

# simplywireless<sup>®</sup>

Radio Frequency (RF) Site Survey for  
Optimum Wireless LAN Performance





# The Benefits of Wireless Networking

Wireless Local Area Networks WLANs are becoming the preferred option to connect the people who rely on your network, because of their productivity gains. Wireless LAN reduces infrastructure implementation and operating costs and can rapidly accommodate growing networks, personnel relocations and office re-configurations.

Wireless LANs are being deployed in businesses in today's shopping malls, office towers, hotels, conference centres and many more places. Business people, customers and tenants can now enjoy working and collaborating with colleagues, wherever it's convenient. Each of these environments is quite different from a Site Survey Point of View. Simply Wireless has performed more site surveys than any Australian Wireless Specialist, and our methodology is highly commended by Cisco Systems.

A wireless access point is the centre point of an all-wireless network or it serves as the connection point between a wired and wireless network. Multiple access points can be placed throughout a building to give wireless users the ability to roam freely throughout an area while maintaining uninterrupted access to network resources.

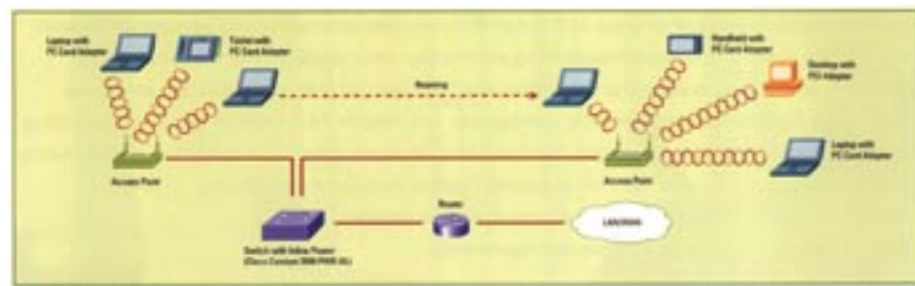
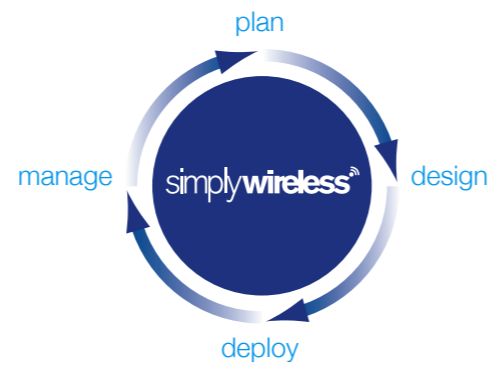


Figure 1 Sample network diagram



## Simply Wireless

At Simply Wireless we offer end to end wireless LAN solutions. Our unbiased advise, ensures the success of your wireless deployment. Proudly vendor neutral, we plan, design, deploy, integrate and support a network solution that is tailored to your needs. Our network architects and radio frequency engineers are highly trained and have extensive experience to draw upon, to design a solution that meets and exceeds your individual network needs.

Simply Wireless offers a complete suite of wireless LAN and wireless WAN solutions to provide our customers with high performance, secure, manageable and reliable networks for mission critical environments. We can help your firm navigate the wireless way with recommendations on wireless LAN hardware, antennae and accessories, which support all standards of IEEE 802.11 whether you choose a, b or g.

In the case of an office block, the ideal scenario is if you can provide a wireless network for the entire building. That way you can co-ordinate the spectrum fo every network in the building , with the appropriate channel selection and power settings to optimize coverage. Occupants can access their companies network securely from anywhere in the building, including common spaces such as meeting rooms, café's or courtyards.

This document discusses how Simply Wireless approaches Site Surveys, the important first step to a successful wireless deployment.



## Wireless Security

Network managers can be assured that wireless LANs can provide the same level of security, manageability and scalability offered by wired LANs. We provide robust security services that closely parallel the security offered by a wired LAN. Our secure WLAN solutions provide scalable, centralized security management and can support dynamic per user, per session WEP encryption keys to protect the the privacy of transmitted data. Other available security features are authentication, message integrity check, and per packet keying. We can help navigate the wireless LAN security options with practical advice and ensure your new wireless LAN security meets your organisations need for a robust, secure environment ensuring the integrity of your network.

## Wireless Support

Deploying Wireless LAN networks can present unique support requirements, especially if your staff have traditionally focused on wired data infrastructures only. When wired and unwired networks merge they create unique planning, design, migration and operations challenges. Our in-depth knowledge of wireless network planning, deployment, operation and optimization requirements ensure the successful outcome of your wireless deployment.

# Radio Frequency (RF) Site Survey for Optimum Wireless LAN Performance

## Introduction

**As companies extend their existing networking infrastructure to include wireless networks, they will need to thoroughly define how wireless technology will be utilised within their organisation.**

**For most companies Wireless Local Area Networks (WLAN's) must be more extensive than the existing wired network (LAN), handle an equivalent level of data and provide continuous, clear and reliable signal coverage.**

## The Importance of a Site Survey



Site survey tool

The primary objective of a Site Survey is to ensure optimum radio frequency planning, ensuring that users of the WLAN do not experience "drop-outs" as users roam within the WLAN environment. A properly planned environment, ensures optimal performance from your wireless investment. The Site Survey Report will also document any potential impacts of adding a wireless LAN to your existing wired LAN.

Performing a Site Survey provides us with a realistic understanding of infrastructure required for any proposed wireless network deployment. The Site Survey can also assist in predicting trends in network traffic, indicate high load areas and resolve difficult RF interference issues

from existing devices or neighbouring sites. The collation of all this data enables Simply Wireless to provide solid recommendations for your wireless solution. This allows accurate indicative project costing, optimal network design and appropriate security recommendations.



# Site Survey Considerations

Simply Wireless Radio Frequency Engineers will consider the following areas while conducting a Site Survey.

## 1. Spectrum Analysis - Range and Coverage Analysis

Range and Coverage Analysis is the first phase of the site survey process. Our engineers will use 802.11 diagnostics software and custom built RF hardware to define the optimum deployment locations, and infrastructure configuration for your wireless LAN. By taking into account issues such as signal propagation, radio frequency analysis, spectrum planning and signal shaping, our engineers can determine the most appropriate design for your environment, be that a lecture theatre, meeting room or office complex.



*Figure 2* An example floor plan overlaid with a Wireless LAN signal coverage analysis. Areas with coverage can be seen in red.

## 2. Multi-path Fading Analysis

Multi-path Fading Analysis is the next phase in a Site Survey. Our engineers will analyse all objects and obstacles that will cause attenuation ( or RF Impedence) of the wireless radio signal. Different construction materials, such as metal objects, concrete or brick walls and so forth, each has a different effect on the propagation of radio coverage.

The positioning of access points will be determined by the location of any obstacles in order to obtain the maximum signal strength to all required areas throughout your organisation.

## 3. Interference and Dampening Analysis

Interference and Dampening Analysis is another crucial phase of the Site Survey. Our engineers will use amplified multi-frequency receivers to detect any opposing signals in the local 2.4 GHz or 5.3 / 5.8 GHz spectrums. This could include high power microwave ovens, long range cordless phones, or even existing wireless networks. Simply Wireless engineers will measure the interference caused by these devices and assess any effects on your wireless network. As required compensation calculations will be made so that the final implementation operatea flawlessly.



*Figure 3* An example floor plan overlaid with a Wireless LAN interference analysis. Areas with interference can be seen in blue.

## 4. Legacy Cohesion Analysis

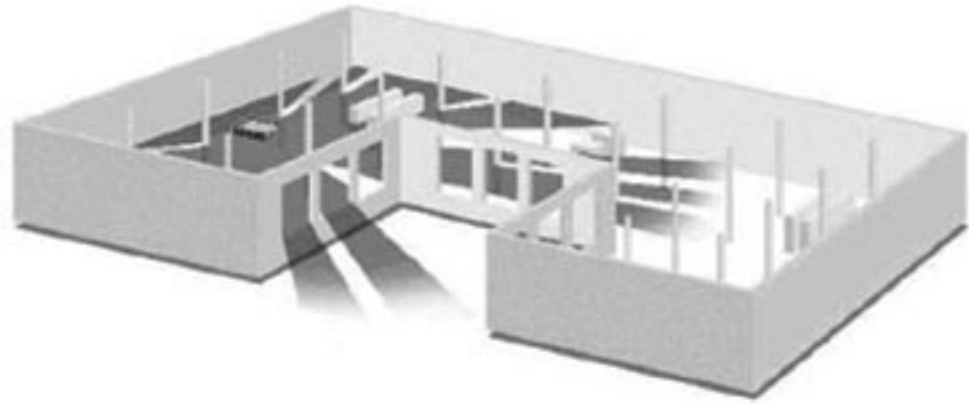
Legacy Cohesion Analysis is an integral part of the site survey analysis. Our network engineers will examine your existing network and any legacy systems to determine any integration issues that need to be considered. Factors such as operating systems, authentication processes, existing server configurations, latency requirements, wired LAN security policies and user collaboration will be taken into account during this phase. This process ensures that the integration of the wireless network is well planned. Simply Wireless can normally integrate existing custom corporate software into your new wireless network. The result is a high performance wireless LAN that is integrated, secure, scalable and easily managable.

## 5. Bandwidth Requirements Analysis

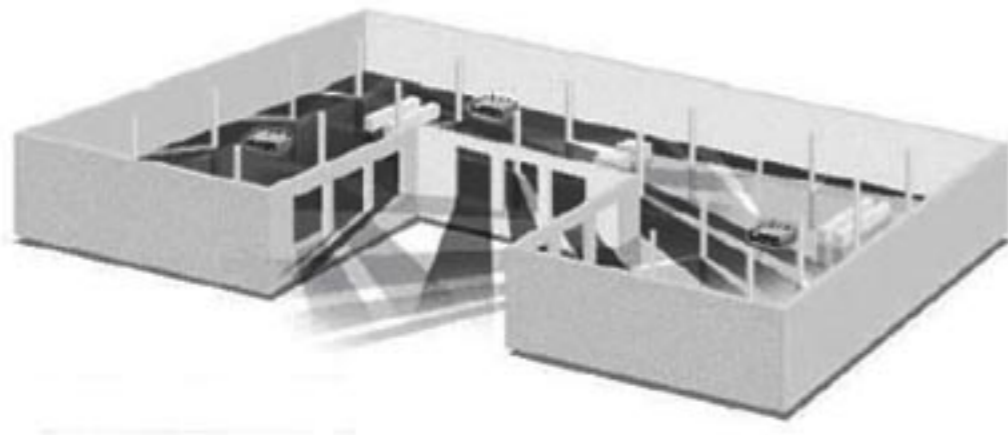
Simply Wireless engineers will evaluate the bandwidth requirements of your network both for todays needs and also with a view to ensuring your wireless LAN can accomodate future wireless LAN applications, including voice and video. Part of this process is an assessment of your networks current bandwidth needs to support your network users. A comprehensive bandwidth analysis ensures our wireless network engineers will plan your wireless LAN, proactively planning to avoid potential bottlenecks, and ensuring those areas with higher bandwidth needs ( ie call centres, meeting rooms) , are appropriately planned for, from the outset.



## Site Survey Process



**Figure 4** shows the initial stage of a Site Survey - as the diagram shows the example site is high in RF obstacles and signal propagation (spread) is poor. Large coverage gaps appear which will cause drop outs and black spots even if the client is in close proximity to the access point.



As shown in **Figure 5**, black spots can be eliminated and full coverage achieved via the precise placement of in this case three access points.

## Signal Shaping - Choosing the Right Antenna

The role of antennas is of paramount importance – by using different antennai our radio frequency engineers can stretch, and shape the RF coverage pattern of a single access point. This is crucial in order to enable optimum cell size and shape, allowing for the planned density of wireless clients (i.e. laptops, desktops, handhelds, wireless phones and other wireless devices), ensuring optimal spectrum planning. The right choice of antenna can minimise external RF leakage to adjoining buildings or to neighbouring office. Antennas can be divided into several categories:

- **Omni-Directional Antennas** have a torus-shaped propagation pattern in 360°, this looks very similar to a doughnut shape. Omni-Directional Antennas come in several different types; **Plane Antennas, Dipole Antennas** and **Rubber Ducky Antennas**. The Plane and Dipole are usually used when the base station requires radiation in all directions.
- **Directional Antennas** concentrate RF in a particular direction. This produces a conical-shaped or flashlight-shaped pattern. Different directional antennas are described by their beam width and gain. The most common type of directional antennas are; **Parabolic Dish Antennas, Yagi Antennas, Sector Antennas, Patch Antennas** and **Panel Antennas**.
- **Yagi and Parabolic Dish Antennas** are used mainly in outdoor point to point or building-to-building bridging or for coverage down a long corridor. Parabolic Dishes usually have a beamwidth of a few degrees and a gain from 20 to 30dBi. Yagi Antennai, on the other hand, have a beamwidth of between 10 to 30 degrees and a gain from 10 to 20 dBi.



A selection of some of the antennas available

- **Sector, Patch and Panel antennas** are commonly used in indoor installations. They allow increased range of an access point and are particularly versatile from an installation location point of view. Sector Antennas usually have around 180 degree beamwidth and a gain from 3 to 10dBi. Patch Antennas and Panel Antennas have minimal gain and are used to better 'shape' the wireless signal.

## Calculating Antenna Coverage

The use of an antenna to increase signal strength is called Antenna Gain and is measured in decibels (dB). Gain improves the coverage area of an access point. For a 1dB increase in the gain, the coverage of an indoor access point is increased by approximately 2.5%. For a 1dB increase in the gain, the coverage of access point is increased by approximate 5%. These figures vary depending on the number and size of obstacles.



## Use of Diversity Antennas to Increase Performance

Diversity is where the radio in an access point can switch between different antennas to minimise interference and noise due to multi-path signals. Diversity allows the access point to reconstruct the radio signal using two or more different antennas.

## Positioning Antennas for Best Results

Positioning and orientation of the antennas ultimately determines the performance of a wireless LAN - factors such as line of sight, obstacles and other issues (as discussed above) are directly related to performance of the WLAN. Our engineers have the relevant training and experience enabling them to design your high performance wireless LAN.

# OUTCOMES

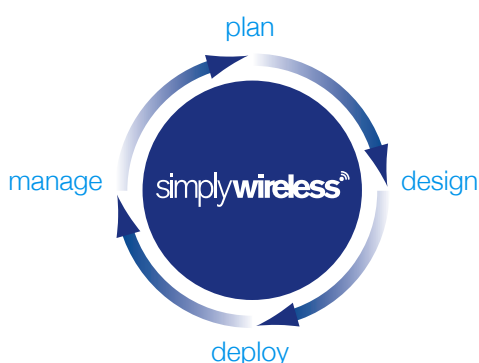
## What you get out of a Simply Wireless Site Survey

Once the Site Survey is completed, the Simply Wireless engineer will collate all the information gathered to produce a professional **Site Survey Report**.

This report contains general recommendations, specific recommendations related to your site, and full documentation. This serves as a baseline to track the performance of your wireless LAN. We produce detailed RF coverage maps which are superimposed on your floorplans. We proactively plan around expected interference problem areas, using sensitive spectrum analysis tools. The report also details channel maps, cable runs and a complete bill of materials for your wireless LAN. We also document hardware configurations, including recommended power output levels.

Simply Wireless Site Survey fully guarantees signal coverage in the areas described in the site survey report.

Simply Wireless takes pride in the quality of our Site Surveys - the report is extensive, detailed and accurate. We look forward to helping your company make the most of its wireless infrastructure.



Premier  
Certified  
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