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How To: Use Coverage Mapping Technology to Optimize Wi-Fi Network Performance

INTRODUCTION

Mapping the wireless signal coverage of a Wi-Fi network can demonstrate the effectiveness of the network as it relates to the desired coverage area. Proper use of mapping technology provides an analysis of signal strength while assisting in the creation of more stable and more complete wireless coverage. Coverage mapping is also useful in identifying potential trouble spots to enable appropriate adjustments to the network deployment. Finally, this process allows for the performance comparison of different signal propagation technologies within the desired coverage environment.

There are a number of Wi-Fi Signal Mapping Technologies available on the market—each of which has certain advantages and disadvantages. Due to its cost effective nature and relative ease of use, this document will focus on the use of Ekahau HeatMapper.

WHAT IS EKAHAU HEATMAPPER?

Ekahau HeatMapper is a free tool for creating a heat map of wireless coverage within a particular environment. For more information and download information, visit http://www.ekahau.com/products/heatmapper/overview.html.

WHAT AND WHERE TO TEST

Wireless technologies are not created equal. The choice of router or access points, antenna technologies, and other components will all have an impact on Wi-Fi network performance. When evaluating the use of Luxul products as part of an overall Wi-Fi network deployment strategy, signal mapping is an important part of the optimization process. When evaluating the reach of a wireless network signal and comparing the efficacy of various technologies within the network environment, it is suggested to test the following:

- **Wireless Coverage:** If a wireless network already exists or you are evaluating different technologies, test to determine the capabilities of the wireless equipment and identify where there are holes in the coverage. This will also help to determine the optimal placement of devices to maximize desired coverage area and make decisions about what equipment to use.
- **Distance:** At short range, standard dipole antennas may be sufficient. However, at longer ranges and wherever there are possible obstructions, other antenna options should be considered. Adding Luxul Circular Polarized (CP) directional antenna technologies and/or Luxul XenTM access points that implement CP technology will provide better coverage at longer ranges, and superior penetration through wood, sheet rock, concrete, stone, brick, and vegetation.

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REQUIRED FOR THE TEST

- One Computer – A 32-bit Windows-based laptop with a wireless network adapter.
- One or More Wireless Routers or Access Points – The routers or APs being tested should be configured to broadcast the SSID and be configured to allow the laptop to connect. Note that the Ekahau HeatMapper can simultaneously map multiple wireless networks.
- Ekahau HeatMapper – Download of HeatMapper installed on the Windows 32bit laptop.
- Image of the Floor Plan or Environment to be Mapped – This is not absolutely necessary, but can be helpful to get an accurate survey of the desired coverage area.

NOTE: Internet connectivity is not a requirement. The test only requires the laptop and the configured Router or Access Point. This document assumes you have at least a rudimentary understanding of wireless networks and can configure a Router or Access Point to broadcast the SSID.

HEATMAPPER INSTALLATION

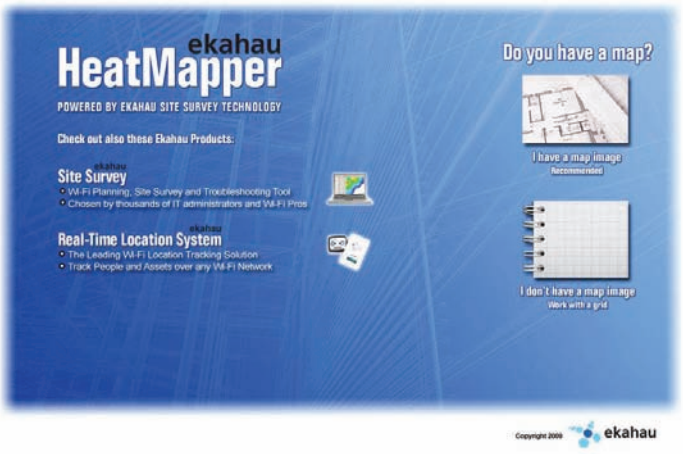
Please note that HeatMapper is currently only available for use with Windows 32bit based machines. Therefore, the installation instructions only cover Windows XP, Vista, and Windows 7 32bit.

HeatMapper is a free utility that can be downloaded here: http://www.ekahau.com/products/heatmapper/overview.html

Complete the application information and follow the instructions in the subsequent email messages you receive. When prompted to "Download or Run" choose "Run." Follow the prompts to install HeatMapper. Remember that the computer used must be mobile and have a working wireless network adapter.

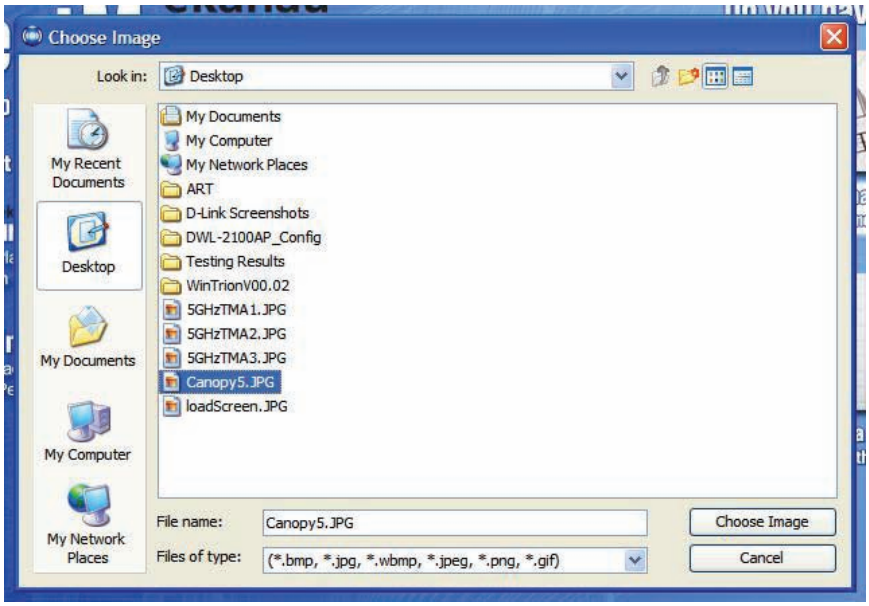
PERFORMING A SITE SURVEY

From your Windows desktop, click Start, choose Programs, Ekahau, and HeatMapper. You will then see the following screen:

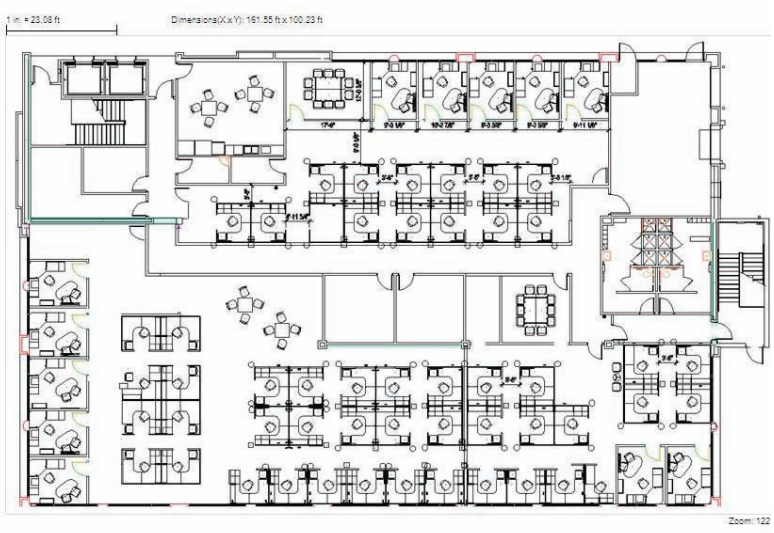


NOTE: There are two options: 1) I have a Map Image; and 2) I Don't Have a Map Image. For best results, it is recommended to use a floor plan or desired coverage area image whenever possible.

If the first option is selected, the next step is to choose a Floor Plan image for the Map. Supported formats are Bitmap, Jpeg, Windows Bitmap, PNG, and GIF.



Below is the representation of the image selected in the previous menu. Any image, as long as it is to scale, will work.



Once the image is selected, the Active Wireless Radio menu and the Help menu will appear. The Active Wireless Radio menu shows any radios that are active within the receive range of the machine. The Help menu contains information needed to run HeatMapper.

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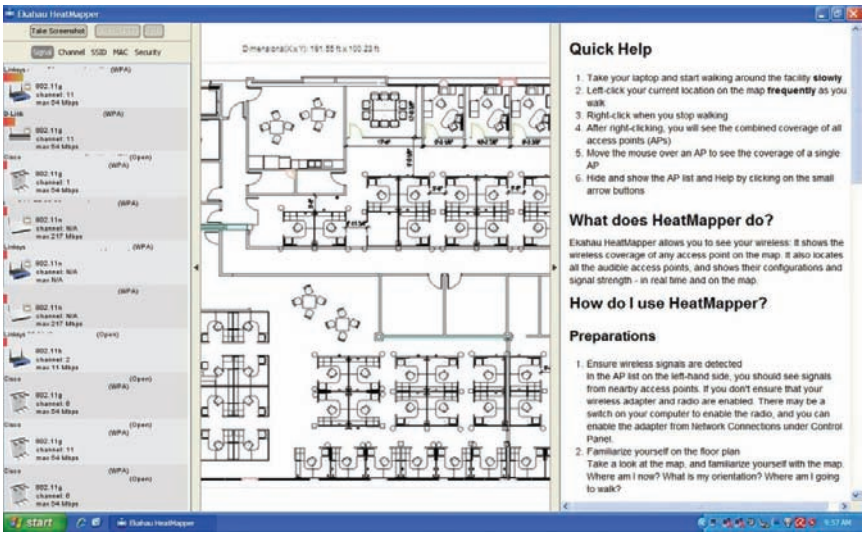
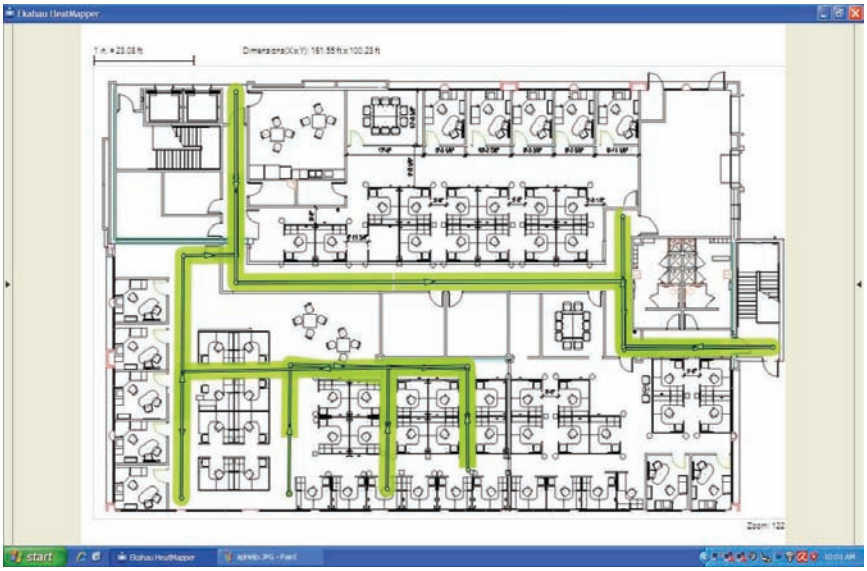


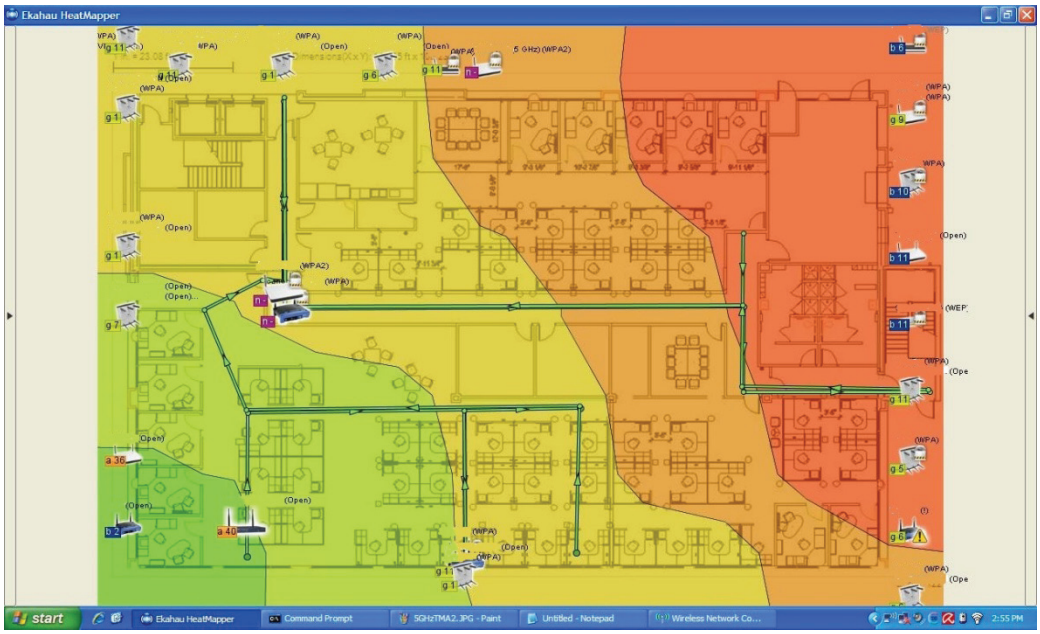
The Active Wireless Radio list will display by default the following: 1) Media Access Control Address; 2) Security Type Enabled; 3) Version of 802.11 being used (a/b/g/n); 4) Frequency (2.4 GHz or 5.0 GHz); and 5) Connection Speed in Mbps (Megabits per second). You can modify this to also show the Channel being used by each radio, SSID of each radio, and/or Security protocols being used by each radio.

To conduct the survey, follow these steps:

1. Minimize the menus by clicking the arrows in the side bar of each menu.
2. Now, simply right click your starting point on the map and begin walking slowly, dragging the path in the direction of travel. At each point you reach that requires a turn, right click again.
3. After making a turn, drag the path to the next turn.
4. Once you have finished, the map should look something like this:



To finish the survey, simply do a left click at any location on the map. The program will now produce the heat map of the surveyed area:



HeatMapper will attempt to locate the approximate location of each active radio on the map. When a highlighted radio is selected, the heat map for that radio will be displayed. The color break down is:

- Blue (best signal available)
- Green (excellent signal)
- Yellow (very good signal)
- Orange (good signal)
- Red (poor signal)
- No Coloration (no signal)

As demonstrated by the heat map above, the selected radio shows a good signal profile. Other active radios within the environment can also be seen, which can introduce signal and interference challenges. In such cases, Luxul technologies can be used to reduce the number of access points in the environment.

CONCLUSION

Mapping the coverage area of a wireless signal can help ensure optimal Wi-Fi network functionality. While there are several tools available for such a purpose, HeatMapper is an excellent, easy to use, and low cost option for graphically representing the signal strength and reach. It also shows other radio devices within the environment that could potentially cause connection issues so that network deployments can be adjusted accordingly. Perhaps the most significant benefit of using HeatMapper or other signal mapping technologies is that it can save significant time and effort by identifying potential issues before the installation is complete.

NOTE: That while signal strength is an important factor in a network deployment, data throughput is also an essential measurement of network efficiency. A properly functioning network must demonstrate both consistent signal stability and sufficient data throughput. Luxul recommends the use of iPerf for measuring data throughput. For more information about the use of iPerf or various Luxul products available to optimize your network, visit www.luxul.com.

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