FCC Compliance Report
Part 24 Certification
For
Flarion Technologies, Inc.
RadioRouter Outdoor Base Station

Prepared By: National Technical Systems
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FCC Compliance Report
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Date	**:**	8/25/03
MJO #	**:**	40375-04
File	**:**	40375-04-fcc24out.FTI
Revision #	**:**	None
Product	**:**	RadioRouter Outdoor Base Station
Manufacturer	**:**	Flarion Technologies, Inc.
P.O. #	**:**	NR0164

Product	:	RadioRouter Outdoor Base Station
Model	:	97-014X-XXX
Serial Number	:	None
Manufacturer	:	Flarion Technologies, Inc.
Address	:	135 Route 202/206 South Bedminster, NJ 07921 USA
Phone	:	908 947 7052
Fax	:	908 997 2050
Date Received	:	9/8/03
Contact	:	Bill Clark
Test Laboratory	:	National Technical Systems 36 Gilbert Street South Tinton Falls, NJ 07724 USA Phone: 732 936 0800 Fax: 732 936 0700 E-mail: nts-nj@ntscorp.com

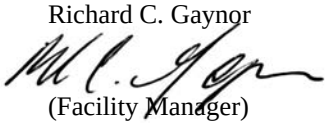
Prepared By : Mark S. Betts Date: 1/22/04

(Senior EMC Test Engineer)

Reviewed By : Mark S. Betts Date: 1/22/04

(Program Manager)

Approved By : Richard C. Gaynor Date: 1/22/04



(Facility Manager)

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1. General Description:

The Flarion RadioRouter base station is a pure Internet Protocol (IP)-based wireless access system that enables network operators to provide high-capacity broadband data and packet voice services to mobile users. Through its flash-OFDM airlink technology, the RadioRouter delivers a LAN-like experience to data users, with an average sustainable throughput of 1.5 Megabits per second (Mbps) per sector, and peak user data rates of 3 Mbps in only 1.25 MHz of paired radio spectrum. In addition, the system inherently supports more simultaneous voice users per MHz of radio spectrum than any other wireless standard in the world.

The RadioRouter base station transparently interfaces to off-the-shelf IP networking gear through the industry-standard IP protocols. This defines the new mobile edge of the IP core network, enhancing the creation, provisioning and delivery of compelling data and packet voice services. The Flarion RadioRouter supports up to three sectors, and provides coverage that is comparable to existing cellular voice base stations and easily overlays onto an operator's existing network. The Flarion system also requires no frequency planning, and features self-provisioning attributes for rapid and efficient deployment.

The RadioRouter base station is part of an end-to-end mobile broadband network solution that includes Flarion's Wireless Network Card, Mobile Broadband Chipset and FlashView Element Management System.

2. Classification and Environment:

FCC Part 24, Personal Communications Services and TIA/EIA 603 Land Mobile FM or PM Communications Equipment Measurement and Performance standards are applied to the RadioRouter Outdoor Base Station.

3. Test Summary:

Tests
Transmitter Power Conducted Output
Transmitter Occupied Bandwidth
Frequency vs. Temperature
Frequency vs. Voltage
Conducted Spurious Emissions
Radiated Spurious Emissions
Band Edge Measurements

4. Test Report Summary:

The RadioRouter Outdoor Base Station was tested to the specified standards.

4.1. Test Sample Description:

The RadioRouter Base Station has the following physical characteristics:
• Side by side double bay EIA 19 inch rack mount
• 22 U min height/bay
• 60”H X 47”W X 30”D
• Weight 1400 lbs
• Inherent forced air-cooling, heat exchanger system
• Front and rear door access
• Antenna and cable access from bottom
• Cable interconnect-Blind mate PA and filter module connections
• EMI/Environmental sealed cabinet
• Color: Antique Ivory

4.1.1. Block Diagram:

Not available.

4.1.2. EUT Equipment List:

The table below displays what the EUT consists of during the tests.

Manufacturer	Model	Serial Number
SBS Technologies – CPU	CT8U84AN781C	N/A
SBS Technologies – CPU Rear Transition Module (CPU RTB)	CT7-TM	N/A
Jasper Electronics – Power Conditioning Unit (PCU)	2DPCI304-1022-4LSSS	N/A
SBS Technologies – Backhaul Unit (BHU) PMC with carrier	MAXIM-564R	N/A
SBS Technologies – Backhaul Unit Rear Transition Module (BHU RTB)	MAXIM-564-TM	N/A
Flarion – Baseband Unit (BBU)	73-0101-003	N/A
Flarion – Radio Frequency Unit (RFU)	75-0138-001	N/A
Flarion – Radio Frequency Unit (TXU)	75-0139-001	N/A
K&L Microwave – LNA/Duplexer	49-0190-001	N/A
MITEC – Power Amplifier (PA)	49-0189-001	N/A
Rittal – cPCI Chassis	49-0133-002	N/A
Flarion – AIU Alarm Interface Unit	73-0124-001	N/A
Telect – DSX Panel	010-5012-0001	N/A

4.1.3. EUT Cabling:

Not available.

4.2. Test Configuration:

4.2.1. EUT Electrical Mode of Operation:

The EUT was operated at 208 VAC Nominal.
The EUT was run in Normal Operation mode.

4.2.2. Software/Firmware:

Windows GUI

4.3. Test Procedure:

The EUT's testing was performed in accordance with approved test procedures specified in the applicable standards. All test procedures can be found with their appropriate tests.

4.4. Test Results and Data:

4.4.1. Transmitter Conducted Power Output:

Transmitter Conducted Power Output testing was conducted as defined in TIA\EIA-603, Paragraph 2.2.1

A spectrum analyzer was used to perform this test. The test was done on the RF output of the unit. The output of the unit was connected to the input of the spectrum analyzer through a 40 dB attenuator. All measurements include attenuator and cable losses.

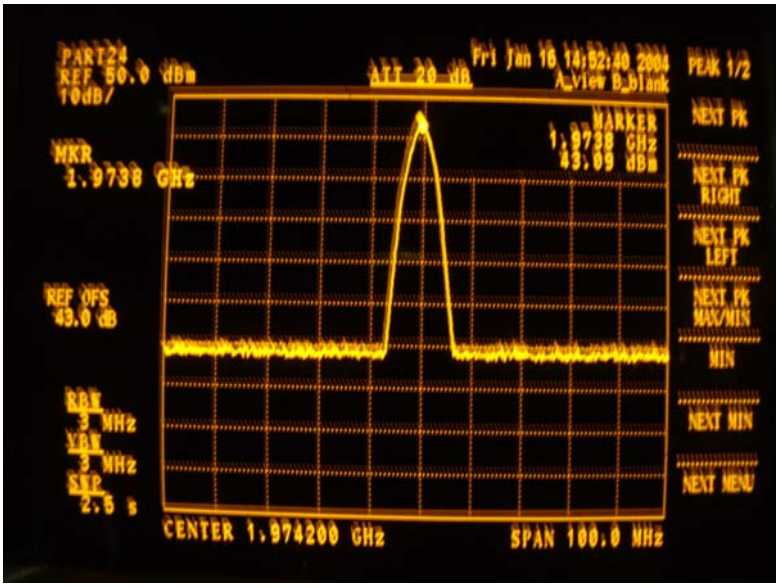
Transmitter Conducted Power Output Report

MJO #:	40375-04	**Applied Standard:**	TIA/EIA 603
Manufacturer Name:	Flarion Technologies, Inc.	**Date of Test:**	1/14/04
Product Name:	RadioRouter Outdoor Base Station	**Tester:**	Mark Betts
Model Number:	97-014X-XXX	**Test Facility:**	Safety Area
Serial Number:	N/A	**Temperature:**	20°C
Performance Criteria:	N/A	**Relative Humidity:**	50%
EUT Mode:	Normal Operation	**EUT Power:**	208 VAC

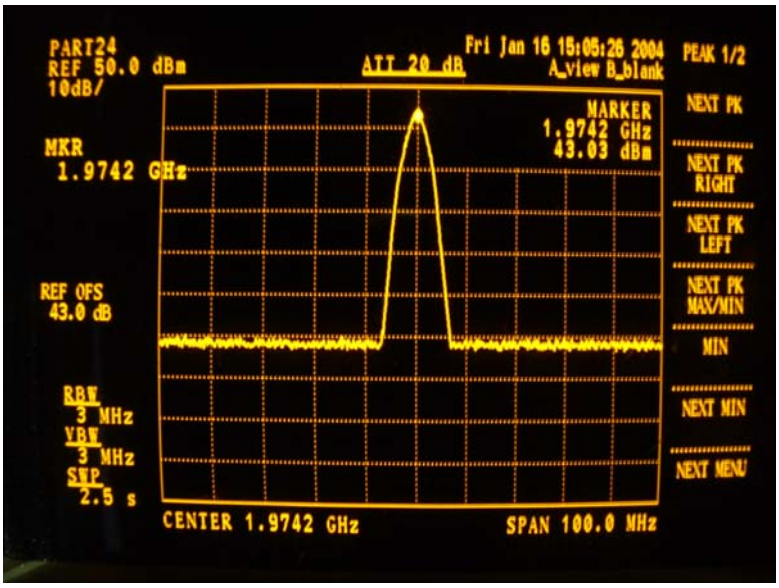
Transmitter Conducted Power Output Test Results
Note: All levels include attenuator and cable losses.

Frequency (MHz)	Conducted Power Output (dBm)
1973.8	43.09
1974.2	43.03
1974.95	43.09

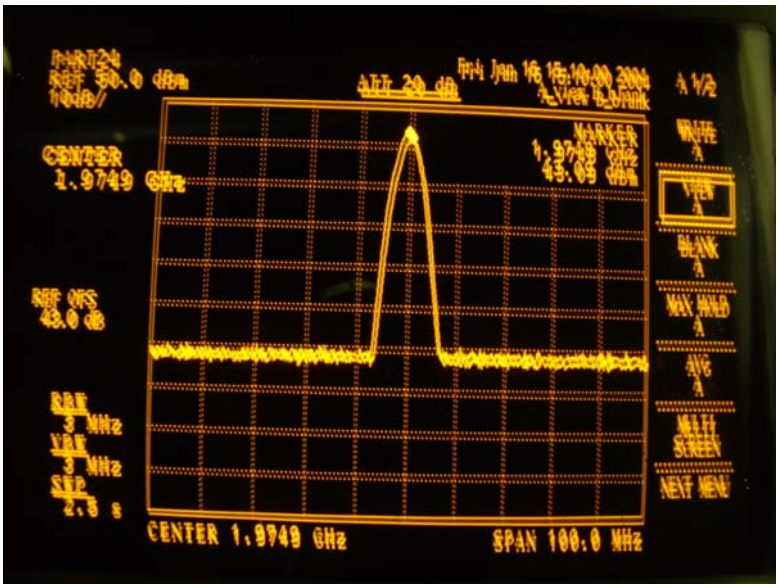
1973.8 MHz



1974.2 MHz



1974.95 MHz



Transmitter Conducted Power Output Equipment List:

Property Number	Manufacturer	Make	Model	S/N	Cal. Date	Cal. Due
WA527	Advantest	Spectrum Analyzer	RS3271A	45050124	12/22/03	12/22/04

4.4.2. Transmitter Occupied Bandwidth:

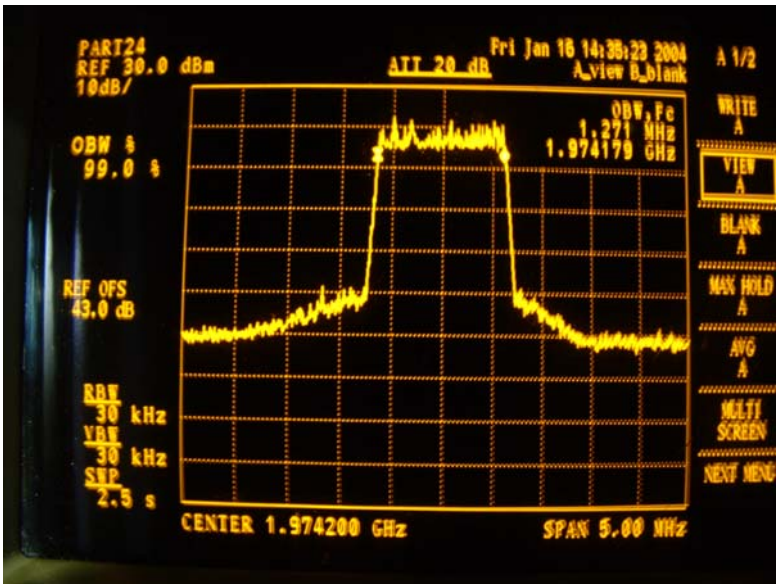
Transmitter Occupied Bandwidth testing was conducted as defined in TIA\EIA-603, Paragraph 2.2.11
A spectrum analyzer was used to perform this test. The test was done on the RF output of the unit. The output of the unit was connected to the input of the spectrum analyzer through a 40 dB attenuator. All measurements include attenuator and cable losses.

Transmitter Occupied Bandwidth Laboratory Report

MJO #:	40375-04	**Applied Standard:**	TIA/EIA 603
Manufacturer Name:	Flarion Technologies, Inc.	**Date of Test:**	1/16/04
Product Name:	RadioRouter Outdoor Base Station	**Tester:**	Mark Betts
Model Number:	97-014X-XXX	**Test Facility:**	Safety Area
Serial Number:	N/A	**Temperature:**	20°C
Performance Criteria:	N/A	**Relative Humidity:**	50%
EUT Mode:	Normal Operation	**EUT Power:**	208 VAC

Transmitter Occupied Bandwidth Test Results:
Note: All levels include attenuator and cable losses.

1974.2 MHz



Transmitter Occupied Bandwidth Equipment List:

Property Number	Manufacturer	Make	Model	S/N	Cal. Date	Cal. Due
WA527	Advantest	Spectrum Analyzer	RS3271A	45050124	12/22/03	12/22/04

4.4.3. Frequency vs. Temperature

Frequency vs. Temperature testing was conducted as defined in TIA\EIA-603, Paragraph 2.2.2

A spectrum analyzer was used to perform this test. The test was done on the RF output of the unit. The output of the unit was connected to the input of the spectrum analyzer through a 40 dB attenuator. The unit was then placed in a temperature chamber where the temperature was raised to 50º C and lowered to -30º C in increments of 10º C. Measurements were taken when the unit was stabilized at the set temperature. All measurements include attenuator and cable losses.

Frequency vs. Temperature Laboratory Report

MJO #:	40375-04	**Applied Standard:**	TIA/EIA 603
Manufacturer Name:	Flarion Technologies, Inc.	**Date of Test:**	1/15/04
Product Name:	RadioRouter Outdoor Base Station	**Tester:**	Mark Betts
Model Number:	97-014X-XXX	**Test Facility:**	Temperature Chamber
Serial Number:	N/A	**Temperature:**	Variable
Performance Criteria:	N/A	**Relative Humidity:**	N/A
EUT Mode:	Normal Operation	**EUT Power:**	208 VAC

Frequency vs. Temperature Test Results-:
Note: All levels include attenuator and cable losses.

Temperature (ºC)	Frequency (MHz)	Frequency Change (Hz)
-30	1974.195190	+10
-20	1974.195180	0
-10	1974.195180	0
0	1974.195190	+10
10	1974.195200	+20
20	1974.195190	+10
Ambient	**1974.195180**	**N/A**
30	1974.195180	0
40	1974.195170	-10
50	1974.195190	+10

Frequency vs. Temperature Equipment List:

Property Number	Manufacturer	Make	Model	S/N	Cal. Date	Cal. Due
WA527	Advantest	Spectrum Analyzer	RS3271A	45050124	12/22/03	12/22/04
CH424	Thermotron	Thermal Chamber	WP-499-TCM2-10-10	23-9618	11/18/02	2/18/04 ext.

4.4.4. Frequency vs. Voltage

Frequency vs. Voltage testing was conducted as defined in TIA\EIA-603, Paragraph 2.2.2 A spectrum analyzer was used to perform this test. The test was done on the RF output of the unit. The output of the unit was connected to the input of the spectrum analyzer through a 40 dB attenuator. The unit was then adjusted from 85% to 115% of input voltage. All measurements include attenuator and cable losses.

Frequency vs. Voltage Laboratory Report

MJO #:	40375-04	**Applied Standard:**	TIA/EIA 603
Manufacturer Name:	Flarion Technologies, Inc.	**Date of Test:**	1/15/04
Product Name:	RadioRouter Outdoor Base Station	**Tester:**	Mark Betts
Model Number:	97-014X-XXX	**Test Facility:**	Safety Area
Serial Number:	N/A	**Temperature:**	20°C
Performance Criteria:	N/A	**Relative Humidity:**	50%
EUT Mode:	Normal Operation	**EUT Power:**	Variable

Frequency vs. Voltage Test Results-:
Note: All levels include attenuator and cable losses.

Test State	Voltage (VDC)	Power (W)	Power Calculated (dB)	Frequency (MHz)	Frequency Change (Hz)
115% STV	239.2	43.00	19.95	1974.195180	-10
100% STV	208	43.31	21.44	1974.195190	0
85% STV	176.8	43.06	20.24	1974.195190	0

Frequency vs. Voltage Equipment List:

Property Number	Manufacturer	Make	Model	S/N	Cal. Date	Cal. Due
WA527	Advantest	Spectrum Analyzer	RS3271A	45050124	12/22/03	12/22/04
ML419	Keithley	Digital Multimeter	2000	626108	8/7/03	8/7/04

4.4.5. Transmitter Conducted Spurs:

Transmitter Conducted Spurs testing was conducted as defined in TIA\EIA-603, Paragraph 2.2.13.
A spectrum analyzer was used to perform this test. The test was done on the RF output of the unit. The output of the unit was connected to the input of the spectrum analyzer through a 40 dB attenuator. All measurements include attenuator and cable losses.
Conducted Spurs were checked to the 10^{th} harmonic.

Transmitter Conducted Spurs Report

MJO #:	40375-04	**Applied Standard:**	TIA/EIA 603
Manufacturer Name:	Flarion Technologies, Inc.	**Date of Test:**	1/16/04
Product Name:	RadioRouter Outdoor Base Station	**Tester:**	Mark Betts
Model Number:	97-014X-XXX	**Test Facility:**	Safety Area
Serial Number:	N/A	**Temperature:**	20°C
Performance Criteria:	N/A	**Relative Humidity:**	50%
EUT Mode:	Normal Operation	**EUT Power:**	208 VAC

Transmitter Conducted Spurs Test Results
Note: All levels include attenuator and cable losses.

Frequency (MHz)	Level (dBm)	Limit (dBm)	Delta (dBm)
1973 Fundamental	N/A	N/A	N/A
.704	-27.44	*-13.0*	-14.44
844.8	-32.55	*-13.0*	-19.55
3946	-41.23	*-13.0*	-28.23
1974 Fundamental	N/A	*N/A*	***N/A***
.704	-26.45	*-13.0*	-13.45
844.8	-16.37	*-13.0*	-3.37
3948	-41.85	*-13.0*	-28.85
1975 Fundamental	N/A	N/A	N/A
.704	-25.34	*-13.0*	-12.34
844.8	-32.73	*-13.0*	-19.73
2820	-27.48	*-13.0*	-14,48
3950	-51.49	*-13.0*	-38.49

Transmitter Conducted Spurs Equipment List:

Property Number	Manufacturer	Make	Model	S/N	Cal. Date	Cal. Due
WA527	Advantest	Spectrum Analyzer	RS3271A	45050124	12/22/03	12/22/04

4.4.6. Transmitter Radiated Spurs:

Transmitter Radiated Spurs testing was conducted as defined in TIA\EIA-603, Paragraph 2.2.12.
A spectrum analyzer connected to an antenna was used to perform this test. The output of the unit was connected to a cable terminated by a 50-ohm load. All measurements include antenna factors and cable losses.
Radiated Spurs were checked to the 10^{th} harmonic.

Transmitter Radiated Spurs Report

MJO #:	40375-04	**Applied Standard:**	TIA/EIA 603
Manufacturer Name:	Flarion Technologies, Inc.	**Date of Test:**	1/14/04
Product Name:	RadioRouter Outdoor Base Station	**Tester:**	Mark Betts
Model Number:	97-014X-XXX	**Test Facility:**	Semi-Anechoic Chamber
Serial Number:	N/A	**Temperature:**	20°C
Performance Criteria:	N/A	**Relative Humidity:**	48%
EUT Mode:	Normal Operation	**EUT Power:**	208 VAC

Transmitter Radiated Spurs Test Results
Note: All levels include antenna factors and cable losses.

No Radiated Spurious Emissions were detected. Any emissions would be below the noise floor, which was at –20 dBm. The unit was checked at 1973, 1974 and 1975 MHz.

Transmitter Radiated Spurs Equipment List:

Property Number	Manufacturer	Make	Model	S/N	Cal. Date	Cal. Due
AN371	Emco	Active Rod Antenna	3301B	9607-3708	07/15/02	07/15/05
AN368	Emco	Biconilog Antenna	3143	9607-1282	07/01/02	07/01/05
AN354	Electrometrics	Double Ridged Guide Antenna	6150	6150	05/17/01	05/17/04
WA527	Advantest	Spectrum Analyzer	RS3271A	45050124	12/22/03	12/22/04

4.4.7. Transmitter Band/Block Edge:

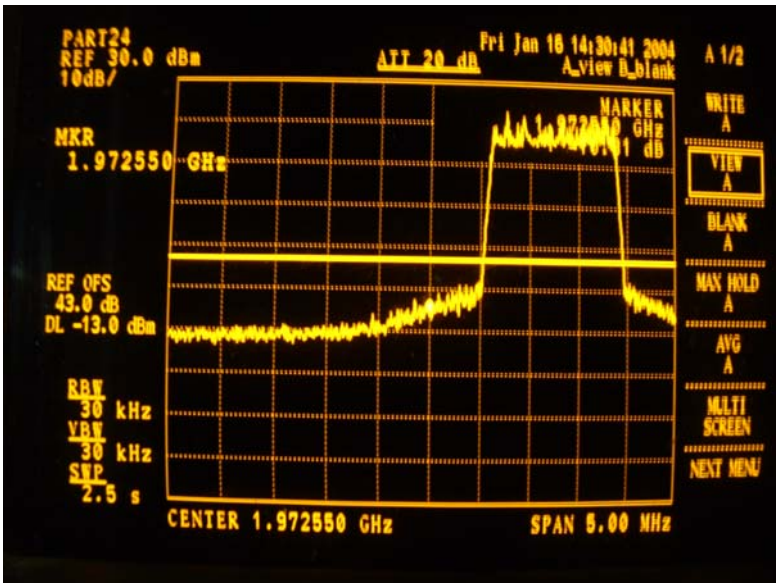
Transmitter Band/Block Edge testing was conducted as defined in TIA\EIA-603, Paragraph 2.2.11
A spectrum analyzer was used to perform this test. The test was done on the RF output of the unit. The output of the unit was connected to the input of the spectrum analyzer through a 40 dB attenuator. All measurements include attenuator and cable losses.

Transmitter Band/Block Edge Laboratory Report

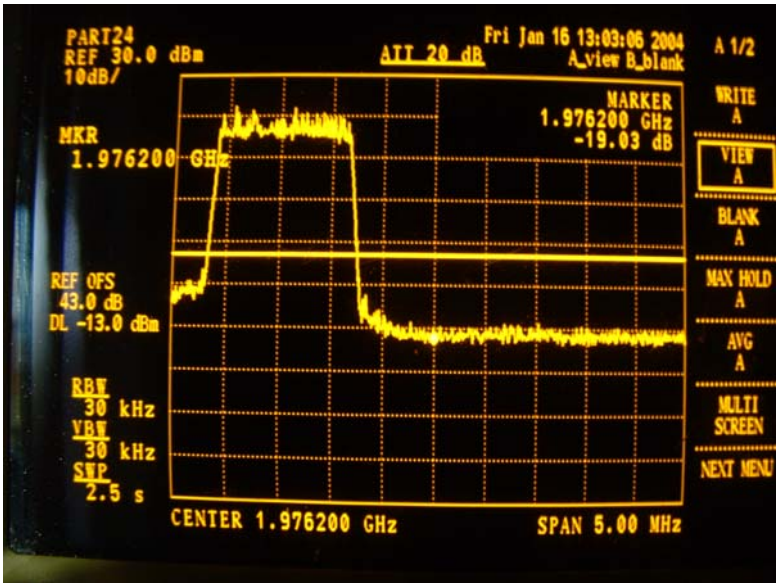
MJO #:	40375-04	**Applied Standard:**	TIA/EIA 603
Manufacturer Name:	Flarion Technologies, Inc.	**Date of Test:**	1/16/04
Product Name:	RadioRouter Outdoor Base Station	**Tester:**	Mark Betts
Model Number:	97-014X-XXX	**Test Facility:**	Safety Area
Serial Number:	N/A	**Temperature:**	20°C
Performance Criteria:	N/A	**Relative Humidity:**	50%
EUT Mode:	Normal Operation	**EUT Power:**	208 VAC

Transmitter Band/Block Edge Test Results:
Note: All levels include attenuator and cable losses.

1972.55 MHz-Lower Band Edge



1976.2 MHz-Upper Band Edge



Transmitter Band/Block Edge Equipment List:

Property Number	Manufacturer	Make	Model	S/N	Cal. Date	Cal. Due
WA527	Advantest	Spectrum Analyzer	RS3271A	45050124	12/22/03	12/22/04

5. Test Equipment:

All test equipment used in the compiling of test data can be found in the test laboratory reports.

6. References:

40375-04-fcc24out.VCE	Test Report for EUT
FCC Part 24	FCC part 24- Personal Communications Services
TIA/EIA 603	Land Mobile FM Or PM Communications Equipment Measurement and Performance Standards

Attachment 1, Photographs

EUT Test Setup