.3
14652.00	23.40	*	Avg	41.9	-15.5	-0.5	34.3	47.7	54.0	-6.3
17094.00	42.40	*	Pk	41.9	-16.9	-0.5	34.3	65.1	74.0	-8.9
17094.00	23.60	*	Avg	41.9	-16.9	-0.5	34.3	48.0	54.0	-6.0
2481										
4962.00	48.20		Pk	31.4	-7.0	-0.4	35.0	52.0	74.0	-22.0
4962.00	34.00		Avg	31.4	-7.0	-0.4	35.0	37.8	54.0	-16.2
7443.00	48.20	*	Pk	34.5	-10.6	-0.5	35.4	58.4	74.0	-15.6
7443.00	33.90	*	Avg	34.5	-10.6	-0.5	35.4	44.1	54.0	-9.9
9924.00	47.20	*	Pk	36.8	-13.0	-0.5	35.5	62.0	74.0	-12.0
9924.00	33.00	*	Avg	36.8	-13.0	-0.5	35.5	47.8	54.0	-6.2
12405.00	45.80	*	Pk	39.0	-13.6	-0.5	34.3	64.6	74.0	-9.4
12405.00	29.10	*	Avg	39.0	-13.6	-0.5	34.3	47.9	54.0	-6.1
14886.00	41.50	*	Pk	41.9	-15.5	-0.5	34.3	65.1	74.0	-8.9
14886.00	24.00	*	Avg	41.9	-15.5	-0.5	34.3	47.6	54.0	-6.4

EUT:		WAVENET 2458 2.4GHZ					CUSTOMER NAME:		WIRELESS	
RULE PART:		15.247					WORK ORDER:		8092101	
							FILE:		8092101E	
ANTENNA:		HORN					ATTN dB		0	
POLARIZATION:		HORIZONTAL					DUTY dB		0	
MODULATION TYPE:							HP IL dB		0	
TESTED BY:		SHAWN					DIST dB:		0	
COMMENT:		2' DIA DISH ANTENNA								
FREQ.	READING		Pk	A.F.	Cbl	FLTR	AMP	TOTAL,	LIMIT	DELTA
MHz	dB(uV)	NF	or Av	dB	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB
2403										
4806.00	46.20	*	Pk	31.4	-7.0	-0.4	35.0	50.0	74.0	-24.0
4806.00	27.80	*	Avg	31.4	-7.0	-0.4	35.0	31.6	54.0	-22.4
7209.00	48.50	*	Pk	34.5	-10.6	-0.5	35.5	58.6	74.0	-15.4
7209.00	27.83	*	Avg	34.5	-10.6	-0.5	35.5	38.0	54.0	-16.0
9612.00	46.50	*	Pk	36.8	-13.0	-0.5	35.5	61.3	74.0	-12.7
9612.00	27.10	*	Avg	36.8	-13.0	-0.5	35.5	41.9	54.0	-12.1
12015.00	46.20	*	Pk	39.0	-13.6	-0.5	34.3	65.0	74.0	-9.0
12015.00	26.30	*	Avg	39.0	-13.6	-0.5	34.3	45.1	54.0	-8.9
14418.00	43.30	*	Pk	41.8	-14.5	-0.5	34.3	65.8	74.0	-8.2
14418.00	25.70	*	Avg	41.8	-14.5	-0.5	34.3	48.2	54.0	-5.8
16821.00	42.00	*	Pk	38.8	-16.8	-0.5	34.3	63.8	74.0	-10.2
16821.00	24.00	*	Avg	38.8	-16.8	-0.5	34.3	45.8	54.0	-8.2
2433										
4866.00	46.20	*	Pk	31.4	-7.0	-0.4	35.0	50.0	74.0	-24.0
4866.00	26.30	*	Avg	31.4	-7.0	-0.4	35.0	30.1	54.0	-23.9
7299.00	47.00	*	Pk	34.5	-10.6	-0.5	35.5	57.1	74.0	-16.9
7299.00	27.30	*	Avg	34.5	-10.6	-0.5	35.5	37.4	54.0	-16.6
9732.00	46.20	*	Pk	36.8	-13.0	-0.5	35.5	61.0	74.0	-13.0
9848.00	26.80	*	Avg	36.8	-13.0	-0.5	35.5	41.6	54.0	-12.4
12310.00	45.80	*	Pk	39.0	-13.6	-0.5	34.3	64.6	74.0	-9.4
12165.00	25.90	*	Avg	39.0	-13.6	-0.5	34.3	44.7	54.0	-9.3
14598.00	43.10	*	Pk	41.9	-15.5	-0.5	34.3	66.7	74.0	-7.3
14598.00	23.50	*	Avg	41.9	-15.5	-0.5	34.3	47.1	54.0	-6.9
17031.00	44.00	*	Pk	41.9	-16.9	-0.5	34.3	69.0	74.0	-5.0
17031.00	24.10	*	Avg	41.9	-16.9	-0.5	34.3	49.1	54.0	-4.9
2481										
4962.00	46.30	*	Pk	31.4	-7.0	-0.4	35.0	50.1	74.0	-23.9
4962.00	27.00	*	Avg	31.4	-7.0	-0.4	35.0	30.8	54.0	-23.2
7443.00	47.00	*	Pk	34.5	-10.6	-0.5	35.4	57.2	74.0	-16.8
7443.00	26.30	*	Avg	34.5	-10.6	-0.5	35.4	36.5	54.0	-17.5
9924.00	45.20	*	Pk	36.8	-13.0	-0.5	35.5	60.0	74.0	-14.0
9924.00	26.00	*	Avg	36.8	-13.0	-0.5	35.5	40.8	54.0	-13.2
12405.00	44.30	*	Pk	39.0	-13.6	-0.5	34.3	63.1	74.0	-10.9
12405.00	24.60	*	Avg	39.0	-13.6	-0.5	34.3	43.4	54.0	-10.6
14886.00	43.10	*	Pk	41.9	-15.5	-0.5	34.3	66.7	74.0	-7.3
14886.00	24.00	*	Avg	41.9	-15.5	-0.5	34.3	47.6	54.0	-6.4

EUT:		WAVENET 2458 2.4GHZ					CUSTOMER NAME:		WIRELESS	
RULE PART:		15.247					WORK ORDER:		8092101	
							FILE:		9082101F	
ANTENNA:		HORN					ATTN dB		0	
POLARIZATION:		HORIZONTAL					DUTY dE		0	
MODULATION TYPE:							HP IL dB		0	
TESTED BY:		SHAWN					DIST dB:		0	
COMMENT:		1' DIA DISH ANTENNA								
FREQ.	READING		Pk	A.F.	Cbl	FLTR	AMP	TOTAL,	LIMIT	DELTA
MHz	dB(uV)	NF	or Av	dB	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB
2403										
4806.00	46.30	*	Pk	31.4	-7.0	-0.4	35.0	50.1	74.0	-23.9
4806.00	27.80	*	Avg	31.4	-7.0	-0.4	35.0	31.6	54.0	-22.4
7209.00	47.00	*	Pk	34.5	-10.6	-0.5	35.5	57.1	74.0	-16.9
7209.00	26.30	*	Avg	34.5	-10.6	-0.5	35.5	36.4	54.0	-17.6
9612.00	46.20	*	Pk	36.8	-13.0	-0.5	35.5	61.0	74.0	-13.0
9612.00	27.10	*	Avg	36.8	-13.0	-0.5	35.5	41.9	54.0	-12.1
12015.00	46.20	*	Pk	39.0	-13.6	-0.5	34.3	65.0	74.0	-9.0
12015.00	25.80	*	Avg	39.0	-13.6	-0.5	34.3	44.6	54.0	-9.4
14418.00	43.10	*	Pk	41.8	-14.5	-0.5	34.3	65.6	74.0	-8.4
14418.00	25.00	*	Avg	41.8	-14.5	-0.5	34.3	47.5	54.0	-6.5
16821.00	42.00	*	Pk	38.8	-16.8	-0.5	34.3	63.8	74.0	-10.2
16821.00	23.40	*	Avg	38.8	-16.8	-0.5	34.3	45.2	54.0	-8.8
2433										
4866.00	46.40	*	Pk	31.4	-7.0	-0.4	35.0	50.2	74.0	-23.8
4866.00	26.80	*	Avg	31.4	-7.0	-0.4	35.0	30.6	54.0	-23.4
7299.00	47.30	*	Pk	34.5	-10.6	-0.5	35.5	57.4	74.0	-16.6
7299.00	27.00	*	Avg	34.5	-10.6	-0.5	35.5	37.1	54.0	-16.9
9732.00	46.20	*	Pk	36.8	-13.0	-0.5	35.5	61.0	74.0	-13.0
9848.00	26.00	*	Avg	36.8	-13.0	-0.5	35.5	40.8	54.0	-13.2
12310.00	44.90	*	Pk	39.0	-13.6	-0.5	34.3	63.7	74.0	-10.3
12165.00	24.00	*	Avg	39.0	-13.6	-0.5	34.3	42.8	54.0	-11.2
14598.00	43.40	*	Pk	41.9	-15.5	-0.5	34.3	67.0	74.0	-7.0
14598.00	23.50	*	Avg	41.9	-15.5	-0.5	34.3	47.1	54.0	-6.9
17031.00	43.60	*	Pk	41.9	-16.9	-0.5	34.3	68.6	74.0	-5.4
17031.00	23.80	*	Avg	41.9	-16.9	-0.5	34.3	48.8	54.0	-5.2
2481										
4962.00	46.80	*	Pk	31.4	-7.0	-0.4	35.0	50.6	74.0	-23.4
4962.00	27.50	*	Avg	31.4	-7.0	-0.4	35.0	31.3	54.0	-22.7
7443.00	46.80	*	Pk	34.5	-10.6	-0.5	35.4	57.0	74.0	-17.0
7443.00	26.30	*	Avg	34.5	-10.6	-0.5	35.4	36.5	54.0	-17.5
9924.00	45.20	*	Pk	36.8	-13.0	-0.5	35.5	60.0	74.0	-14.0
9924.00	25.40	*	Avg	36.8	-13.0	-0.5	35.5	40.2	54.0	-13.8
12405.00	44.60	*	Pk	39.0	-13.6	-0.5	34.3	63.4	74.0	-10.6
12405.00	24.30	*	Avg	39.0	-13.6	-0.5	34.3	43.1	54.0	-10.9
14886.00	43.10	*	Pk	41.9	-15.5	-0.5	34.3	66.7	74.0	-7.3
14886.00	23.60	*	Avg	41.9	-15.5	-0.5	34.3	47.2	54.0	-6.8

APPENDIX C
15.207
CONDUCTED EMISSIONS

Government Agency and Limit: CISPR Class A

Customer:	KRBR	Operator:	SHAWN
Date:	09-23-1998	Time:	15:08:47
Temperature Range:	70	Deg F	Percent Humidity: 45
E.U.T.:	ENVIROMONITOR		
Serial Number:	PROTO		
Support Devices:	CPU		
Serial Number:			
FCC ID:			
Exercise Program:			
Modifications:	None		
Report File Name:	F:\TESTDATA\8092102.C		

TEST FREQ	TEST dBuV	CLASS A LIMIT	VERSUS A LIMIT	CONDUCTOR	TYPE
=====	=====	=====	=====	=====	=====
0.235	47.8	66.0	-18.1	LINE	PK
0.312	45.7	66.0	-20.3	LINE	PK
1.329	21.1	60.0	-38.9	LINE	PK
2.248	22.7	60.0	-37.3	LINE	PK
4.891	30.7	60.0	-29.3	LINE	PK
5.560	43.6	60.0	-16.4	LINE	PK
11.190	23.4	60.0	-36.6	LINE	PK
22.250	29.9	60.0	-30.1	LINE	PK
27.750	33.5	60.0	-26.5	LINE	PK
0.235	47.3	66.0	-18.7	NEUTRAL	PK
0.405	35.3	66.0	-30.7	NEUTRAL	PK
2.260	24.2	60.0	-35.8	NEUTRAL	PK
4.855	31.9	60.0	-28.1	NEUTRAL	PK
5.500	43.2	60.0	-16.8	NEUTRAL	PK
11.190	25.7	60.0	-34.3	NEUTRAL	PK
22.250	28.3	60.0	-31.7	NEUTRAL	PK
27.690	33.0	60.0	-27.0	NEUTRAL	PK

APPENDIX D
15.209
RADIATED EMISSIONS

Electronic Compliance Laboratories, Inc.
 1249 Birchwood Ave.
 Sunnyvale, CA
 Radiated Emissions
 Frequency range: 30MHz-1000MHz
 10 Meter Open Site
 Site Calibrated: June 1997

Government Agency and Limit: FCC Class A

QP = Quasi-Peak Note: Ignore peak readings when Quasi-Peak reading exists
 PK = Peak

Customer: WIRELESS Operator: SHAWN
 Date: 09-21-1998 Time: 14:34:24
 Temperature Range: 78 Deg F Percent Humidity: 50
 E.U.T.: WAVENET IP2458 MODIFIED BOX
 Serial Number:
 Support Devices:
 Serial Number:
 FCC ID:
 Exercise Program:
 Modifications: None
 Report File Name: F:\TESTDATA\8092101A.RF

Antenna Type: BICONICAL

TEST FREQ	TEST dBuV	ACTUAL dBuV/m	CLASS A LIMIT	VERSUS A LIMIT	TABLE DEGREES	ANTENNA HEIGHT	POLAR- IZATION	DETECTOR Type
=====	=====	=====	=====	=====	=====	=====	=====	=====
38.750	37.2	26.3	39.0	-12.7	270	1.5	V	PK
43.200	46.1	33.7	39.0	-5.3	180	2.0	V	PK
43.200	44.5	32.1	39.0	-6.9	180	2.0	V	QP
132.04	39.0	29.3	43.5	-14.2	150	2.0	V	PK
132.600	38.4	28.8	43.5	-14.7	150	2.0	H	PK
42.925	41.5	29.1	39.0	-9.9	200	2.0	H	PK

NOTE: NO OTHER EMISSIONS TO 1 Ghz

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APPENDIX E
SET-UP PHOTOS



**FCC 15.209 Class B
Radiated Emissions**



FCC 15.205 Restricted Band



FCC 15.205 Restricted Band



FCC 15.205 Restricted Band





FCC 15.247 Conducted RF