



Aironet Wireless Communications, Inc.
367 Ghent Road, Suite 300
Fairlawn, OH 44333
Phone 330-664-7900/Fax 330-664-7301

Facsimile Cover Sheet

To: Joe Dickson

Company:

Phone:

Fax:

From: D. Case

Company:

Phone:

Fax:

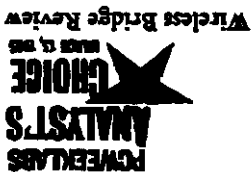
Date: 2-12-99

Pages including
this cover page: 5 pgs

Comments:



APRIL 1996



CONFIDENTIAL

The documents accompanying this telecopy contain information from Aironet which is confidential and/or legally privileged. The information is intended only for the use of the individual or entity named on this transmission sheet. If you are not the intended recipient, you are hereby notified that any disclosure, copying, distribution or the taking of any action in reliance on the contents of this telecopied information is strictly prohibited, and that the documents should be returned to Aironet immediately. In this regard, if you have received this telecopy in error, please notify us by telephone immediately so that we can arrange for the return of the original document to us.



2/12/99

Joe Dichoso
FCC

Joe,

Per our conversation on 2/10/99, the data for the 11 MB processing gain marked confidential was for internal reasons only. It is our understanding that this data and test method does not fall under the confidential rulings and will be added to the file. However, I also understand that the research data done on this issue will remain confidential per our conversation.

Regards

A handwritten signature in cursive script, appearing to read "David A. Case".

David A. Case NCE
Senior EMC and Reliability Engineer
Airnet Wireless Communications.



HIGHLY CONFIDENTIAL DOCUMENT
AIRNET INTERNAL USE ONLY

PRODUCT NAME: AIRNET LM4800 RADIO
NAME OF TEST: The Processing Gain of a Direct Sequence System.

FCC Part 15.247 (e) specifies:

The processing gain of a direct sequence system shall be at least 10 dB.

Guidance on measurement by FCC

The processing gain may be measured using the CW jamming margin method. The test consists of stepping a signal generator in 50kHz increments across the passband of the system. At each point, the generator level required to produce the recommended Bit Error Rate (10⁻⁵) is recorded. This is the jammer level. The output power of the transmitting unit is measured at the same point. The jammer to signal (J/S) ratio is then calculated. Discard the worst 20% of the J/S data points. Total losses in a system including transmitter and receiver, should be assumed to be no more than 2 dB.

therefore, processing gain = S/N + Mj + Lsys

Where :

S/N = Signal to noise ratio required at the receiver output for 10⁻⁵ error rate of a ideal receiver for your demodulation scheme

Mj = Jammer to signal ratio

Lsys = System losses (2dB max)

Test results :

for 1 mb data rate:

S/N = 13 dB ; taken from Wireless Information Networks by Pahlavan & Levesque
Mj = - 2.5 dB ; worst case jamming margin from tests in lab
Lsys = 0.5 dB ; system losses
therefore the processing gain at 1mb is 13 dB - 2.5 dB + 0.5 dB = 11.0 dB

for 2 mb data rate:

S/N = 13 dB ; taken from Wireless Information Networks by Pahlavan & Levesque
Mj = - 2.9 dB ; worst case jamming margin from tests in lab
Lsys = 1.0 dB ; system losses
therefore the processing gain at 2mb is 13 dB - 2.9 dB + 1.0 dB = 11.1 dB



SECRET

H.

for 5.5 mb data rate:

S/N = 13.6 dB : taken from Harris CCK encoding modulation

Mj = - 5.2 dB : worst case jamming margin from tests in lab

Lsys = 2.0 dB : system losses

therefore the processing gain at 5.5mb is 13.6 dB - 5.2 dB + 2.0 dB = 10.4 dB

for 11 mb data rate:

S/N = 16.0 dB : taken from Harris CCK encoding modulation

Mj = - 7.3 dB : worst case jamming margin from tests in lab (after 20% discarded)

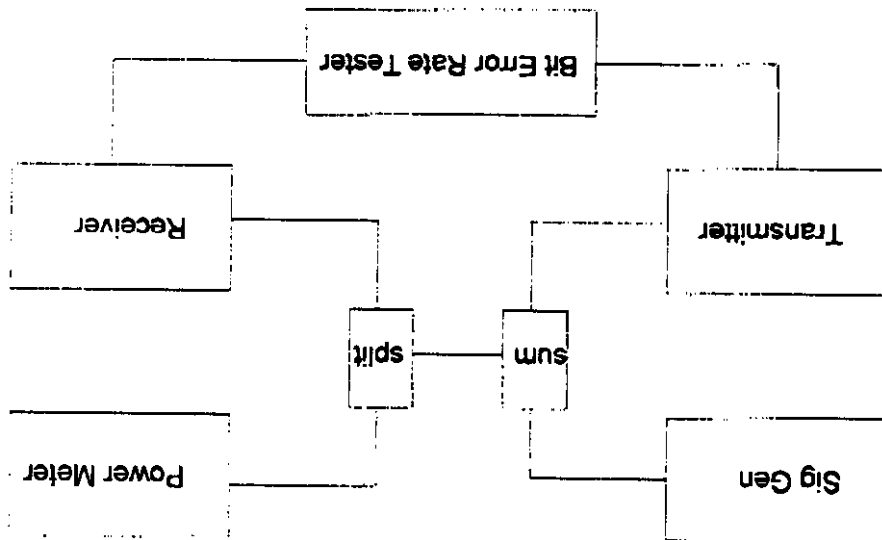
Lsys = 2.0 dB : system losses

therefore the processing gain at 11mb is 16.0 dB - 7.3 dB + 2.0 dB = 10.7 dB

HIGHLY CONFIDENTIAL DOCUMENT
AIRNET INTERNAL USE ONLY



Jamming Test Setup



AIRONET RF Systems Engineering	
2.4 GHz SPREAD SPECTRUM RADIO, 2nd GEN	
Jammer Test, R240	
eng: J. Friedman	Rev: FCCC025.2 doc
eng: J. Friedman	Date: 07/19/98

AIRONET CONFIDENTIAL

HIGHLY CONFIDENTIAL DOCUMENT
AIRONET INTERNAL USE ONLY

11/30/98

AIRONET CONFIDENTIAL

11/30/98

radio conditions : supply voltage 5V, at room temp, rx s/n = #2000, tx s/n = #2003, Rev AC2 with Harris HF-A3860B (CCK modulation)

radio carrier freq=2465

input signal level = -60 dBm, jammer level = -65.2 dBm, then $M_j = -5.2$ dB for 10-5 BER

$$G_p = 13.6 \text{ dB} + -5.2 \text{ dB} + 2.0 \text{ dB} = 10.4 \text{ dB} \text{ (worst case point after lowest 20\% discarded)}$$

hammer
pass (over)
rate under
hammer

[illegible]

11/30/98

CONFIDENTIAL

radio conditions : supply voltage 5v, at room temp, rx s/n = #2000, tx s/n = #2003, Rev AC2 with Harris HFA3860B (CCK modulation)

$$G_p = S/N + M_f + L_{sys}; \text{ where } S/N = 13.6 \text{ dB as per CCK modulation; } L_{sys} = 2.0 \text{ dB}$$

input signal level = -60 dbm, jammer level = -65.2 dbm, then $M_j = -5.2$ db for 10-5 BER

$G_p = 13.6 \text{ dB} + -5.2 \text{ dB} + 2.0 \text{ dB} = 10.4 \text{ dB}$ (worst case point after lowest 20% discarded)

jammer	pass (over)	jammer	rate under	jammer	rate under	jammer
--------	-------------	--------	------------	--------	------------	--------

[illegible]

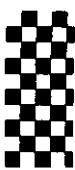
HIGHLY CONFIDENTIAL DOCUMENT
AIRNET

Processing gain by method of jamming margin using Debugger Software Linktest											
radio conditions : supply voltage 5v, at room temp, rx s/n = #2000, tx s/n = #2003, Rev AC2 with Harris HFA3860B (CCK modulation)											
tester name : Jim Nahra / Jim Friedmann											
test date : 11/12/98											
radio carrier freq=2465											
Gp = S/N + Mj + Lsys; where S/N = 16.0 dB as per CCK modulation; Lsys = 2dB											
input signal level = -60 dbm, jammer level = - 67.3 dbm, then Mj = - 7.3 dB for 10-5 BER											
Gp = 16.0 dB + -7.3 dB + 2 dB = 10.7 dB (worst case point after lowest 20% discarded)											
pass (error rate under 1x10-5)	jammer freq	pass (error rate under 1x10-5)	jammer freq	pass (error rate under 1x10-5)	jammer freq	pass (error rate under 1x10-5)	jammer freq	pass (error rate under 1x10-5)	jammer freq		
pass /	Hz	pass /	Hz	pass /	Hz	pass /	Hz	pass /	Hz		
FAILURE		FAILURE		FAILURE		FAILURE		FAILURE			
1	2456.50	19.7	pass	81	2460.50	11.7	pass	121	2462.50	10.7	pass
2	2456.55	19.7	pass	82	2460.55	11.7	pass	122	2462.55	10.7	pass
3	2456.60	19.7	pass	83	2460.60	11.2	pass	123	2462.60	10.7	pass
4	2456.65	19.2	pass	84	2460.65	11.2	pass	124	2462.65	10.7	pass
5	2456.70	19.2	pass	85	2460.70	11.2	pass	125	2462.70	10.7	pass
6	2456.75	19.2	pass	86	2460.75	11.2	pass	126	2462.75	10.7	pass
7	2456.80	19.2	pass	87	2460.80	11.2	pass	127	2462.80	10.7	pass
8	2456.85	19.2	pass	88	2460.85	11.2	pass	128	2462.85	10.7	pass
9	2456.90	18.7	pass	89	2460.90	11.2	pass	129	2462.90	10.7	pass
10	2456.95	18.7	pass	90	2460.95	11.2	pass	130	2462.95	10.7	pass
11	2457.00	18.7	pass	91	2461.00	11.2	pass	131	2463.00	10.7	pass
12	2457.05	18.7	pass	92	2461.05	11.2	pass	132	2463.05	10.7	pass
13	2457.10	18.7	pass	93	2461.10	11.2	pass	133	2463.10	10.7	pass
14	2457.15	18.7	pass	94	2461.15	11.2	pass	134	2463.15	10.7	pass
15	2457.20	18.2	pass	95	2461.20	11.2	pass	135	2463.20	10.7	pass
16	2457.25	18.2	pass	96	2461.25	11.2	pass	136	2463.25	10.7	pass
17	2457.30	18.2	pass	97	2461.30	11.2	pass	137	2463.30	10.7	pass
18	2457.35	17.7	pass	98	2461.35	11.2	pass	138	2463.35	10.7	pass
19	2457.40	17.2	pass	99	2461.40	11.2	pass	139	2463.40	10.7	pass
20	2457.45	17.2	pass	100	2461.45	11.2	pass	140	2463.45	10.7	pass
21	2457.50	17.2	pass	101	2461.50	11.2	pass	141	2463.50	10.7	pass
22	2457.55	17.2	pass	102	2461.55	11.2	pass	142	2463.55	10.7	pass
23	2457.60	16.7	pass	103	2461.60	11.2	pass	143	2463.60	10.7	pass
24	2457.65	16.7	pass	104	2461.65	11.2	pass	144	2463.65	10.7	pass
25	2457.70	16.2	pass	105	2461.70	11.2	pass	145	2463.70	10.7	pass
26	2457.75	15.7	pass	106	2461.75	11.2	pass	146	2463.75	10.7	pass
27	2457.80	15.7	pass	107	2461.80	11.2	pass	147	2463.80	10.7	pass
28	2457.85	15.7	pass	108	2461.85	11.2	pass	148	2463.85	10.7	pass
29	2457.90	15.2	pass	109	2461.90	11.2	pass	149	2463.90	10.7	pass
30	2457.95	14.7	pass	110	2461.95	11.2	pass	150	2463.95	10.7	pass
31	2458.00	14.7	pass	111	2462.00	11.2	pass	151	2464.00	10.7	pass
32	2458.05	14.7	pass	112	2462.05	11.2	pass	152	2464.05	10.7	pass
33	2458.10	13.7	pass	113	2462.10	11.2	pass	153	2464.10	10.7	pass
34	2458.15	13.7	pass	114	2462.15	11.2	pass	154	2464.15	10.7	pass
35	2458.20	13.7	pass	115	2462.20	11.2	pass	155	2464.20	10.7	pass
36	2458.25	13.7	pass	116	2462.25	10.7	pass	156	2464.25	10.7	pass
37	2458.30	13.7	pass	117	2462.30	10.7	pass	157	2464.30	10.7	pass
38	2458.35	13.7	pass	118	2462.35	10.7	pass	158	2464.35	10.7	pass
39	2458.40	13.7	pass	119	2462.40	10.7	pass	159	2464.40	10.7	pass
40	2458.45	13.7	pass	120	2462.45	10.7	pass	160	2464.45	10.7	pass

drop 20% = 340 x 20% = 68 : therefore can drop up to 68 lowest pts

drop 20% = 340 x 20% = 68 : therefore can drop up to 68 lowest pts

AIRNET CONFIDENTIAL



MFG
M. Flom Associates, Inc. - Global Compliance Center
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85224-1571
www.goodnet.com/~mflom, (602) 926-3100, FAX: 926-3598

TOTAL PAGES:	1
DATE:	February 10, 1999
VIA FAX:	1 301 344 2050
TO:	Federal Communications Commission,
ATTENTION:	Joe Dichoso, Electronics Engineer
APPLICANT:	Airnet Wireless Communications, Inc.
EQUIPMENT:	FCC ID: LOZ102035 Confirm. EA92699
SUBJECT:	Your phone call today

Joe:

Once again, thank you for your prompt phone response to our fax. It is very much appreciated in saving time.
In searching through our lab test records, we found the information which is required, i.e.

TUNED, MHZ.
CONDUCTED POWER, dbm and mw

2412	20	1005
2442	19.3	85
2442	19.3	85

Trust this meets your needs.

Regards,

M. Flom

MORTON FLOM, P. Eng.

mfl.mgt