California Science Center

CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)

Rhett T. Williams

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)

How does distance affect wireless data transfer?

Science Fair Use Only

S0620

Division

S Junior (6-8) S Senior (9-12)

Preferred Category (See page 5 for descriptions.)

6 - Electricity & Electronics

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)

Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Objective - I think that the further you get from the base station the signal strength will drop off and the data transfer rate will decline.

Materials and Methods # I will be testing the wireless access device at 25 feet, 50 feet, 75 feet, 100, and 125 feet distances. This is thru three normal house walls that are constructed with wood studs, sheetrock and fiberglass insulation. The Apple Airport base station is connected to a Cisco 10/100baseT Ethernet device and a router to the Internet. From there it is connected to a G3 Desktop computer. I will be transferring ten megabytes for the test.

Results # The concluding details determined I was wrong on one part of my hypothesis that the signal and speed would drop off as you go further and further away. It is true that you lose signal as you get further away but not speed of data transfer. It had a good signal at 50 feet and a better signal at 100 feet away from the base station and the speed also increased at 100 feet.

Distance, ft.○Signal, %○Time, min:sec○Transfer Rate

25○	50○	0:00:38○	0.000038
50○	25○	0:00:47○	0.000048
75○	20○	1:27:14○	0.000127
100○	19○	0:00:45○	0.000045
125○	10○	3:15:36○	0.000315

Discussion - The 802.11 Spread Spectrum standard is constantly evolving with improvements in speed, security, distance and application. There are three variations on wireless; WWAN (Wireless Wide Area Network) which uses cellular for miles of coverage, WLAN (Wireless Local Area Network) which uses 802.11b for 100#s of feet coverage and finally WPAN (Wireless Personal Area Network) which is called Bluetooth for 10#s of feet coverage. Wireless communications based on the 802.11 standards use either Direct Squencing or Frequency Hopping. The idea was first patented by screen star Heddy Lamarr and was first used during the Cuban Missle Crisis. The currently know standards are 802.11b which delivers 11Mbps; 802.11a which delivers 54 Mbps; 802.11g which delivers 20 Mbps. They use the unlicensed frequencies of 900Mhz, 2.45Ghz and 5.8Ghz. Wi-Fi and WECA are groups dedicated to the development, compatibility and testing of standards for wireless networks.

Summary Statement (In one sentence, state what your project is about.)

I will be doing an experiment on how distance affect#s wireless data transfer using the 802.11b standard.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.

Dad purchased the wireless access point for me to use in the experiment.