THE STANDARDS INSTITUTION OF ISRAEL Telematics Laboratory

Test Report No.8312319160

On Alvarion (formerly Flower & BreezeCom)

Equipment Under Test:

BreezeAccess Repeater System

Models:
CX-BA2.4-BA2.4, CX-VL5.8-BA900, CX-VL5.8-BA2.4, CX-BA2.4-BA900, CX-VL5.8-VL-5.8

From The Standards Institution
Of Israel
Industry Division
Telematics Laboratory
EMC Section

ACCREDITED
Certificate No. 1487.01

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Title: Test on BreezeAccess Repeater System

Models:
CX-BA2.4-BA2.4, CX-VL5.8-BA900, CX-VL5.8-BA2.4, CX-BA2.4-BA900, CX-VL5.8-VL-5.8

Order placed by:	Alvarion (formerly Flower & BreezeCom)
Address:	P.O.Box 13139. Tel Aviv 61131, Israel
Sample for test selected by:	The customer
The date of test:	16, 21/12/2003

Description of Equipment Under Test (EUT):	BreezeAccess Repeater System
Models:	CX-BA2.4-BA2.4, CX-VL5.8-BA900, CX-VL5.8-BA2.4, CX-BA2.4-BA900, CX-VL5.8-VL-5.8
Manufactured by:	Alvarion (formerly Flower & BreezeCom)

Reference Documents:

- CFR 47 FCC: "Rules and Regulations":
  Part 15. "Radio frequency devices",
  Subpart B: Unintentional radiators (2002).

Test Results: See clause 5.

This Test Report contains 19 pages and may be used only in full.	This Test Report applies only to the specimen tested and may not be applied to other specimens of the same product.

Table of Contents

1. EUT Description and operation

1.1. General description:

* All description in clause below is provided by the manufacturer.

Description of Equipment Under Test (EUT):	BreezeAccess Repeater System
Models:	CX-BA2.4-BA2.4, CX-VL5.8-BA900, CX-VL5.8-BA2.4, CX-BA2.4-BA900, CX-VL5.8-VL-5.8

The BreezeAccess repeater system is a mechanical modification of the BreezeAccess 2.4GHz (LKT-IF-24), BreezeACCESS 900(LKT-IF-900), BreezeACCESS VL(LKT-VL-IF) where indoor units(IF card) were implemented in one mechanical box. No electrical changes were done in the indoor unit itself, the outdoor unit was not changed. The upgraded inbox unit is bigger than the original indoor unit box to handle the two indoor units, power supply (new card) and communication card (new card). The two units are an AU system and SU system (outdoor + indoor) connected to each other through the 10BaseT ethernet port. The repeater determine the source and validity of the incoming signal, and only retransmits signals from a specific transmitter, which is listed on its grant.

The IF card is connected to a radio unit operating in the 2.4 GHz or 900 MHz band via a TNC connector and 50 ohm coaxial Intermediate Frequency (IF) cable. This cable carries 440 MHz IF signals between the Interface Unit and the radio unit. In addition, this cable transfers power (12 VDC) and control signals from the Interface Unit to the radio units. The connection to a BreezeACCESS VL outdoor unit operating in the 5.8 GHz band is via a weather protected Ethernet connector and a Category 5 Ethernet cables. This cable carries Ethernet traffic between the indoor and the outdoor units, and also transfers power (54 VDC) and control from the indoor unit to the outdoor unit.

Figures 1 and 2 describes the nature of the change.
EUT's views are presented in Photos #1- #3

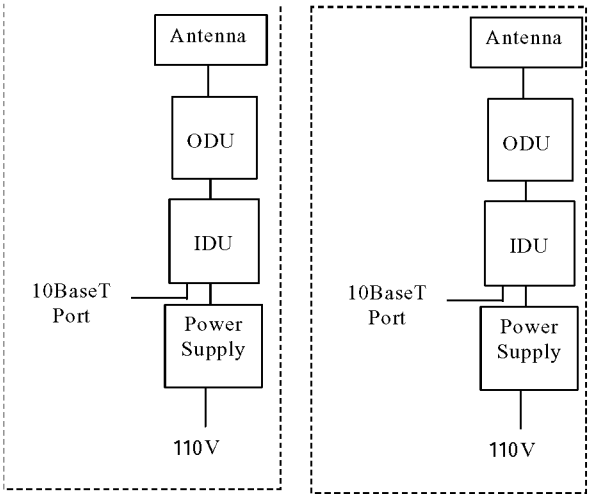


Figure 1. Two BreezeAccess 2.4GHz in current grant configuration

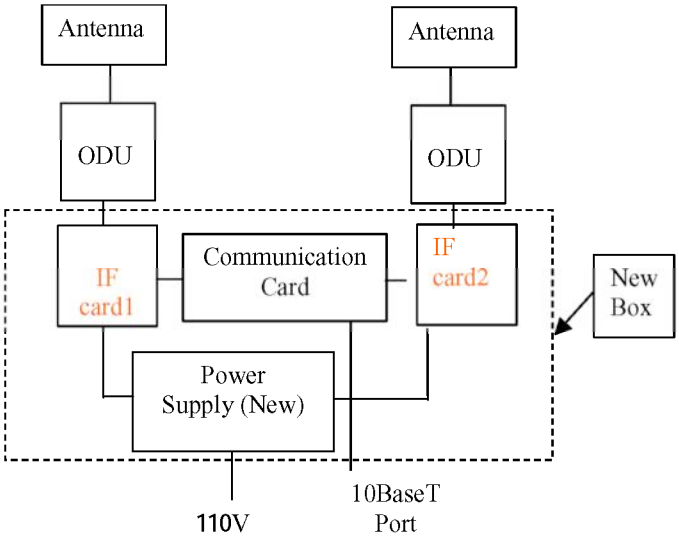


Figure 2. New setting of the BreezeAccess 2.4GHz for the repeater unit

Photo # 1. EUT's view

Photo # 2. EUT Connector side View

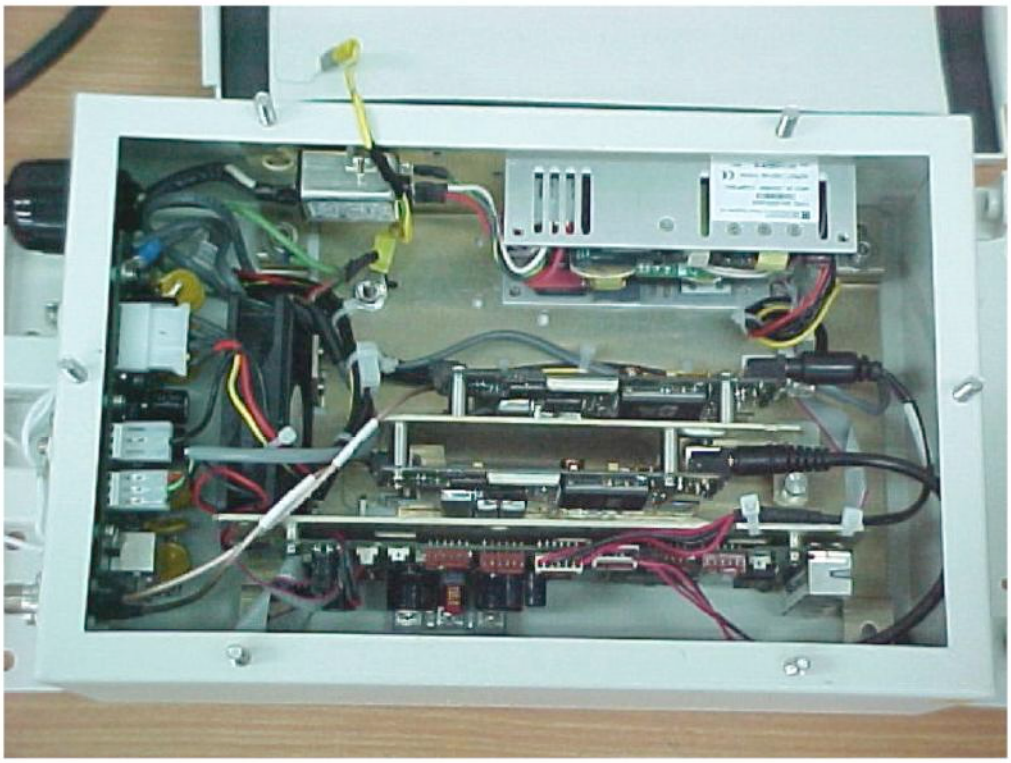


Photo # 3. EUT's internal view

1.2. EUT setup and operation:

The EUT was configured as described in Table 1.

The model names of the repeater represent arrangements of the systems with given FCC grant.

Table 1. Tested Configurations

Model Name	PS	IF Card1	IF Card2	Control card	Radio 900 MHz	Radio 2.4 GHz	Radio 5.8 GHz	Tested configu-ration
CX-BA2.4-BA2.4 FCC ID: LKT-IF-2.4	x	x	x	x	--	x	--	--
CX-VL5.8-BA900 LKT-VL-IF LKT-IF-900	x	x	--	x	x	--	X	x
CX-VL5.8-BA2.4 LKT-VL-IF LKT-IF-2.4	X	--	X	X	--	X	X	x
CX-BA2.4-BA900 FCC ID: LKT-IF-2.4 LKT-IF-900	x	x	x	x	x	x	--	x
CX-VL5.8-VL5.8 LKT-VL-IF	x	--	--	x	--	--	--	--

Note:
The tested configurations shown in the table above represent all 5 possible frequency arrangement of the Repeater.

2. Test specification, Methods and Procedures

Test Specification, Methods and Procedures:

- CFR 47 FCC: "Rules and Regulations:
  Part 15. Radio frequency devices;
  Subpart B: Unintentional radiators" (2002).
- ANSI C63/4/1992: "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz".

3. Additional deviations or exclusions from the test specifications

Not applicable.

4. Measurements, examinations and derived results

4.1. Location of the Test Site:

Conducted emission and preliminary radiated tests were carried out in the EMC laboratory of the Standards Institution of Israel in Tel-Aviv.

Radiated emission tests were conducted in an Open Area Test Site located at Kibbutz Native Halamed Hai in Emek HaEla, Israel.

4.2. Test condition:

Temperature: 22 °C. Humidity: 54 %.Atmospheric pressure: 1010 mbar.

4.3. Emission tests:

- For both radiated and conducted measurements, initial scans were made using a peak detector but still using the appropriate CISPR 16 (Quasi-Peak) detector IF bandwidth.
- For conducted emissions, a tolerance limit was set 6 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector or an average detector.
- For radiated emissions, a tolerance limit was set 10 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector.
- If the result with a Quasi-Peak detector exceeds the specification limit, it is marked with "Fails" in the margin, if it is within the limits of uncertainty for the measurement, it is marked with a "*".

4.4. Initial visual check and functional test:

Initial visual check of the EUT was performed before testing.
No external damages were found.

4.5. Conducted emission tests:

4.5.1. Test Configuration:

The EUT was placed on a non-metallic table in a shielded chamber at a height of 80 cm from the floor of the shielded chamber and 40 cm from the wall of the tested chamber.

4.5.2. Test procedure:

The EUT was operated according to clause 1.2.

The test was performed on power port of three following models:

1. CX-VL5.8-BA900;
2. CX-BA2.4-BA900;
3. CX-VL5.8-BA2.4.

First, initial scan were performed. Final measurements were performed for emission, which exceeded the tolerance limit.

Test equipment (EMI receiver) setup was as follow:

Initial scan:		Measurements:	
Detector type	Peak	Detector type	Quasi-peak (CISPR)
Mode	Max hold	Bandwidth	9 kHz
Bandwidth	9 kHz	Measurement time	200 seconds/MHz
Step size	Continuous sweep	Observation	>15 seconds
Sweep time	>100 msec		

4.5.3. Test results:

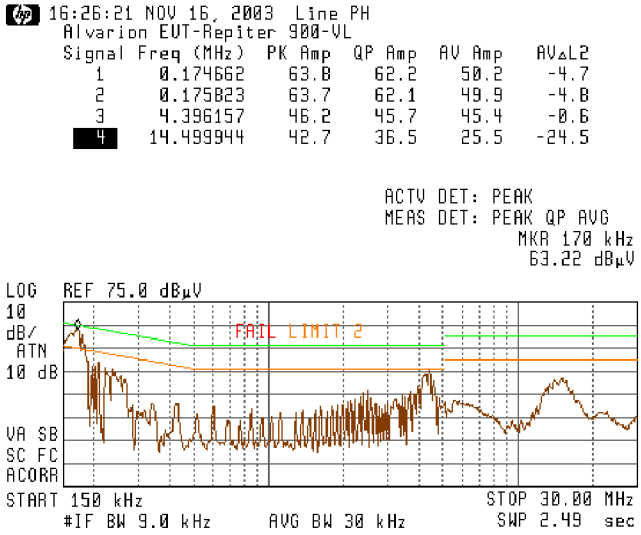
All received Peak emissions from EUT were found below FCC Part 15 Subpart B following limits.

Model CX-VL5.8-BA900: the worst result was recorded on Neutral line at 0.17 MHz, AVG detector, to 4.5 dB below Class A AVG limit (see Plots #1 -#2).

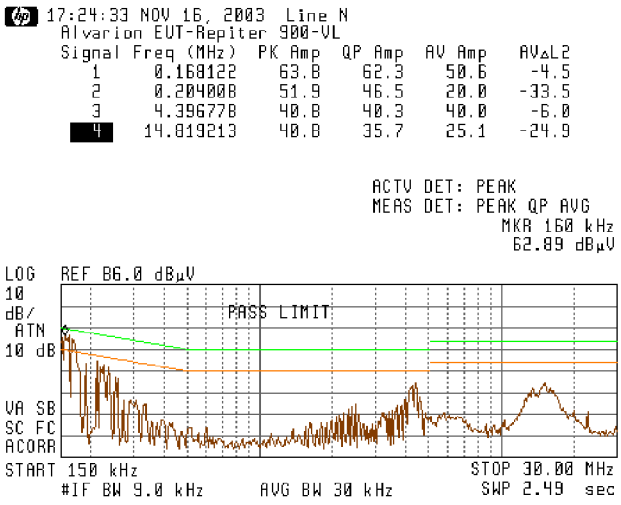
Model CX- BA2.4-BA900: the worst result was recorded on Phase line at 0.15 MHz, QP detector, to 7.1 dB below Class A AVG limit (see Plots #3 -#4).

Model CX-VL5.8-BA2.4: the worst result was recorded on Phase line at 0.15 MHz, QP detector, to 15.9 dB below Class B QP limit (see Plots #5 -#2).

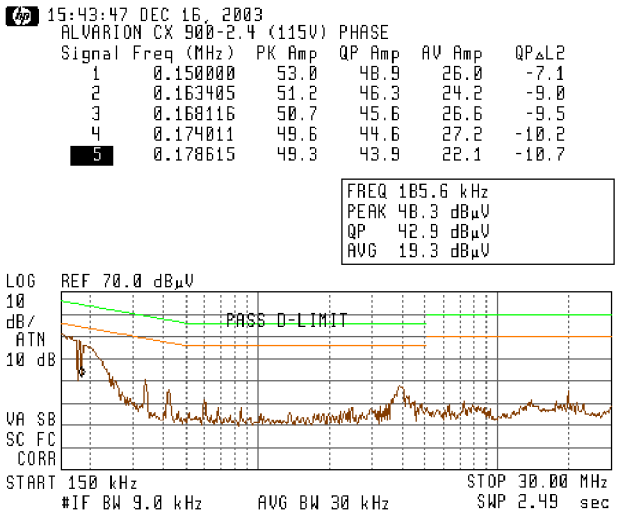
Test results and plots are presented below.



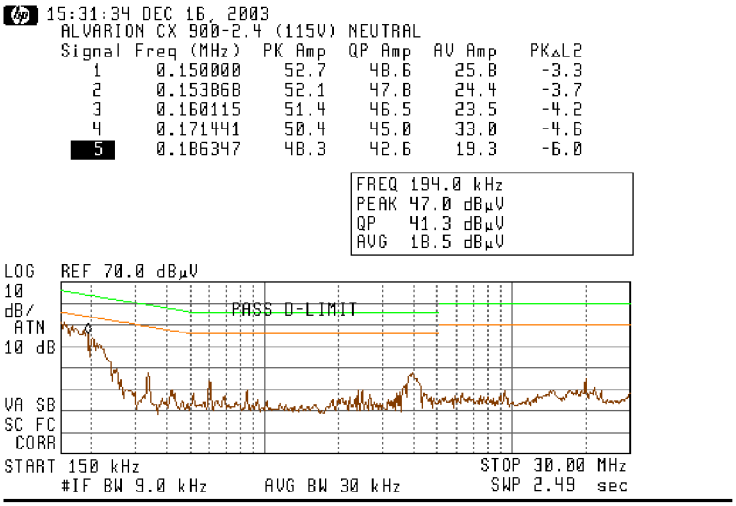
Plot 1. Conducted emissions measurement result on CX-VL5.8-BA900
Reference standard: FCC Part 15 Class A
Tested line: Phase



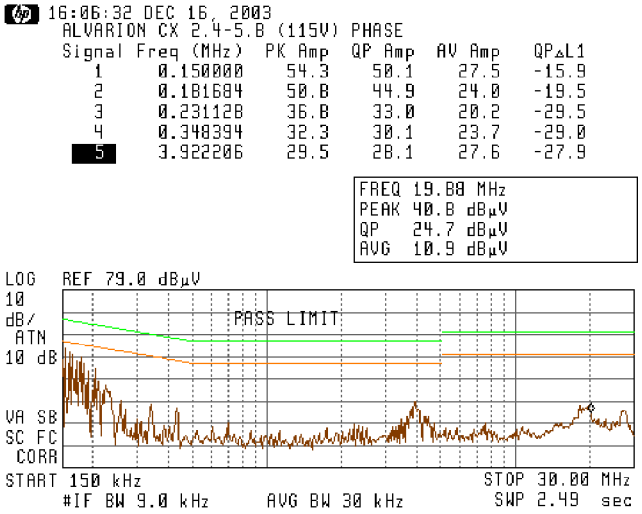
Plot 2. Conducted emissions measurement result on CX-VL5.8-BA900
Reference standard: FCC Part 15 Class A
Tested line: Neutral



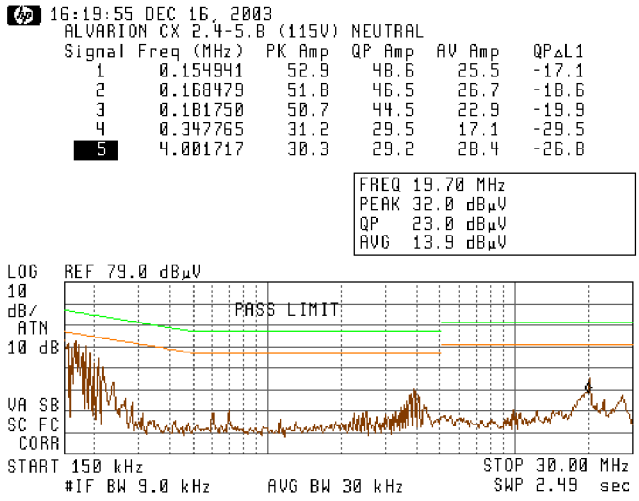
Plot 3. Conducted emissions measurement result on CX-BA2.4-BA900
Reference standard: FCC Part 15 class B
Test line: Phase



Plot 4. Conducted emissions measurement result on CX-BA2.4-BA900
Reference standard: FCC Part 15 class B
Test line: Neutral



Plot 5. Conducted emissions measurement result on CX-VL5.8-BA2.4
Reference standard: FCC Part 15 Class B
Tested line: Phase



Plot 6. Conducted emissions measurement result on CX-VL5.8-BA2.4
Reference standard: FCC Part 15 Class B
Tested line: Neutral

4.6. Radiated emission test:

4.6.1. Preliminary radiated emission tests:

Preliminary radiated measurements were performed in a semi-anechoic chamber at a distance of 3 meters.

The EUT was setup in its typical configuration and operated in its various modes.

For each mode of operation the frequency spectrum was monitored.

EUT configuration, cable configuration and mode of operation, which produced the maximum level of emission, were documented. A list of frequencies to be tested was prepared.

4.6.2. Final measurements:

The final radiated measurements were performed at the Open Area Test Site.

The EUT was arranged on a non-metallic table 0.8 m placed on the turntable.
The photos of the test layout are presented see in Appendix 3.

All measurements at the Open Area Test Site were performed at a 10 m measurement distance.

The Biconilog 30 MHz-2 GHz antenna was used.

The EUT's configuration and mode of operation, which produced the maximum level of emissions, were selected.

The frequency range from 30 to 2000 MHz was investigated.

The measurements were performed at each frequency found previously and at frequencies at which the signal was 10 dB below the limit or less.

The level were maximized by initially rotating turntable through 360°, varying the antenna height between 1 m and 4 m, rerouting EUT cables and changing antenna-to-EUT polarization from vertical to horizontal.

Unless stated otherwise, the measuring equipment settings were:

Initial scan:		Measurements:	
Detector type	Peak	Detector type	Quasi-peak (CISPR)
Mode	Max hold	Bandwidth	120 kHz
Bandwidth	120 kHz	Measurement time	20 seconds/MHz
Step size	Continuous sweep	Observation	>15 seconds
Sweep time	>1 seconds/MHz		

(For antenna and cable factors – see Appendix 2).

Unless otherwise stated, the EUT was operated in the mode described in clause 1.2.

4.6.3. Radiated emission test results:

Test results are presented in Table 2.

Table 2. Radiated emission test results
FCC Part 15 Subpart B Class B

Frequency (MHz)	Turn-table Angle (°)	Antenna Polariz.	Antenna Height (m)	Emission Level (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Results
37.9	219	V	1.35	27.3	40.0	12.7	Complies
44.1	213	V	2.27	26.5	40.0	13.5	Complies
55.3	263	V	2.54	26.4	40.0	13.6	Complies
59.9	90	V	2.47	25.9	40.0	14.1	Complies
68.7	78	V	2.13	25.9	40.0	14.1	Complies
75.4	343	V	1.93	25.4	40.0	14.6	Complies
119.9	241	V	1.92	27.6	43.5	15.9	Complies
125.1	121	V	1.73	28.8	43.5	14.7	Complies
125.4	235	H	3.97	32.1	43.5	11.4	Complies
167.8	163	V	1.90	28.0	43.5	15.5	Complies
187.2	0	H	4.00	27.1	43.5	16.4	Complies
188.2	195	V	1.58	29.4	43.5	14.1	Complies
458.2	359	V	2.91	28.6	46.0	17.4	Complies
803.6	246	V	2.98	32.7	46.0	13.3	Complies
994.9	118	V	2.17	30.6	46.0	15.4	Complies

Note 1: Emission level = E Reading (dBμV) + Cable loss (dB) + Antenna Factor (dB/m)
For Cable Loss and Antenna Factor refer to Appendix 2.

Note 2: The measurements were performed at 10 m distance and the results were extrapolated to 3 m distance.

5. Compliance with specification

Test	Standard	Class/ Severity level	Test result
Conducted emission on mains terminal Frequencies range of 150 kHz to 30 MHz	FCC Part 15 Subpart B	CX-VL5.8-BA900: Class A	Complies
		CX-BA2.4-BA900: Class A	Complies
		CX-VL5.8-BA2.4: Class B	Complies
Radiated emission Frequencies range of 30 -1000 MHz		Class B (3 models)	Complies

Telematics Laboratory
11 January 2004

Approved by: Eng. Yuri Rozenberg
Position: Head of EMC Branch

Tested by: Albert Herzenshtein
Position: Test Engineer

6. Appendix 1: Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding once a year.

Instrument	Manufac-turer	Model	Serial No.	Last calibration date	Next calibration date
EMI Receiver	HP	8546A+85460A	SII 4068	11/03	11/04
LISN 9 kHz – 30 MHz	FCC	LISN- 50/250-32-4-16	SII 5023	05/03	05/04
Transient limiter 0.009-200 MHz	HP	11947A	31074A3105	05/03	05/04
Antenna Biconilog 30 – 2000 MHz	Schaffner-Chase	CBL6112B	S/N 2531	01/03	01/04
Antenna Mast	R&S	HCM	100002	N/A	N/A
Metallic turntable	R&S	HCT12	100001	N/A	N/A
Positioning controller	R&S	HCC	100002	N/A	N/A

7. Appendix 2: Antenna Factor and Cable Loss

Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	21	1000	3.68
2	50	0.75	22	1100	3.82
3	100	1.08	23	1200	4.07
4	150	1.39	24	1300	4.24
5	200	1.61	25	1400	4.43
6	250	1.752	26	1500	4.6
7	300	2.00	27	1600	4.7
8	350	2.15	28	1700	4.85
9	400	2.26	29	1800	4.98
10	450	2.383	30	1900	5.19
11	500	2.52	31	2000	5.34
12	550	2.606	32	2100	5.51
13	600	2.75	33	2200	5.69
14	650	2.856	34	2300	5.89
15	700	3.06	35	2400	6.07
16	750	3.201	36	2500	6.22
17	800	3.27	37	2600	6.28
18	850	3.38	38	2700	6.41
19	900	3.46	39	2800	6.53
20	950	3.55	40	2900	6.84

Table 3. Antenna Factor

For Biconilog Antenna, Model Number: CBL-6112B, S/N: 2531
10 m Calibration

Horizontal Polarization				Vertical Polarization			
Frequency (MHz)	Antenna Factor (dB/m)	Frequency (MHz)	Antenna Factor (dB/m	Frequency (MHz)	Antenna Factor (dB/m)	Frequency (MHz)	Antenna Factor (dB/m)
30	19.7	725	19.7	30	17.6	725	19.8
40	13.8	750	20.1	40	16.1	750	20.0
50	8.5	775	20.1	50	8.2	775	20.0
60	6.3	800	20.1	60	6.0	800	20.1
70	6.4	825	20.3	70	6.2	825	20.3
80	7.2	850	20.5	80	7.7	850	20.6
90	9.1	875	20.7	90	9.2	875	20.8
100	10.8	900	20.7	100	10.6	900	20.9
110	11.7	925	20.9	110	11.4	925	21.0
120	12.0	950	21.0	120	11.7	950	21.2
130	11.8	975	21.4	130	11.8	975	21.3
140	11.3	1000	21.5	140	11.3	1000	21.4
150	10.5	1050	22.0	150	10.4	1050	21.9
160	10.0	1100	22.2	160	9.8	1100	22.2
170	9.6	1150	22.7	170	9.4	1150	22.6
180	9.2	1200	23.2	180	9.4	1200	23.1
190	9.0	1250	23.6	190	9.6	1250	23.5
200	9.3	1300	24.0	200	9.9	1300	23.8
225	9.8	1350	24.1	225	10.5	1350	24.0
250	12.7	1400	24.6	250	12.6	1400	24.3
275	12.9	1450	24.9	275	13.2	1450	24.7
300	13.3	1500	25.1	300	13.4	1500	25.0
325	13.8	1550	25.2	325	13.8	1550	25.2
350	14.6	1600	25.4	350	14.6	1600	25.3
375	15.0	1650	25.9	375	15.1	1650	25.8
400	15.9	1700	26.1	400	16.0	1700	26.0
425	16.6	1750	26.4	425	16.7	1750	26.2
450	16.8	1800	26.4	450	16.7	1800	26.4
475	17.5	1850	26.7	475	17.4	1850	26.7
500	17.7	1900	27.3	500	17.7	1900	27.3
525	18.0	1950	27.6	525	18.0	1950	27.3
550	19.3	2000	27.6	550	19.1	2000	27.7
575	19.4			575	19.1		
600	19.3			600	19.3		
625	19.7			625	19.5		
650	19.6			650	19.5		
675	19.5			675	19.5		
700	19.4			700	19.5		

8. Appendix 3: Test configuration illustrations

This appendix contains the following illustrations:

Photo # 4.BreezeAccess Repeater System
Radiated emission test setup. Front view

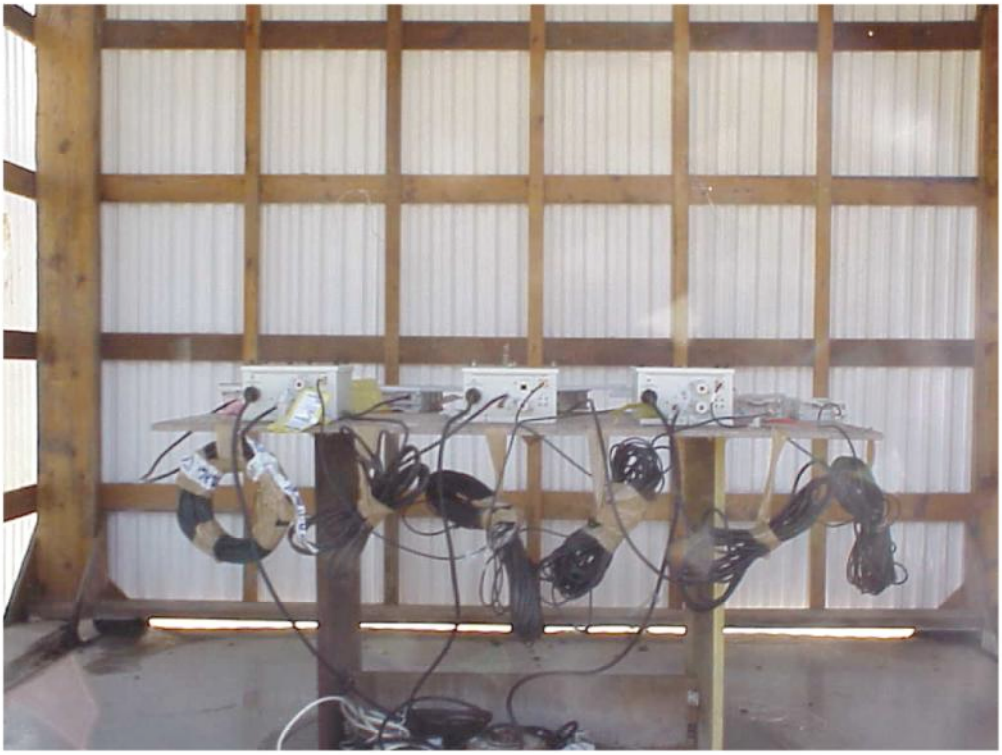


Photo # 5. BreezeAccess Repeater System
Radiated emission test setup. Rear view