

# Where is Your Wireless Network?

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## Introduction

**Aim:** To investigate wireless computer networks in Palmerston North, their security and then visualize the data 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

A Wardrive of the city was conducted,

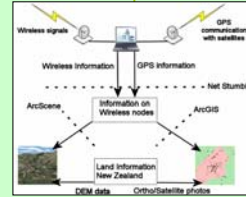
806 wireless networks were detected and mapped



Wireless signals picked up by laptop and GPS information attached. The data can then be used by ArcScene or ArcGIS software



**Definition:** War-driving is an activity consisting of driving around with a laptop or a PDA in one's vehicle, detecting Wi-Fi wireless networks.

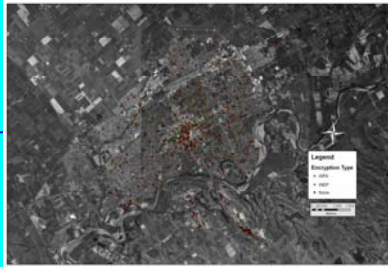


GPS information used by GPS Daemon and handed on to wireless detection software. Kismet picks up wireless signals and assigns GPS information to detected wireless network

## Analysis

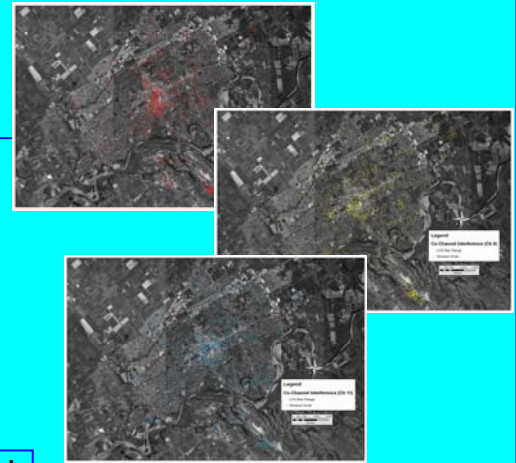
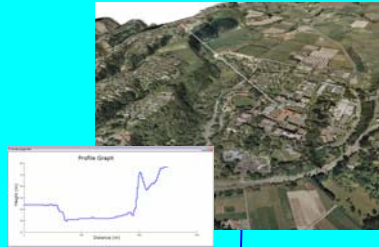
### Security Analysis

- Security data are output to investigate security trends of users. Three main types were found:
  - No security protocol
  - WEP (Wireless Equivalent Privacy) and
  - WPA (Wi-Fi Protected Access)



### Frequency Analysis

- The data are separated into the three main wireless channels (1, 6 and 11)
- This data are overlaid over a rectified image of the city
- Clashing/interfering (co-channel interference) networks can be identified and the problems rectified

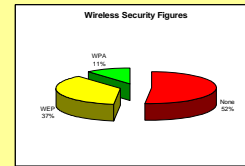
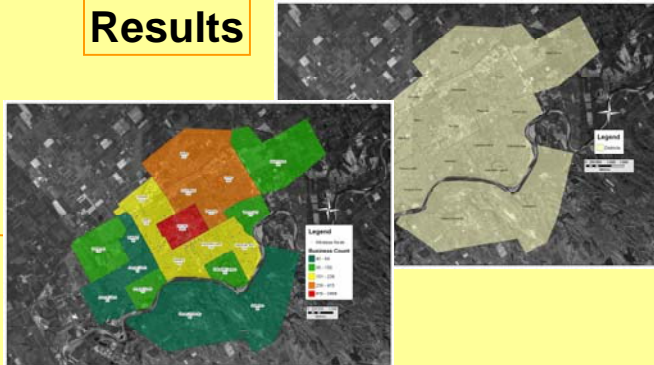


### Line of Sight (LOS) Analysis

- 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

Allows hot spot companies to see where wireless networks are needed, according to commercial complexes, and install accordingly after checking interference sources and/or LOS



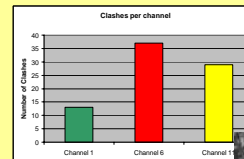
Security Level	None		WEP		WPA		WPA2	
	yes	no	yes	no	yes	no	yes	no
Number of Nodes	410	1	295	15	89	0		

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

Quicker and more efficient than onsite signal analysis, and trouble shooting, will be able to calculate if LOS is possible over the phone immediately with a customer.

Use of GIS will allow wireless companies and ISP's to setup wireless networks, by maximising productivity while minimising co-channel interference and cost of trouble shooting problems.

GIS is a very powerful tool and scarcely used due to cost in general at present, method for wireless hot spot planning. Not only can it be used for existing wireless networks, it can be used for the analysis of the new location placement of new wireless networks according to the surrounding interference. It is not limited to 802.11 and can be used for almost any wireless communication planning.



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

