

## CLEAR-WAV™ ADVANTAGE

X-WAV™

SHOCK-WAV™

PRO-WAV™

### OBJECTIVE:

To provide complete wireless coverage of a three level 7500 square foot home.

### METHODOLOGY:

Augment the performance of a standard off-the-shelf WAP (Wireless Access Point) using a Luxul Wireless Pro-WAV™ 100 WiFi System.

### RESULTS:

The Luxul Wireless Pro-WAV™ 100 WiFi System provided complete coverage to all three levels, the garage and surrounding outdoor areas without the need for additional access points.

## COST-EFFECTIVE AND PAINLESS DELIVERY OF “WHOLE-HOME” WIRELESS NETWORK COVERAGE FOR INTEGRATORS OF WIRELESS HOME AUTOMATION SOLUTIONS



### INTRODUCTION

Integrators of wireless home automation solutions can deliver a superior customer experience through the use of Luxul Wireless networking solutions. Luxul Wireless technologies increase the wireless signal range and improve penetration through walls and other obstacles, while also enhancing data rates.

### HOME AUTOMATION AND THE WIRELESS CHALLENGE

When it comes to the availability of modern technology and conveniences in our homes, we live in a remarkable time. The advent of wireless home automation products makes it possible to roam from room to room, controlling everything from lighting, to appliances, to communications and entertainment devices, to the security system—all at the touch of a button. While these home automation technologies introduce the homeowner to some impressive conveniences, there are also some challenges and pitfalls that need to be considered to ensure worry-free operation throughout the entire home and property.

Oftentimes, the single most challenging component in a wireless home automation implementation is the wireless network itself—the backbone of the wireless home automation environment. As an integrator of home automation systems, it's important to ensure the availability of a high quality wireless network. Your reputation depends on it. When evaluating the network quality, you need to ask yourself some simple usage questions. Can the homeowner maintain a clear wireless IP telephone connection while walking from one end of the home to another?

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LUXUL WIRELESS SOLUTIONS  
ENHANCE THE PERFORMANCE  
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ACCESS POINTS) BY 400% OR  
MORE, ALLOWING FOR A  
SIMPLER, EASIER-TO-MAINTAIN  
AND MORE COST-EFFECTIVE  
WIRELESS NETWORK.

How about when going to the basement, the garage, or the patio? Does the laptop maintain a strong signal and consistent data rates, regardless of where it located in the home? Does the handheld home automation touch panel work as it should in every corner of the home and no matter how it's positioned in your hand? The answer to these questions can make the difference between a happy customer and a constant support problem.

The bottom line is that maintaining complete and consistent wireless network coverage can be a real challenge in a home automation environment. Every home is unique, and a solution that works in some may fall short in others. The traditional method for providing more complete coverage is to install multiple wireless access points (WAPs)—an inconvenience requiring additional time, costs, and labor. Deploying multiple WAP's also introduces other potential problems:

- Having multiple networks in one area increases interference and static “noise”
- Switching between coverage areas plays havoc with wireless devices. Many control panels must re-boot each time they cross into a new coverage area. They also get confused when trying to connect in an area where the coverage of 2 WAP's overlaps.
- Even with multiple WAP's, dead spots may still exist.

The ideal method for avoiding such challenges is to simplify the network by lighting up the entire home from just one access point.—using one network and one signal for all devices.

## THE SOLUTION

Luxul Wireless solutions enhance the performance of standard WAPs by 400% or more, allowing for a simpler, easier-to-maintain and more cost-effective wireless network. Luxul's Pro-WAV™ 100 WiFi System combines patented cutting-edge signal boosting technology with unique signal patterns to boost and clarify a wireless network, achieving superior signal strength and range. The Pro-WAV 100 easily connects directly to any standard off-the shelf WAP with removable antennas. Now you can light up an entire home using a single WAP, while having complete confidence in the products and services you deliver.

## A CASE STUDY

The following is a real-world case study that exhibits the power of Luxul Wireless solutions:

**Home and Network Description:** A three-level 7500 square foot home using a single WAP located in the basement level. Due to the location of the WAP, network coverage throughout the home was spotty and incomplete on the main level and nearly non-existent on the upper level.

**Test Overview Description:** Signal strength and data-rate tests were conducted first with only the WAP (a popular, off the shelf router). Afterwards, the WAP was connected to the Pro-WAV 100 and the same tests were run. AirMagnet Survey ([www.airmagnet.com](http://www.airmagnet.com)) was used to compare the signal strengths, while IPERF (a freeware utility) was used to measure and compare data rates.

The test results reflected in this case study were performed using the following parameters:

- Test Area: 7500 sq. foot home, three floors
- Data collection tools: AirMagnet Survey and IPERF
- Access Point: Linksys WRT54G
- Access Point Power: Full Power, 18 dBm
- Baseline Antenna Configuration: Standard OEM dual dipole antennas
- Comparison Configuration: Luxul Pro-WAV 100 System connected to port 1

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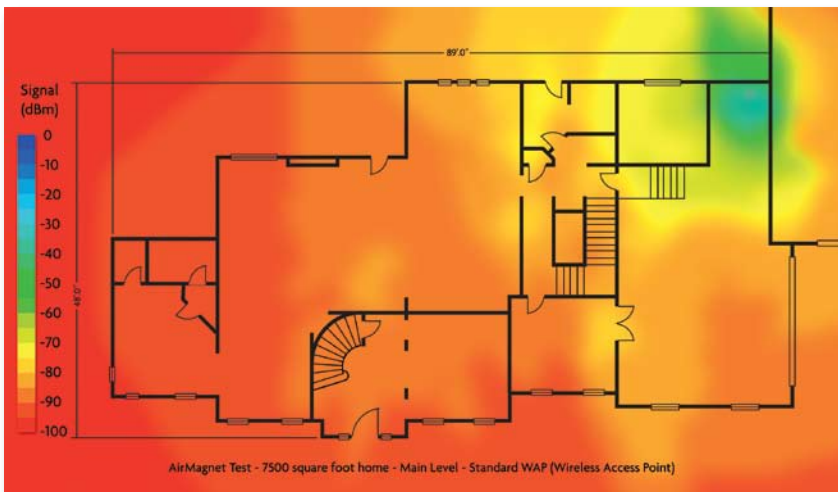
### Test 1: Signal Strength Survey

The WAP equipment (Linksys WRT54G) was placed in the basement office and its position remained unchanged for the duration of the test. A laptop running the AirMagnet Survey Software was used to collect signal strength data of the WAP alone at various predetermined points throughout the house. The WAP was then connected to a Luxul Wireless Pro-WAV™ 100 WiFi System and the same points within the house were again tested. By measuring the signal strength at these points, AirMagnet interpolates the range of signal strength available throughout the entire house. AirMagnet, was then able to plot comparisons of the gathered data to show the difference in signal strength between the two configurations as shown in the diagrams below.

### Signal Strength Results Summary

From the first two figures below and the next page (Image A: Top Floor, A: Main Floor, A: Basement), it is easy to see that the standard WAP alone struggles to provide good signal strength throughout the entire home, except in the immediate vicinity of the access point, where signal strength is not expected to be a problem. It is in the outlying portions of the basement level and the upper levels of the home where signal strength and connectivity become more of an issue.

The next three images (B: Top Floor, B: Main Floor, B: Basement,) clearly demonstrate that adding the Pro-WAV 100 results in superior signal strength compared to the use of the WAP alone. The overwhelming results speak for themselves. Signal strength throughout the entire home was increased dramatically. It must also be noted, that the Pro-WAV 100 has 15 dB of receive gain, allowing it to “hear” the signal from the weak client device.



**A: MAIN FLOOR**

The first diagram (A) shows the signal strength available throughout the main floor of the home with the standard WAP configuration. The second diagram (B) shows the signal strength with the Luxul Wireless Pro-WAV™ 100 WiFi System in place. Green represents good signal strength, while red signals weak signal strength. AP, in the purple box, upper right of the basement image, (Next Page), indicates the position of the WAP.



**B: MAIN FLOOR**

**See all three floors on the next page**

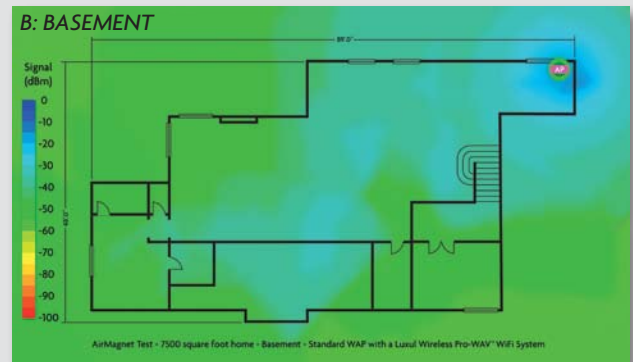
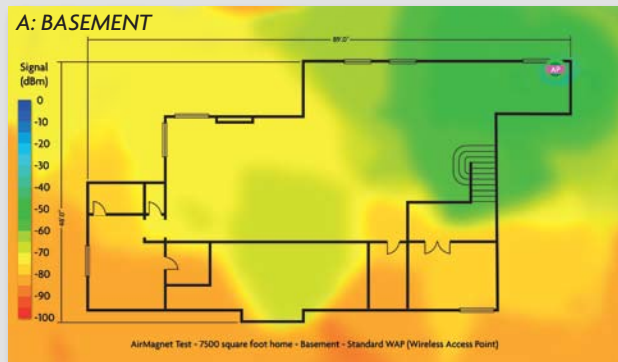
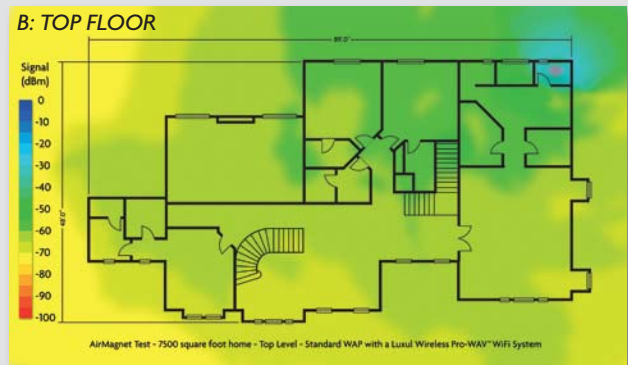
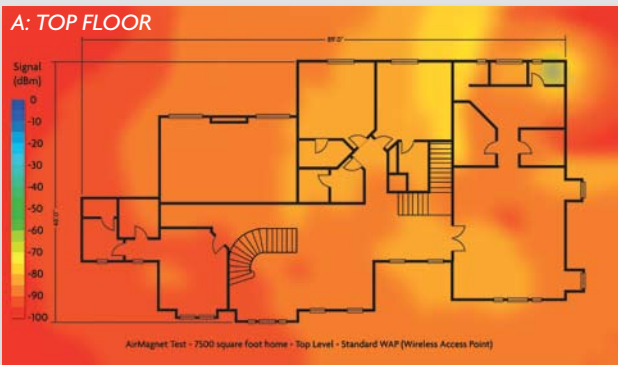
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AirMagnet test results of all three floors of the 7500 square foot test home. Image series A, (Left), shows the results of a standard off the shelf WAP, Image series B, (Right), shows the same standard WAP with a Luxul Wireless Pro-WAV 100 installed.



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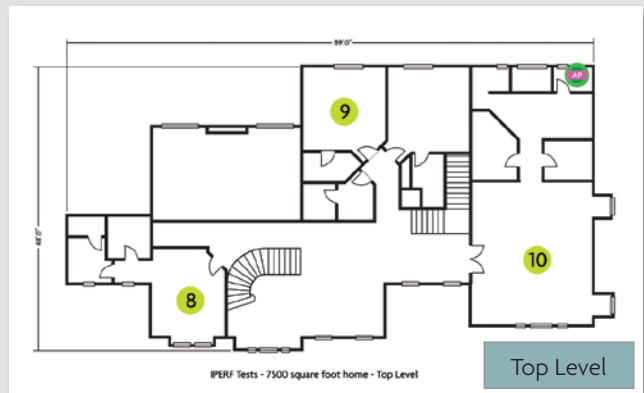
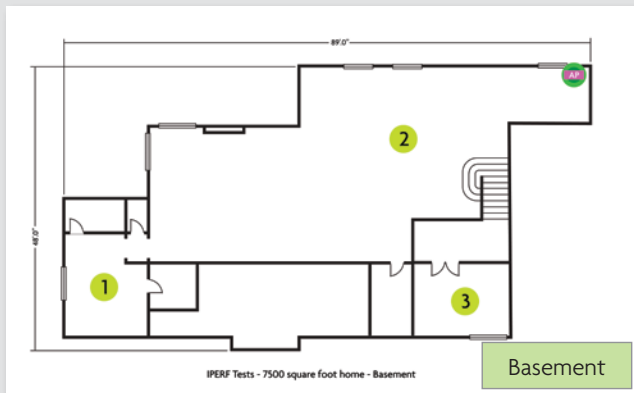
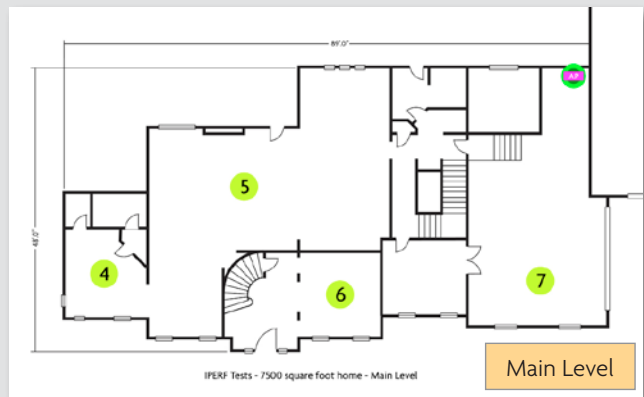
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### Test 2: Data Rates with IPerf

Signal strength alone does not always tell the whole story. The use of many traditional amplifier technologies can greatly increase signal strength—lighting up all 5 bars—while allowing only for unacceptably low data rates. The Pro-WAV 100 incorporates the patented Shock-WAV™ WiFi Signal Booster technology, which increases signal strength and expands coverage areas, while also maintaining high data rates.

To measure data rates, IPerf was loaded onto a standard laptop using a standard internal antenna and radio card. IPerf was then used to test data rates at the same ten locations throughout the home, first using the standard Linksys router to create a baseline. Next, we added the Pro-WAV 100 system and ran the tests again. The charts below summarize the results of the two tests:

TEST POINT	STANDARD WAP	PRO-WAV 100
1	6.37 Mbps	24 Mbps
2	27.8 Mbps	28.7 Mbps
3	6.73 Mbps	27.4 Mbps
4	607 Kbps	12.5 Mbps
5	5.45 Mbps	21.8 Mbps
6	2.02 Mbps	23.2 Mbps
7	3.4 Mbps	20.6 Mbps
8	198 Kbps	16.9 Mbps
9	9.16 Mbps	23.4 Mbps
10	4.4 Mbps	24.7 Mbps



### SUMMARY

In a wireless home automation environment, Luxul Wireless solutions will help improve your customer experience by extending the usability of standard off-the-shelf wireless access points and wireless routers. This is accomplished through the use of unique and patented technologies incorporated into Luxul Pro-WAV System solutions.