BLT LAN Transceiver
Processing Gain Test Procedure

Part of Document Number 89-0612

Modified Date: August 26, 1999

Test Name: Processing Gain   **Test #: 5.9**
Test Summary: Verifies compliance with FCC requirement for direct sequence system processing gain of at least 10 dB measured using the CW jamming margin method.
Applies to Specification 2.1.10

Pass / Fail Criteria:
Every point must exhibit => 12 dB processing gain. (FCC Requirement: 10 dB)

Required Test Equipment:
Boonton 4220A Power meter with 51175 sensor (diode sensor).
HP8594E Spectrum Analyzer
HP8656 Signal Generator
6-way divider and cabling for synthesizer inputs to DUTs
BLT Tx Breadboard including HP8647A signal generator
TOMM (tx source with a special 101 MHz sma output tap before keying portion of unit)
2 Variable Decade Attenuators, one with 0.1 dB precision
Power Supply 13.5 Vdc, 5 A
Fluke 87 True RMS Multi-meter
2-way and 6-way splitters and cabling
PCs with multiple serial ports running Grabber w/ Windows95
2-way power combiner

Equipment Set-up:

HP8594E Spectrum Analyzer
Resolution Bandwidth   =   3 MHz
Video Bandwidth   =   1 MHz
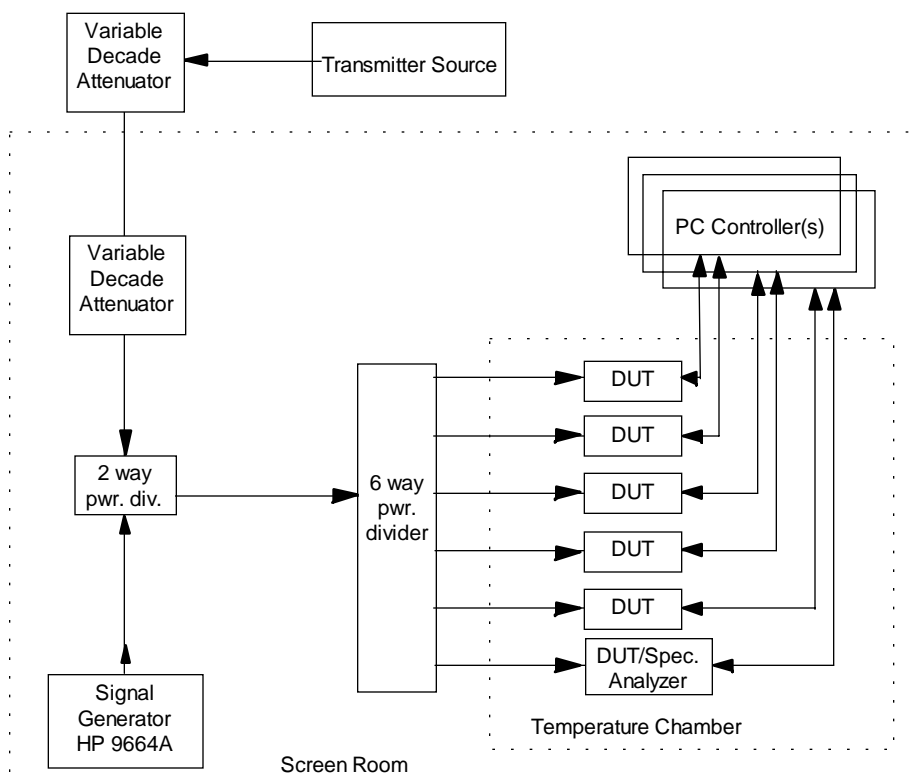   Sweep   =   50 msec
    Span   =   0 MHz
    Attenuation   =   10 dB
Variable Attenuator   =   as required to achieve a -80 dBm spread signal.

Note: Ensure that all test equipment has been warmed up for 30 minutes and calibrated before measurements are taken.

Procedure:

1.   The purpose of this test is to measure the processing gain of the DUTs using the CW jamming margin method and OOK modulation. The expected result is a measure of the effective processing gain in dB, as determined from a measurement of jamming margin combined with a theoretical prediction of PSR versus post-despread SNR. For OOK modulation, theory predicts a BER of 1e-3 at a post-despread SNR of 13.8 dB. This BER corresponds to a PSR of 78%.

2.   Use the test setup for the 5.8.2 and 5.8.3 portions of the receiver throughput test, with the following changes. Use a power combiner to add the output of a CW source with the output of the transmitter. The CW signal should be controllable in increments of 1dB maximum and must reach the receiver in a range of -10 to +10 dB relative to the output of the transmitter. Calibrate the signal strength from both sources, per paragraph 3.2.3.

3.   Turn off the CW source and set the source transmitter for a power of -80 dBm at 917.58 MHz with 0 PPM offset. Configure the receiver (DUT) to receive on antenna port A at 917.58 MHz. Confirm that the PSR using at least 600 packets is > 98%. Turn on the CW signal and adjust it until the PSR using at least 600 packets is 78%. Record the difference in dB, with an accuracy of 0.5 dB, between the CW and transmitter powers reaching the receiver, with a higher power CW signal yielding a positive difference.

4.   Compute the processing gain as **PG = D + 13.8 + L**, in dB, where D is the difference in CW and transmitter powers, and L is an allowance for implementation loss. Use 2 dB as the value of L.

5.   Perform this test for CW frequencies ranging from 200 kHz below to 200 kHz above the transmit carrier, stepping in increments of 50 kHz. Convert the measured gains from dB to scalar, find the average, and convert back to dB.

Delta reading in dB, jammer source level vs packet level (at DUT)
dB converted to scalar, scalar averaged, average converted back to dB

+25 Degrees C   **15.8 (13.8dB +2dB losses) added to average**

DUT #		Frequency Offset (KHz)									AVE
		-200	**-150**	**-100**	**-50**	**0**	**50**	**100**	**150**	**200**	**dB**
1 dB-->		3	4	4	5	7	5	4	5	4	
Scalar-->		2	2.51	2.51	3.16	5.01	3.16	2.51	3.16	2.51	20.49
2 dB-->		3	4	4	5	7	5	5	5	4	
Scalar-->		2	2.51	2.51	3.16	5.01	3.16	3.16	3.16	2.51	20.6
3 dB-->		3	4	4	5	7	5	4	5	4	
Scalar-->		2	2.51	2.51	3.16	5.01	3.16	2.51	3.16	2.51	20.49
4 dB-->		3	4	4	4	5	4	4	4	4	
DSP Scalar-->		2	2.51	2.51	2.51	3.16	2.51	2.51	2.51	2.51	19.82

formula for average =ROUND(((LOG10(AVERAGE(#REF!))*10)+15.8),2)

Acceptance Block: A signature below denotes that this test has met all pass criteria.

Signature: *David Di Salvo*   **Date**: *July 99*