



Who is on your Wireless Network?

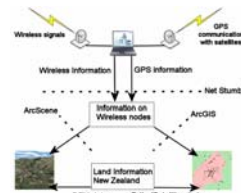
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Introduction

- ✦ Aim: To investigate wireless computer networks in Palmerston North, their security and analyse the data spatially using GIS (Geographical Information Systems)
- ✦ [802.11 non-enterprise sales topped U.S \$1.3 Billion in 2003]
- ✦ The area being studied is Palmerston North which has a population of approx 76,000
- ✦ Wireless networks are growing rapidly and so are the issues
- ✦ Definition: War-driving is driving around a city searching for Wireless LANs while in motion.
- ✦ The task is automated using wardrive software and GPS
- ✦ A Wardrive of the Palmerston North city was conducted
- ✦ 806 wireless networks were detected and mapped and analysed spatially



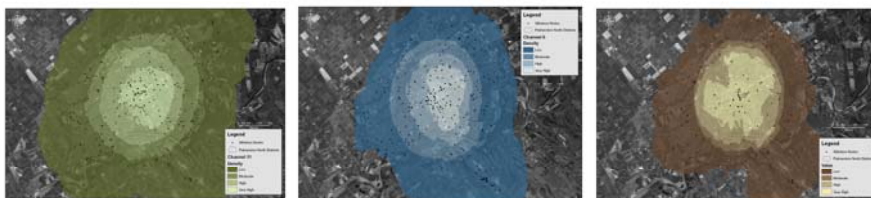
Wireless signals picked up by laptop and GPS information attached. The data can then be used in ArcGIS to analyse spatially the wireless access in the city



GPS information used by GPS Daemon and handed on to wireless detection software. Kismet picks up wireless signals and assigns GPS information to detected wireless network

Frequency Analysis

- ✦ The data are separated into the three main wireless channels (1,6 and 11)
- ✦ Density maps are shown below to highlight the distribution of the 3 main channel usage
- ✦ A buffer analysis based on the range of a wireless network can identify potential interference
- ✦ Clashing/interfering (co-channel interference) networks can be identified and the problems rectified

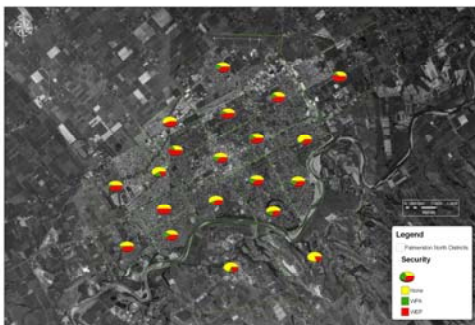


Analysis

Security Analysis

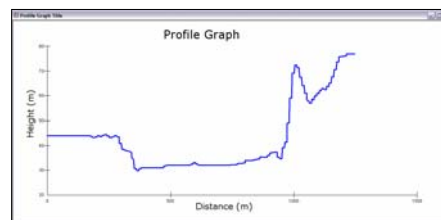
Security data are output to investigate security trends of users. Three main types were identified:

- No security protocol
- WEP (Wireless Equivalent Privacy)
- WPA (Wi-Fi Protected Access)



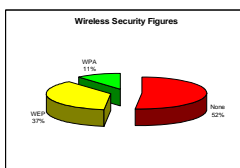
Line of Sight (LOS) Analysis

- ✦ LOS of wireless networks can be assessed
- ✦ Provides an indication of wireless range, natural barriers or sources of interference / co-channel interference
- ✦ Any location on a DEM can be assessed
- ✦ Multiple potential locations can be analysed and compared for efficiency of deployability and service area

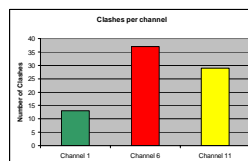
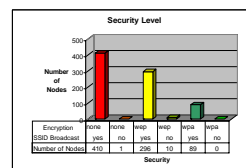


Results

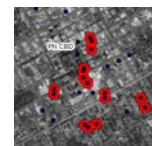
Outputs from this study can help hot spot companies to identify where wireless networks are required and install accordingly after checking interference sources and/or LOS



- ✦ 806 networks detected
- ✦ 52% not using any security protocols
- ✦ 37% using less secure WEP
- ✦ 11% using more secure WPA



Extrapolating clashes per channel, can be seen that in the case of Palmerston North, Channel 1 would be the recommended channel to use



Conclusions

The use of GIS will allow wireless companies and ISP's to setup wireless networks that maximise productivity while minimising co-channel interference and cost of trouble shooting problems.

GIS analysis provides fast and efficient signal analysis, and trouble shooting. A supplier will immediately be able to calculate if LOS is possible or recognise potential interference and provide a solution to the customer. A security analysis can identify networks that are at risk if infiltration by unauthorised users, where the supplier can indicate what steps need to be taken to secure the network

GIS provides the tools for developing a method for wireless hot spot planning. Existing wireless networks can be identified and GIS can be used in the placement of new wireless networks according to the surrounding interference. This can be used for almost any wireless communication planning.