

Lucent WaveLAN Throughput Testing

March 15, 2002

**Kulsoom Abdullah, Cherita Corbett, and John Copeland
Communications System Center
Georgia Institute of Technology**

Table of Contents

A. OVERVIEW	2
B. ASSUMPTIONS	2
C. TEST ENVIRONMENT	3
D. WIRELESS LAN SCENARIOS	3
E. RESULTS AND ANALYSIS	4
1. SCENARIO 1	4
o <i>UDP</i>	4
o <i>TCP</i>	4
2. SCENARIO 2	5
o <i>UDP</i>	5
o <i>TCP</i>	6
3. SCENARIO 3	7
o <i>UDP</i>	7
o <i>TCP</i>	7

A. Overview

This document will summarize the results of throughput tests performed on the Lucent WAVE LAN cards. Three different wireless LAN scenarios were set up and tested under different parameters.

B. Assumptions

The following assumptions used for the tests:

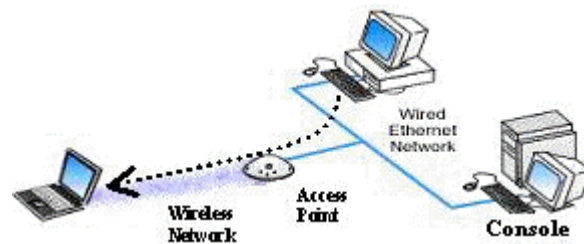
- The software used to perform the throughput tests was NetIQ's Chariot.
- The console data traffic, used for collecting statistics, was sent on the wired Ethernet network existent in the lab. Only the test data traffic was used on the wireless network. This was to ensure the most accuracy of the results.
- The throughput script in the Chariot software was used in the tests. This script transferred a file of 100 KB.
- The Access Point used was Lucent AP1000 with the Lucent Gold card.
- The wireless clients were two Toshiba satellite laptops (list processor and memory spec). One is running windows 2000 with the Gold card and the other Windows XP with the silver card.
- The wired client is a Dell running windows 2000.

- All scenarios were run with and without 64-bit encryption.
- TCP and UDP traffic flows were both simulated in each of the scenarios.

C. Test Environment

The tests were performed in the GCATT building of Georgia Tech's campus in the CSC labs. The wired client and console client were in a lab adjacent to the second lab, which held the two wireless clients and access point. Prior to recording the throughput results, all equipment and various scenarios were tested to ensure proper functionality.

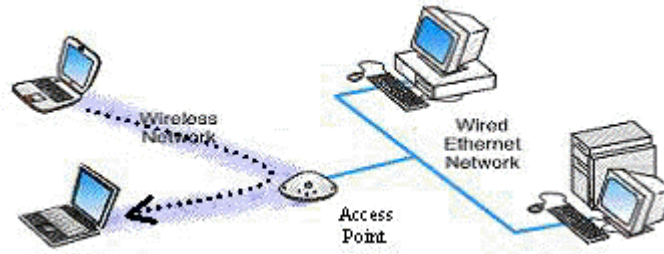
D. Wireless LAN Scenarios



- **Scenario 1:** We connected the Lucent AP1000 access point to the 802.3 LAN and placed a wireless client nearby. We configured the throughput script to run from a desktop connected via the wired LAN to the wireless client.



- **Scenario 2:** We connected the Lucent AP1000 access point to the 802.3 LAN and placed two wireless clients nearby. We configured two paths: 1) desktop A to laptop A and 2) desktop B to laptop B. The throughput script ran along each path simultaneously.



- **Scenario 3:** The WLAN operated as a stand-alone network with two wireless clients. We configured the throughput script to run from laptop A to laptop B.

E. Results and Analysis

1. Scenario 1

The average results for the first scenario are:

○ UDP

Encryption	Average	Min	Max
Off	4.102	4.02	4.167
On	2.628	0.81	3.419

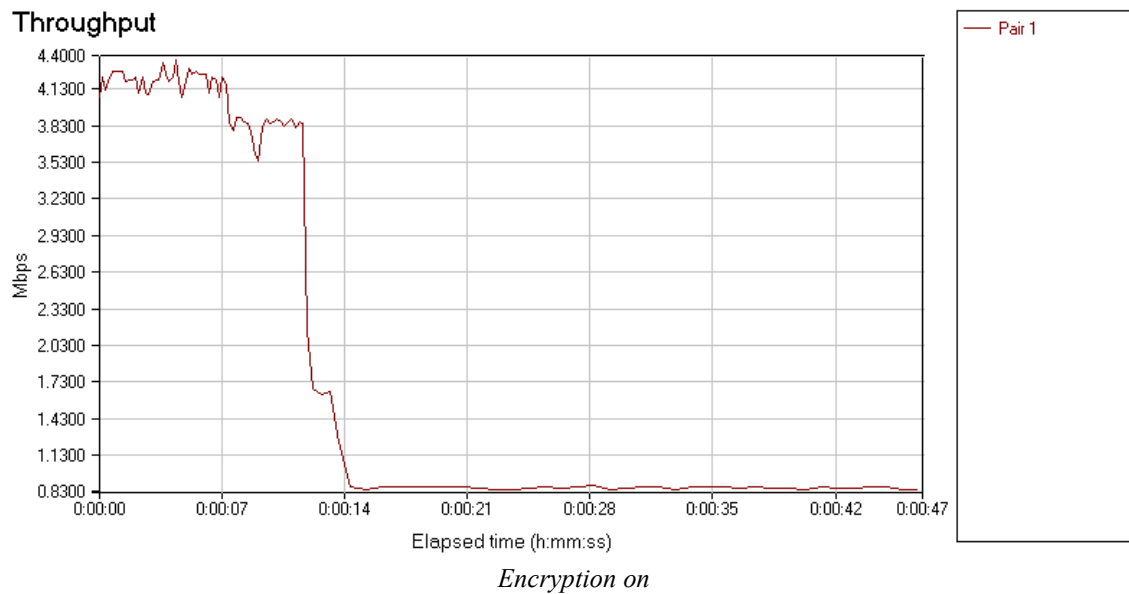
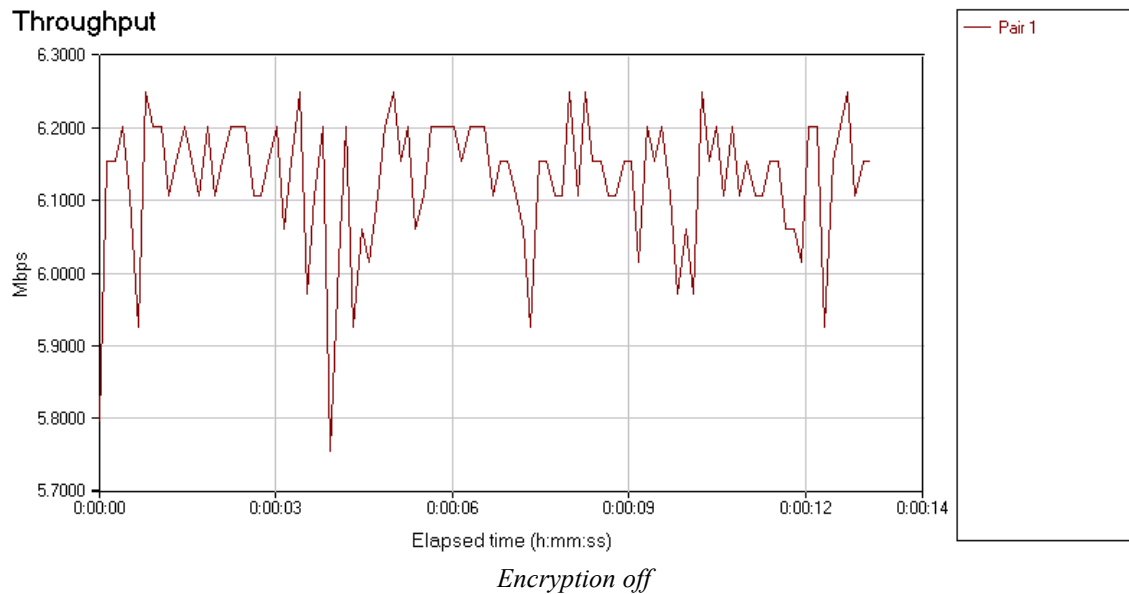
Here there was an 18% decrease in the maximum throughput with encryption on.

○ TCP

Encryption	Average	Min	Max
Off	6.103	5.755	6.25
On	1.712	0.844	4.372

Here there was a 30% decrease in the maximum throughput with encryption on.

Below are the graphs of the simulations for TCP.



2. Scenario 2

The average results for the second scenario are:

- UDP

Encryption	Average	Min	Max
Off	4.133	3.865	4.233
On	3.288	2.73	3.434

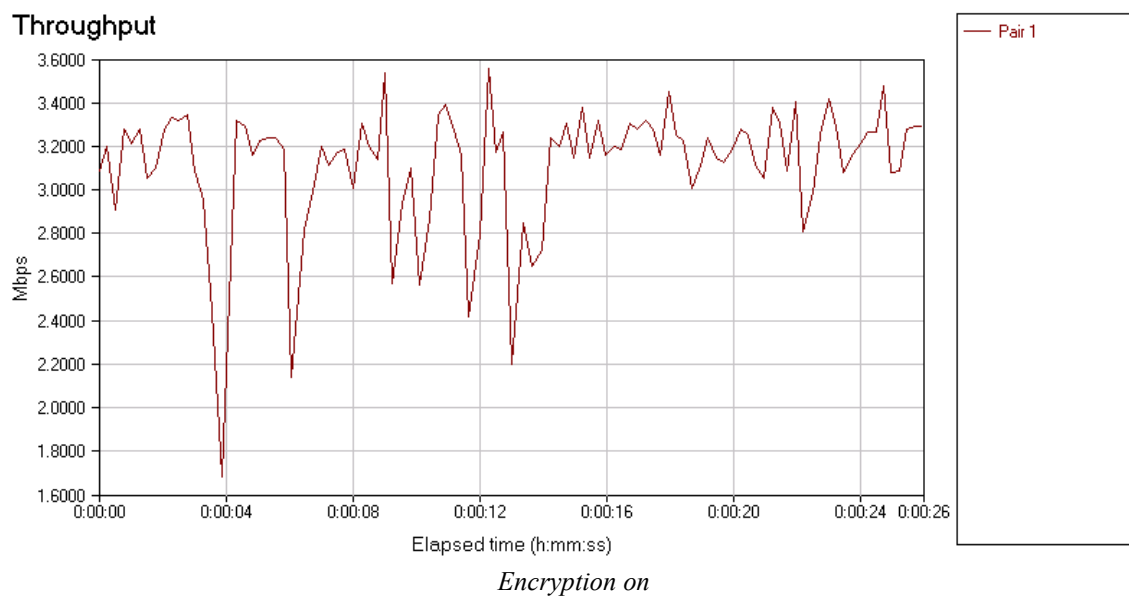
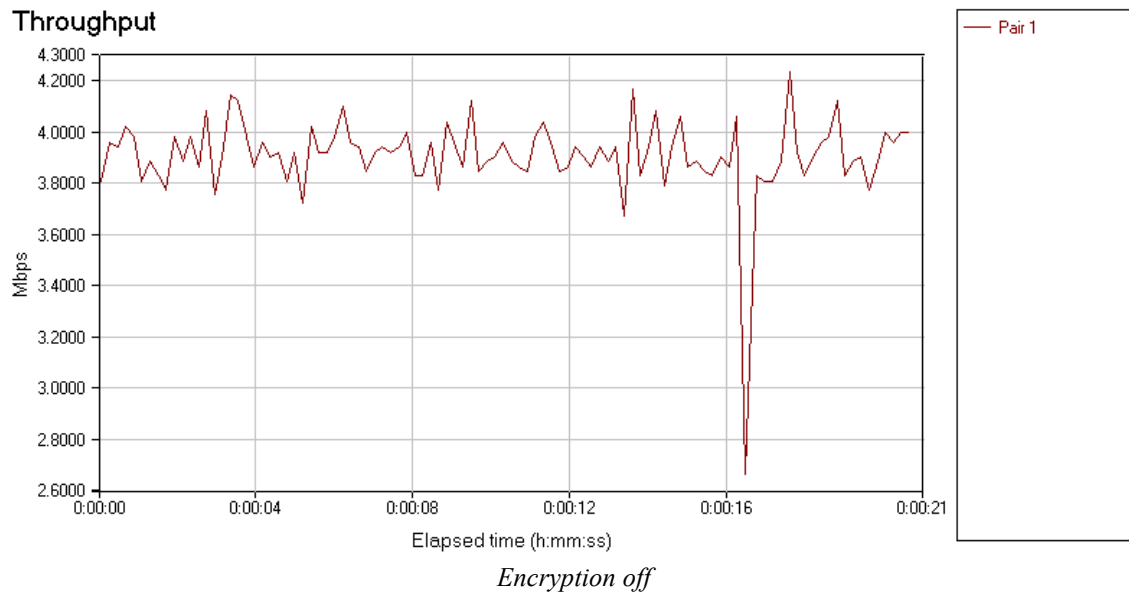
Here there was a 19% decrease in the maximum throughput with encryption on.

- TCP

Encryption	Average	Min	Max
Off	3.877	2.667	4.233
On	3.079	1.684	3.556

Here there was a 16% decrease in the maximum throughput with encryption on.

Below are the graphs of the simulations for TCP.



3. Scenario 3

The average results for the third scenario are:

- UDP

Pair 1

Encryption	Average	Min	Max
Off	2.9	1.421	3.587
On	1.583	0.722	2.424

Pair 2

Encryption	Average	Min	Max
Off	2.332	1.055	3.98
On	1.499	0.636	3.175

Total

Encryption	Average	Min	Max
Off	3.98	1.055	4.657
On	2.996	0.636	3.175

Here there was a 32% decrease in the maximum throughput with encryption on for the total pairs.

- TCP

Pair 1

Encryption	Average	Min	Max
Off	3.833	0.672	5.556
On	1.917	0.725	2.952

Pair 2

Encryption	Average	Min	Max
Off	1.482	0.589	2.564
On	1.649	0.571	3.67

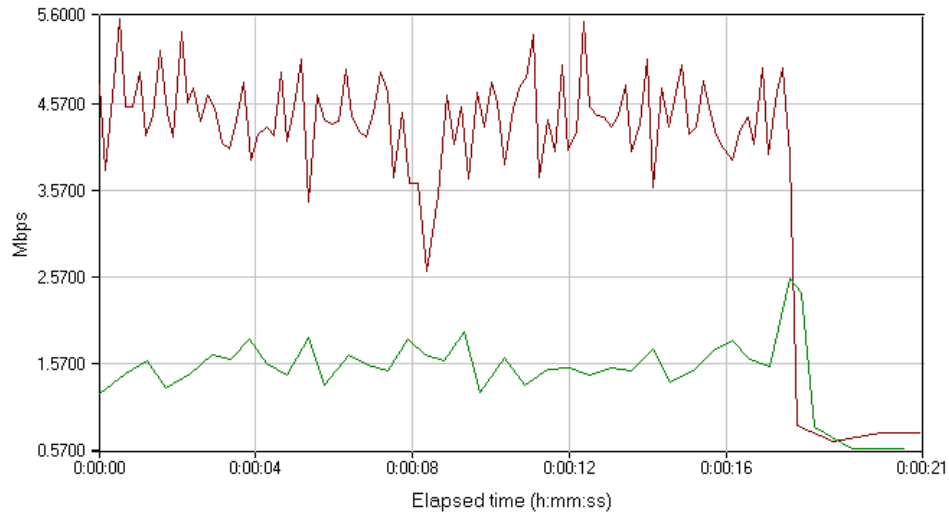
Total

Encryption	Average	Min	Max
Off	5.276	0.589	5.556
On	3.295	0.571	3.67

Here there was a 34% decrease in the maximum throughput with encryption on.

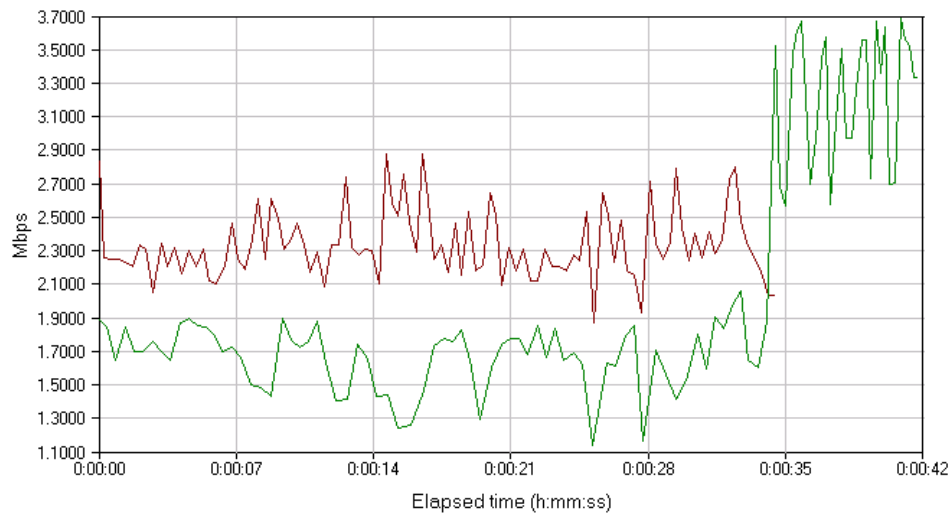
Below are the graphs of the simulations for TCP.

Throughput



Encryption off

Throughput



Encryption on

