KeyLabs
BottomLine Quality Management

Test Final Report

U.S.Robotics

Wireless MAXg Router and Wireless MAXg PC Card 802.11g Performance Benchmark

Project ID: 0408050

March 23, 2005

385 South 520 West
Lindon, UT 84042
(801) 852-9500
Fax: (801) 852-9501
www.keylabs.com
mailto: info@keylabs.com

KeyLabs TESTED

Certification by KeyLabs

Any access to or use of this Report is conditioned on the following:

1. The information in this Report is subject to change by KeyLabs without notice.
2. The information in this Report is believed by KeyLabs to be accurate and reliable, but is not guaranteed. All use of and reliance on this Report are at your sole risk. KeyLabs is not liable or responsible for any damages, losses or expenses arising from any error or omission in this Report.
3. **NO WARRANTIES, EXPRESS OR IMPLIED ARE GIVEN BY KEYLABS. ALL IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT ARE DISCLAIMED AND EXCLUDED BY KEYLABS. IN NO EVENT SHALL KEYLABS BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY LOSS OF PROFIT, REVENUE, DATA, COMPUTER PROGRAMS, OR OTHER ASSETS, EVEN IF ADVISED OF THE POSSIBILITY THEREOF.**
4. This Report does not constitute an endorsement, recommendation or guarantee of any of the products (hardware or software) tested or the hardware and software used in testing the products. The testing does not guarantee that there are no errors or defects in the products, or that the products will meet your expectations, requirements, needs or specifications, or that they will operate without interruption.
5. This Report does not imply any endorsement, sponsorship, affiliation, or verification by or with any companies mentioned in this report.

All trademarks, service marks, and trade names used in this Report are the trademarks, service marks, and trade names of their respective owners, and no endorsement of, sponsorship of, affiliation with, or involvement in, any of the testing, this Report or KeyLabs is implied, nor should it be inferred.

Table of Contents

List of Tables

1.0 INTRODUCTION

In March of 2005, U.S. Robotics contracted KeyLabs to conduct independent throughput benchmark testing of six performance 802.11g products. The purpose of this benchmarking engagement is to help buyers make informed decisions in selecting the best product for their needs. Additionally, the results in this report will help buyers that are weighing the cost / benefits of 802.11g versus "Pre-N" networking standard.

2.0 EXECUTIVE SUMMARY

2.1 Overview and Results

KeyLabs was engaged by U.S. Robotics to conduct throughput testing on Netgear 108, D-Link, Linksys, Belkin High Speed Mode and U.S. Robotics 802.11g wireless routers and wireless network adapters. Ixia's Chariot network benchmarking tool was used to conduct the throughput tests. The objective was to compare upstream and downstream throughput of the 802.11g performance products from Netgear 108, D-Link, Linksys, Belkin, and U.S. Robotics in 802.11g networks at 30 feet / 9 meters, 90 feet / 27 meters, and 160 feet / 49 meters. The testing was conducted in an office space in Schaumburg, Illinois from March 7, 2005 through March 11, 2005. KeyLabs considers this space to adequately represent standard operating conditions for this type of device.

The specific products tested in this engagement were:

Manufacturer	Model#	Description
U.S. Robotics	USR5461	Wireless MAXg Router
U.S. Robotics	USR5411	Wireless MAXg PC Card
Linksys	WRT54GS	Wireless-G Broadband Router with SpeedBooster
Linksys	WPC54GS	Wireless-G Notebook Card with SpeedBooster
Netgear	WGT624	108 Wireless Firewall Router
Netgear	WGT511T	108 Wireless PC Card
Belkin	F5D7231-4	High Speed Mode Wireless Router
Belkin	F5D7011	High Speed Mode Wireless Notebook Card
Belkin	F5D8230-4	Wireless Pre-N Router
Belkin	F5D8010	Wireless Pre-N Notebook Card
DLINK	DI-624M	SuperG MIMO Wireless Router
DLINK	DWL-G650M	SuperG MIMO Wireless Router

2.2 Observations

MAXg versus 802.11g High Speed Mode Competitors

The findings of this testing engagement revealed that the U.S. Robotics MAXg 802.11g performance product consistently out-performed the competition in terms of total throughput

in standard 802.11g mode. Performance gains ranged between 5 and 312 percent when compared with the other products in this benchmark, which included Netgear 108 Wireless Firewall Router/PC Card, Belkin High Speed Mode Wireless Router/Notebook Card, and Linksys Wireless-G Broadband Router/Notebook Card with SpeedBooster. It was also observed that the magnitude of the performance gains depended on the distance and the direction (up or down) of the test traffic.

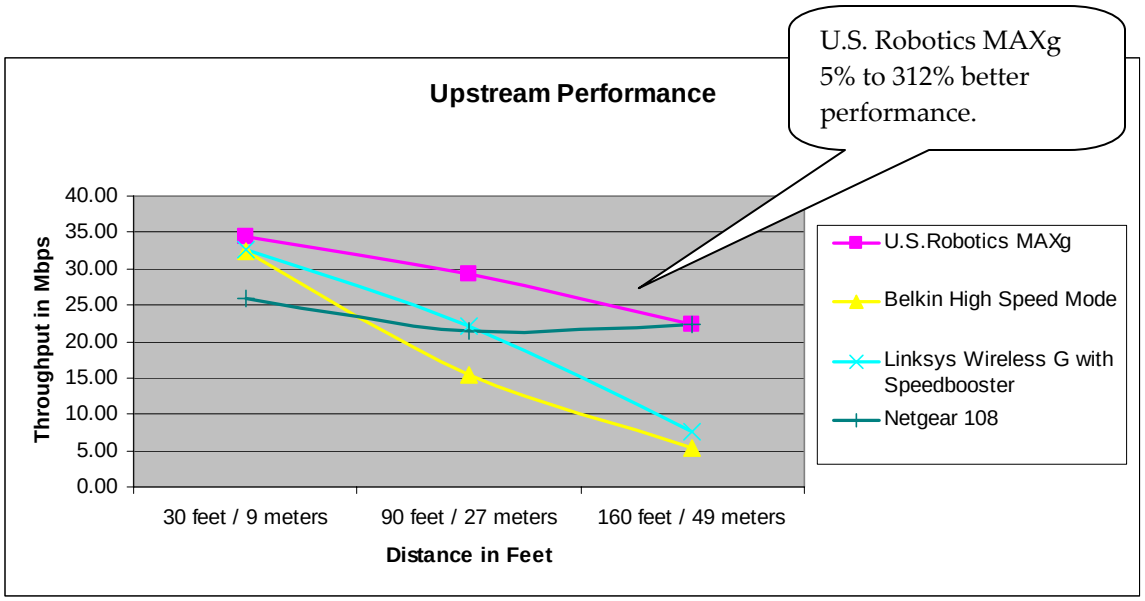


Figure 1: Upstream (from end node to access point) 802.11g performance

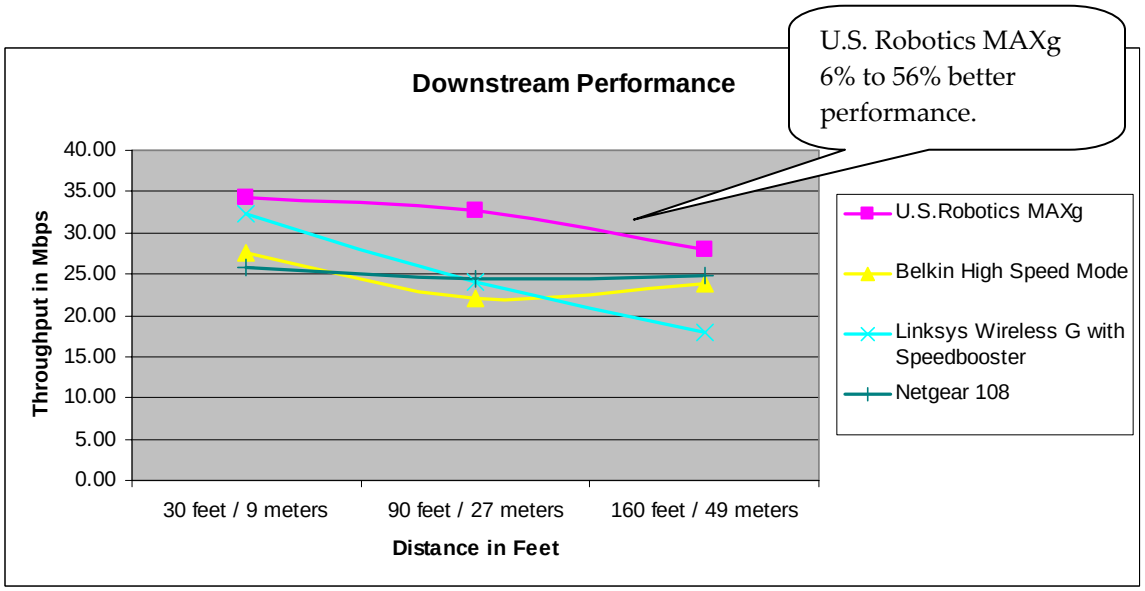


Figure 2: Downstream (from access point to end node) 802.11g performance

These two graphs show the results of throughput testing using Ixia's Chariot throughput.scr script with U.S. Robotics MAXg Router, Belkin High Speed Mode Wireless Router, Linksys Wireless G with SpeedBooster and Netgear 108 Wireless Firewall Router. The first graph is upstream performance, and the second is downstream performance. Higher numbers indicate better performance.

2.2.1 MAXg versus Pre-N/MIMO Competitors

The wireless networking market is constantly advancing. And now that consumers are comfortable with the 802.11g standard, many developers are setting their sights on the next incarnation of the 802.11x standard (tentatively named 802.11n). Some vendors are pre-releasing products before the 802.11n standard gets finalized. These "Pre-N" products promise throughput speeds of 110 Mbit per second, but as indicated in this report, paying a premium for these Pre-N products isn't recommended at this time.

The U.S. Robotics MAXg Router performed between 8 and 50 percent better than the D-Link Pre-N router/PC Card. The U.S. Robotics MAXg even beat the Belkin Wireless Pre-N Router/PC Card's upstream throughput at 30 feet / 9 meters by .59 Mbits per second, although at 90 and 160 feet or 27 and 49 meters upstream the Belkin Wireless Pre-N had slightly higher throughput by 1 to 6.3 Mbit per second depending on distance and direction (upstream or downstream).

KeyLabs did not observe any test results which would substantiate Belkin's claim of 600% greater speed over 802.11g.

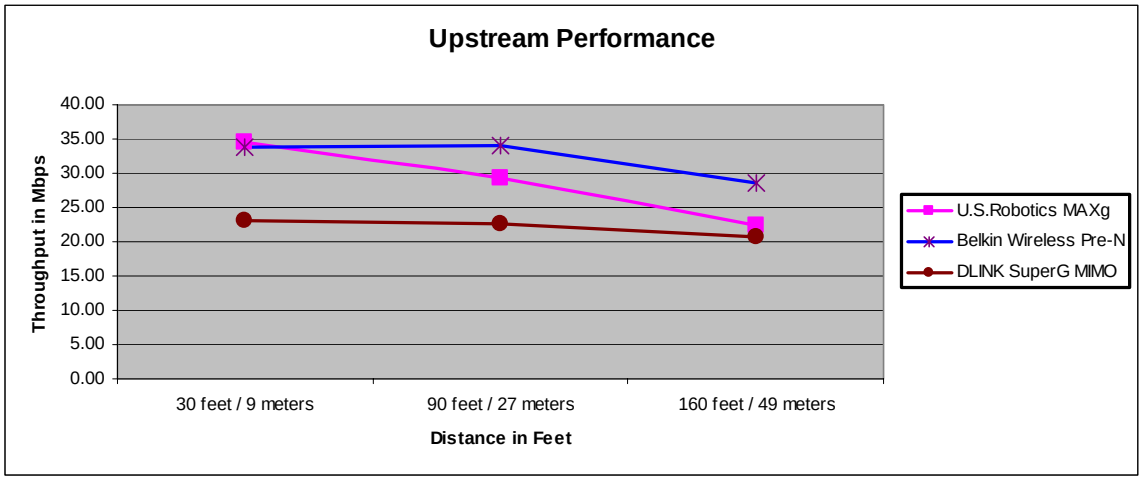


Figure 3:Upstream (from end node to access point) Pre-N performance

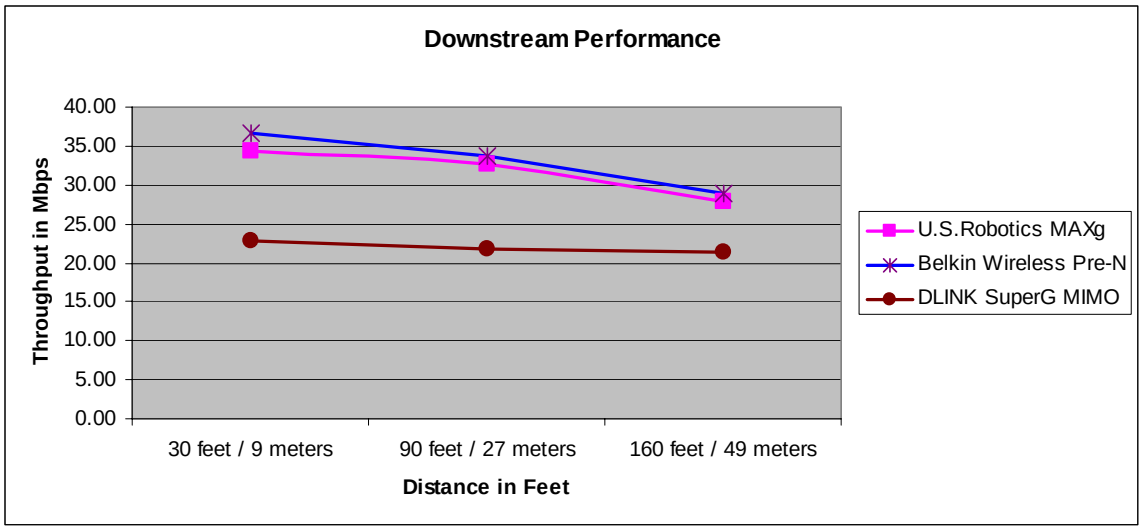


Figure 4: Downstream (from access point to end node) Pre-N performance

These two graphs show the results of throughput testing using Ixia's Chariot throughput.scr script with U.S. Robotics MAXg Router, Belkin Wireless Pre-N Router, and DLINK SuperG MIMO Wireless Router. The first graph is upstream performance, and the second is downstream performance. Higher numbers indicate better performance.

2.3 Recommendations

Based on the results of this testing:

- Individuals using throughput as the primary factor in considering 802.11g wireless products should choose the U.S. Robotics solution over Netgear 108, D-Link, Linksys, or Belkin High Speed Mode.
- Though the Belkin Wireless Pre-N had slightly higher throughput at greater distances, it did not live up to the 600% faster claims. And when considering the cost of the Pre-N enabled products, the U.S. Robotics MAXg product offers a compelling price / performance argument.

3.0 Test Environment and Methodology

3.1 Test Environment

The test environment was set up in an open office space. A spectrum analyzer was used to monitor the environment during testing. If any conditions were created where interference hampered testing, those conditions were rectified before testing continued. Results from testing in this environment were averaged to provide "real world" values for marketing purposes. The test environment consisted of the following components:

- One access point paired with one corresponding client per test case. The following access points and clients were used during testing:
  - Linksys SpeedBooster
    - Wireless Router with SpeedBooster. Firmware 2.07.1
    - 802.11g SpeedBooster Client. Driver 3.50.21
  - Netgear
    - WTG624 Super G Wireless Router. Firmware 4.1.11
    - WG511T Super G Client. Driver 3.0.0.156
  - D-Link Pre-N
    - DL-624M Xtreme G Wireless Router. Firmware v1.00
    - DWL-G650M Xtreme G Client. Driver v1.0.0.28
  - U.S. Robotics MAXg
    - USR5461 MAXg Wireless Router. Firmware 3.91.37.0.1
    - USR5411 MAXg Client. Driver 3.100.46.0
  - Belkin High Speed Mode
    - F5D7231-4 Wireless Router. Firmware 4.03.4
    - F5D7011 Wireless Client. Driver 3.50.21.11
  - Belkin Wireless Pre-N
    - F5D8230-4 Wireless Router. Firmware 1.00.06
    - F5D8010 Wireless Client. Driver 1.2.0.80

- One active wireless client under test per test case (from the same vendor as access point being tested). Clients and access points were configured using standard 802.11g convensions—using the products default configuration. Each client under test was a Chariot endpoint.

- Each access point came with its own embedded 4-port switch. One of these ports was used for the Chariot console connection.

The test lab in the picture below consisted of two PC's performing throughput tests as described:

Chariot Console directly wired to the Router under test.
- Dell Latitude CSx Laptop 500 MHz Pentium 3
- Windows 2000 Pro with all service packs
- 256 MB memory

Chariot endpoint with a wireless interface card associated to the Router.
- Dell Latitude CSx Laptop 500 MHz Pentium 3
- Windows XP Pro with all service packs
- 256 MB memory

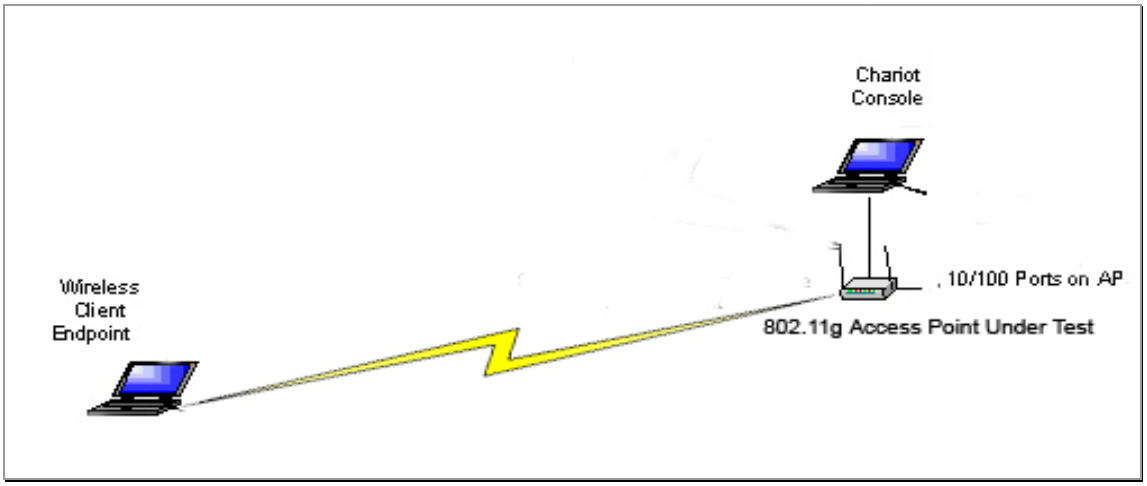


Figure 5: Wireless test bed configuration

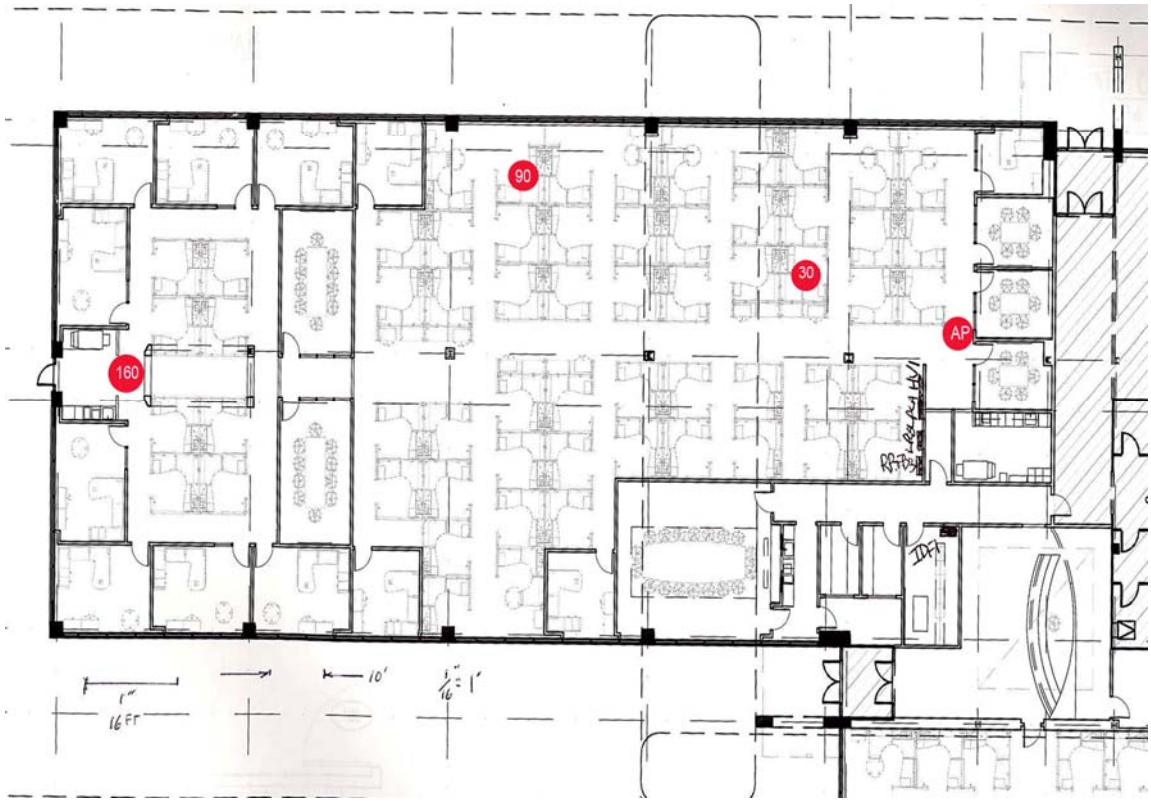


Figure 6: Office configuration layout

The access points were configured without encryption or any extra security features enabled. After analysis of the working environment, channel 6 was selected, this same channel was used for all testing. Other than setting the channel, all access points were left at factory default settings. No channel bonding was enabled on any of the routers.

3.1.1 Summary of Methodology

The tests were conducted using Ixia's Chariot and the "throughput" test script provided with the default installation. The script was modified to send a 10,000,000-byte file instead of a 100,000-byte file. Each test run lasted two minutes to mitigate the normal varying behaviors of the cards being tested. There were 10 passes run downstream, and 10 upstream for a total of 20 passes, per pair, per location. These 20 passes were done at 30 feet / 9 meters and repeated again at 90 feet / 27 meters and 160 feet / 49 meters for a total of 360 test runs.

3.1.2 Description of Collected Metrics

For each test case, the throughput of each pair of endpoints was recorded in the upstream (from client) and downstream (to client) direction. Each test case ran ten times in each direction. The test matrix below shows the completed test runs. The average total throughput (total of all client pairs) was recorded and reported for each test run in megabits per second (Mbps).

4.0 TEST RESULTS

Table 1: Throughput at 30 Feet / 9 meters

Pairing	Avg. Throughput at 30 Feet / 9 meters	
	Upstream	Downstream
MAXg	34.50	34.30
Belkin HIGH SPEED MODE	32.36	27.66
Linksys SpeedBooster	32.62	32.30
Belkin Wireless Pre-N	33.91	36.55
D-Link Pre-N	23.00	22.93
Netgear 108	25.89	25.91

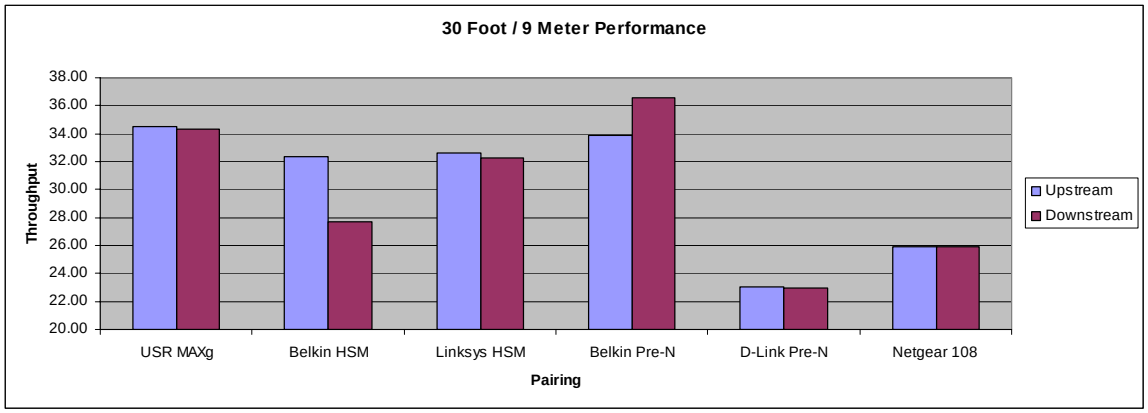


Table 2: Throughput at 90 Feet / 27 meters

Pairing	Avg. Throughput at 90 Feet / 27 meters	
	Upstream	Downstream
MAXg	29.26	32.63
Belkin HIGH SPEED MODE	15.46	21.99
Linksys SpeedBooster	22.22	24.10
Belkin Wireless Pre-N	33.99	33.63
D-Link Pre-N	22.63	21.73
Netgear 108	21.39	24.39

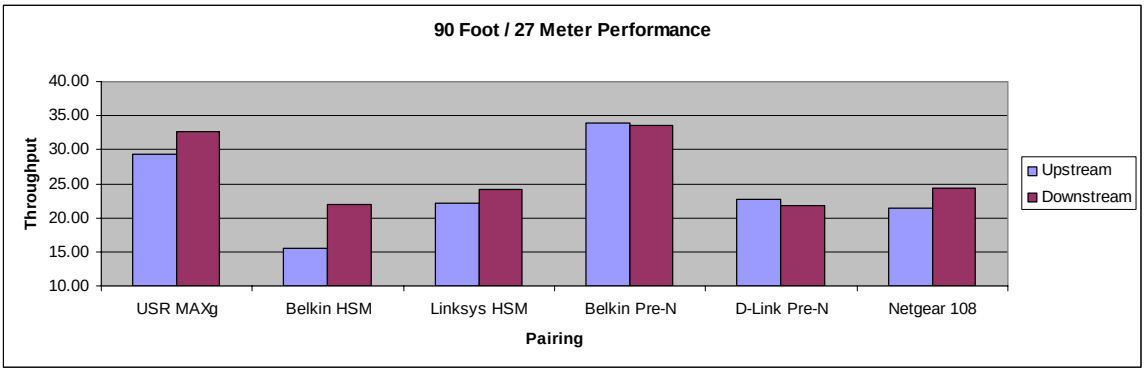
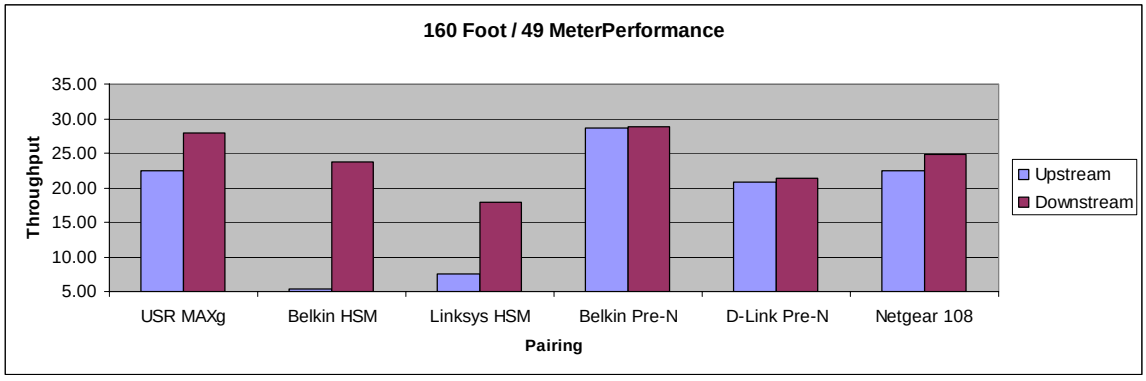


Table 3: Throughput at 160 Feet / 49 meters

Pairing	Avg. Throughput at 160 Feet 49 meters	
	Upstream	Downstream
MAXg	22.40	27.94
Belkin HIGH SPEED MODE	5.44	23.76
Linksys SpeedBooster	7.62	17.88
Belkin Wireless Pre-N	28.68	28.89
D-Link Pre-N	20.83	21.45
Netgear 108	22.41	24.91



5.0 Reported Problems and Issues

No problems or issues were encountered. Occasionally, microwave interference was detected on the spectrum analyzer, when this was encountered the run was stopped, conditions rectified, and the run was restarted.

6.0 APPENDIX

The following tables contain all of the data collected during testing.

Table 5: U.S. Robotics MAXg Throughput at 30 Feet

U.S.Robotics MAXg						
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	34.82	30.85	36.06	34.16	25.92	35.49
2	34.29	27.20	35.97	33.94	26.96	35.69
3	34.36	25.14	35.66	34.07	25.46	35.55
4	34.22	26.55	35.66	34.49	31.11	35.52
5	33.90	26.96	36.19	34.39	31.06	35.30
6	35.06	32.11	35.93	34.17	29.42	35.76
7	34.12	27.93	35.43	34.68	31.52	35.58
8	34.73	27.71	36.16	34.58	31.58	35.54
9	35.00	28.10	36.06	34.66	31.58	35.58
10	34.47	29.81	35.74	33.81	16.13	35.77
Average	34.50	28.24	35.89	34.30	28.07	35.58

Table 6: Linksys Throughput at 30 Feet

Linksys SpeedBooster						
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	33.73	24.08	35.74	29.84	12.90	34.60
2	31.87	23.85	35.19	31.47	8.59	34.61
3	30.69	22.80	35.55	33.55	28.13	34.49
4	32.76	22.35	35.18	33.36	28.36	34.46
5	31.78	16.54	35.01	31.94	9.95	34.23
6	33.18	30.26	35.21	33.42	27.25	34.46
7	33.38	31.04	35.05	29.45	24.12	34.43
8	33.07	25.37	35.66	33.45	26.22	34.35
9	32.37	25.89	35.84	33.48	24.54	34.55
10	33.32	23.04	35.55	33.07	24.31	34.39
Average	32.62	24.52	35.40	32.30	21.44	34.46

Table 7: D-Link Pre-N Throughput at 30 Feet / 9 Meters

D-Link Pre-N						
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	22.90	18.86	23.66	23.25	22.47	23.58
2	23.13	19.13	23.79	23.22	22.70	23.64
3	23.25	19.59	23.81	23.42	22.56	23.81
4	23.23	19.84	23.60	19.36	14.49	23.59
5	23.17	19.09	23.73	23.30	22.84	23.81
6	22.56	14.37	23.63	23.34	22.79	23.64
7	22.96	19.06	23.73	23.29	22.83	23.69
8	22.73	19.33	23.71	23.52	22.83	23.89
9	22.88	19.37	23.59	23.29	23.02	23.63
10	23.20	20.79	23.64	23.34	23.04	23.59
Average	23.00	18.94	23.69	22.93	21.96	23.69

Table 8: Belkin HIGH SPEED MODE Throughput at 30 Feet / 9 Meters

Belkin HIGH SPEED MODE						
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	31.23	22.35	35.39	25.54	18.20	30.44
2	32.80	20.28	36.02	28.94	22.91	30.38
3	33.08	24.65	36.05	28.04	13.45	30.31
4	33.82	25.63	35.87	27.72	11.97	30.37
5	34.01	27.10	35.97	28.05	17.13	30.30
6	32.27	10.88	36.24	27.47	13.05	30.31
7	28.07	22.72	36.33	28.43	21.90	30.48
8	34.40	24.10	36.08	27.75	18.05	30.60
9	33.58	21.94	36.53	26.87	19.18	30.36
10	30.29	20.77	36.43	27.80	14.95	30.34
Average	32.36	22.04	36.09	27.66	17.08	30.39

Table 9: Belkin Wireless Pre-N Throughput at 30 Feet / 9 Meters

Belkin Wireless Pre-N						
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	35.95	29.52	38.46	35.23	27.59	37.37
2	34.31	30.49	37.11	37.08	32.76	38.48
3	34.72	29.77	37.86	37.77	34.03	39.01
4	33.05	28.64	35.86	37.57	24.60	38.57
5	32.74	28.40	36.33	35.21	30.22	38.11
6	33.59	28.50	37.77	34.56	26.11	37.07
7	33.87	28.90	36.90	36.27	30.59	37.81
8	33.31	27.73	38.02	37.91	34.48	39.84
9	35.62	27.89	38.87	37.38	34.19	39.96
10	31.89	21.01	37.19	36.51	29.64	39.70
Average	33.91	28.09	37.44	36.55	30.42	38.59

Table 10: Netgear 108 Throughput at 30 Feet / 9 Meters

			Netgear 108			
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	25.58	23.02	26.90	25.82	24.86	26.63
2	26.12	23.55	27.01	25.90	24.70	26.60
3	26.13	24.41	27.36	25.77	20.14	26.79
4	26.20	23.43	27.21	25.80	25.19	26.44
5	26.07	24.36	26.97	25.59	21.74	26.97
6	25.46	21.55	27.22	26.03	24.98	26.78
7	25.97	23.41	27.20	25.81	24.79	26.45
8	25.76	22.08	27.25	26.11	24.27	26.88
9	25.95	24.57	26.90	26.05	25.03	27.11
10	25.68	23.64	27.06	26.17	24.90	26.90
Average	25.89	23.40	27.11	25.91	24.06	26.76

Table 11: U.S. Robotics MAXg Throughput at 90 Feet / 27 Meters

			USR MAXg			
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	30.11	25.34	33.03	31.84	26.80	35.36
2	31.88	23.31	34.20	33.58	30.21	35.05
3	27.22	22.78	32.46	32.85	27.58	35.22
4	33.21	29.05	35.14	32.50	24.61	34.91
5	31.59	26.50	33.88	32.58	26.94	34.91
6	26.37	19.76	29.96	32.56	26.00	35.07
7	25.90	21.44	30.44	30.47	23.18	34.35
8	27.74	22.08	31.84	32.91	25.55	35.22
9	28.92	24.31	32.85	33.59	25.81	35.28
10	29.68	25.71	33.12	33.42	25.93	35.22
Average	29.26	24.03	32.69	32.63	26.26	35.06

Table 12: Linksys SpeedBooster Throughput at 90 Feet / 27 Meters

			Linksys SpeedBooster			
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	23.56	20.41	26.79	17.77	13.54	22.46
2	23.15	15.62	27.02	21.66	14.02	28.62
3	20.79	16.41	25.21	22.39	6.17	30.40
4	20.89	17.03	23.78	22.37	8.90	29.58
5	19.90	11.13	23.88	26.01	21.40	28.88
6	23.32	20.41	27.10	21.63	8.70	27.06
7	19.29	15.93	24.05	26.36	9.61	32.21
8	23.91	19.89	26.72	27.81	18.89	30.76
9	23.79	17.67	26.86	27.42	19.26	31.06
10	23.56	18.72	26.30	27.55	14.21	31.18
Average	22.22	17.32	25.77	24.10	13.47	29.22

Table 13: D-Link Pre-N Throughput at 90 Feet / 27 Meters

		D-Link Pre-N				
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	23.00	20.63	23.54	21.75	20.50	22.63
2	22.56	17.39	23.59	21.71	20.34	22.78
3	23.07	20.25	23.61	21.76	20.35	22.77
4	22.97	20.81	23.46	22.01	20.22	23.11
5	22.86	18.63	23.59	21.93	19.79	22.77
6	22.80	21.16	23.54	21.45	19.21	22.85
7	22.63	19.02	23.50	21.59	20.37	22.21
8	22.19	20.47	23.00	21.52	15.00	22.94
9	22.07	20.19	23.26	21.68	19.69	23.00
10	22.16	18.12	23.32	21.90	20.11	22.85
Average	22.63	19.67	23.44	21.73	19.56	22.79

Table 14: Belkin HIGH SPEED MODE Throughput at 90 Feet / 27 Meters

		Belkin HIGH SPEED MODE				
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	18.17	13.12	25.13	24.50	17.02	28.47
2	18.91	14.59	27.15	21.32	14.02	27.92
3	14.96	10.85	20.61	21.04	15.74	27.59
4	21.19	16.19	24.29	20.34	14.06	27.12
5	17.41	12.22	24.30	23.74	17.52	28.22
6	18.58	11.84	22.99	22.78	9.47	29.54
7	15.99	10.29	20.82	22.78	9.47	29.54
8	11.46	5.77	22.56	20.61	10.37	27.12
9	8.31	6.43	17.02	20.20	14.23	27.15
10	9.66	5.57	17.00	22.58	14.76	29.47
Average	15.46	10.69	22.19	21.99	13.67	28.21

Table 15: Belkin Wireless Pre-N Throughput at 90 Feet / 27 Meters

		Belkin Wireless Pre-N				
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	35.86	30.53	38.69	30.46	8.09	37.70
2	34.28	14.79	38.67	34.28	28.84	37.12
3	29.61	9.41	37.44	34.97	31.30	36.87
4	30.84	11.60	37.33	34.94	28.71	37.47
5	35.57	22.75	39.27	32.30	13.81	37.45
6	34.19	17.82	38.99	32.83	26.32	36.80
7	34.04	17.04	38.19	32.99	29.02	36.68
8	34.84	20.86	39.20	35.02	31.95	37.00
9	35.26	26.23	37.67	34.31	26.46	36.88
10	35.36	23.33	38.76	34.21	28.45	37.19
Average	33.99	19.44	38.42	33.63	25.29	37.12

Table 16: Netgear 108 Throughput at 90 Feet / 27 Meters

	Netgear 108					
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	21.78	18.85	23.41	24.70	22.39	25.83
2	22.07	19.59	23.49	23.09	6.69	26.47
3	22.40	17.99	24.32	23.90	20.77	25.74
4	20.28	15.05	24.11	24.60	22.73	26.11
5	21.02	18.09	23.81	25.28	23.85	26.56
6	21.38	18.13	23.64	23.15	6.00	26.47
7	20.66	17.25	23.44	24.75	21.59	26.38
8	22.33	19.81	24.83	25.09	22.44	26.38
9	21.04	18.71	23.80	24.68	20.30	26.33
10	20.96	16.81	24.00	24.68	20.30	26.33
Average	21.39	18.03	23.89	24.39	18.71	26.26

Table 17: U.S. Robotics MAXg Throughput at 160 Feet / 49 Meters

		MAXg				
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	25.27	21.01	27.91	26.76	11.88	32.40
2	25.21	21.35	26.59	27.45	15.88	31.68
3	24.09	21.33	26.24	28.10	23.65	32.86
4	20.87	15.77	26.48	27.15	20.19	32.24
5	22.51	13.17	27.01	28.85	22.20	31.68
6	21.33	17.53	24.67	28.20	22.58	31.38
7	22.69	18.09	26.06	26.66	19.64	29.55
8	19.49	16.89	23.35	28.07	19.64	32.76
9	22.60	19.36	25.41	25.77	21.36	30.67
10	19.90	11.56	25.75	32.39	26.05	34.61
Average	22.40	17.61	25.95	27.94	20.31	31.98

Table 18: Linksys SpeedBooster Throughput at 160 Feet / 49 Meters

		Linksys SpeedBooster				
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	7.38	7.04	7.80	16.98	14.56	20.43
2	7.99	7.77	8.21	16.92	14.66	19.68
3	7.70	6.84	8.24	17.68	13.07	20.13
4	7.95	7.36	8.38	18.57	15.54	20.76
5	7.41	7.00	8.09	18.22	15.34	20.15
6	7.51	7.05	7.94	18.04	13.90	22.00
7	7.25	7.08	7.56	18.28	15.46	20.10
8	7.46	6.92	8.02	17.89	14.70	19.86
9	7.55	6.70	7.96	18.47	15.34	20.43
10	7.96	7.26	8.55	17.79	12.71	20.29
Average	7.62	7.10	8.08	17.88	14.53	20.38

Table 19: D-Link Pre-N Throughput at 160 Feet / 49 Meters

		D-Link Pre-N				
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	19.58	17.36	21.48	21.23	17.21	22.56
2	19.46	17.46	21.44	20.56	18.60	21.84
3	19.65	18.52	21.13	21.28	19.68	22.21
4	18.94	17.29	19.56	21.87	20.60	22.85
5	20.09	16.42	22.03	21.14	17.25	23.02
6	22.44	20.80	23.34	22.04	20.72	22.74
7	22.24	18.63	23.60	21.65	19.12	22.86
8	21.29	17.60	23.22	21.79	21.08	22.34
9	22.14	17.96	23.22	21.70	20.38	22.76
10	22.48	20.00	23.18	21.24	19.97	22.06
Average	20.83	18.20	22.22	21.45	19.46	22.52

Table 20: Belkin HIGH SPEED MODE Throughput at 160 Feet / 49 Meters

		Belkin HIGH SPEED MODE				
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	9.44	4.35	13.85	18.41	12.92	23.32
2	5.85	2.43	18.76	16.69	11.60	20.34
3	2.96	1.66	4.56	23.21	20.12	26.83
4	4.10	2.95	11.49	26.78	10.54	29.34
5	3.41	3.14	3.79	27.64	26.46	28.56
6	3.62	1.88	10.56	24.86	16.45	29.57
7	6.92	2.34	11.19	21.03	6.80	26.55
8	6.92	2.34	11.19	23.41	17.82	29.53
9	8.79	6.28	12.74	28.08	24.10	29.40
10	2.41	1.29	4.33	27.50	22.79	29.37
Average	5.44	2.87	10.25	23.76	16.96	27.28

Table 21: Belkin Wireless Pre-N Throughput at 160 Feet / 49 Meters

		Belkin Wireless Pre-N				
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	28.69	14.27	33.49	29.17	11.60	33.03
2	26.94	5.63	33.77	29.06	17.44	31.96
3	30.36	21.97	33.64	30.38	27.40	33.00
4	26.31	6.16	33.07	27.90	10.00	32.57
5	28.35	25.21	32.72	29.87	26.98	32.98
6	28.20	13.20	33.31	30.39	22.48	33.25
7	30.42	25.50	34.23	30.61	26.64	32.49
8	28.74	11.53	32.67	29.35	14.75	32.96
9	28.38	12.00	33.93	27.24	8.84	32.30
10	30.37	20.72	33.40	24.97	14.63	32.61
Average	28.68	15.62	33.42	28.89	18.07	32.72

Table 22: Netgear 108 Throughput at 160 Feet / 49 Meters

	Netgear 108					
Location	UAverage	UMinimum	UMaximum	DAverage	DMinimum	DMaximum
1	22.30	20.93	23.48	25.50	23.59	26.66
2	22.10	20.73	23.71	25.30	19.83	26.38
3	22.05	20.53	23.76	25.50	24.26	26.48
4	20.90	12.47	23.21	25.54	24.15	26.15
5	22.48	20.43	23.70	25.57	24.77	26.25
6	21.84	17.50	23.34	25.58	24.02	26.59
7	22.89	20.27	24.08	25.00	23.40	25.89
8	23.16	20.57	24.10	23.23	22.25	23.92
9	23.10	21.81	24.36	23.30	22.54	24.56
10	23.24	21.54	24.24	24.53	22.96	25.51
Average	22.41	19.68	23.80	24.91	23.18	25.84