

Wireless Network goes bush: Wifi in Zealandia

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ABSTRACT

This poster paper describes an level 7 research project undertaken by two students in the Whitireia New Zealand Graduate Diploma students. Currently evolving conservation research technology makes use of tools that can generate very large quantities of data. In many locations, getting this data to a location for processing can be a challenge. The students worked with staff from the Zealandia Eco-Sanctuary in Wellington, New Zealand, to evaluate the feasibility of using standard wireless network technology to provide Ethernet connectivity into the Zealandia valley. Their research confirmed that a 5 GHz wireless bridge can be operated reliably over one kilometre into the native bush at Zealandia, and identified a range of locations from which devices could be connected to a wireless network.

Categories and Subject Descriptors

K.3.1 [Computers and Education]:

General Terms

Management, Performance, Design, Experimentation, Human Factors,

Keywords

Big Data, Conservation, Outdoors, Wildlife, Wifi, Wireless Ethernet, High Frequency,

1. INTRODUCTION

This poster describes a networking project developed by two second semester Graduate Diploma in Information Technology (GDIT) students at Whitireia New Zealand.

This project was completed in fulfilment of the Level 7 Capstone Project paper at Whitireia. The first author was the academic supervisor for the project.

Zealandia is the trading name of the public resources operated by the Karori Sanctuary Trust of Wellington New Zealand. It is a community-driven eco-sanctuary project, comprising a valley of 225 hectares of regenerating native bush. It is less than ten minutes' drive from the centre of Wellington. The valley is home to a large number of native New Zealand birds and animals found nowhere else on the three main islands of the country.

There has been much academic study in the valley since the Karori Sanctuary Trust was founded in 1995. The current research adds to a large body of literature build from research there.

2. OBJECTIVES

Zealandia provides an environment of interest to a range of people with different motivations. In the same way, this research can provide useful outcomes in a number of areas.

2.1 Research Data Volumes

As the New Zealand and Australian research community develops resources for processing vast quantities of data, there is demand for gathering richer data sets from remote areas. A number of research papers from the annual eResearch Symposia of New Zealand (<http://www.eresearch.org.nz/>) illustrate this growing need. The 2012 symposium included a paper that used data gathered in Zealandia [1].

2.2 Enabling Conservation Work

In order to continue a conservation agenda, Zealandia must undertake research to verify success of plant, bird, and animal introductions. Much of the work documented in the Zealandia research report (<http://www.visitzealandia.com/research/>) can be aided by provision of high-speed real-time data connectivity.

The day to day work maintaining the Zealandia valley can also benefit from staff being able to find creative ways to use high-speed connectivity.

2.3 Visitor Experience

Education and recreation opportunities are also provided by Zealandia. These parts of the operation are essential to build community goodwill, and funding. Provision of wireless network resources in the Valley will provide options to enhance visitor experience with resources such as the Wellington-developed Stqry.com electronic feature interpretation system.. Additionally, some visitors will consider their experience is enhanced by being

ZEALANDIA TE MĀRA A TĀNE
Wireless Network Design and Implementation

Project Description:
Assess the potential for providing wireless network access within the Zealandia Valley. Design the network and possibly implement it.

Project Objectives:
Access Point configurations
Wireless Survey at Significant Places
Testing video quality through wireless link
Connect with Zealandia LAN network

Project Technologies:
Aimagnet survey tool
ARCIS online mapping

Project Methodology:
Random Drive it allows team to easily visualize problem areas within Project.

Project Clients:
Lauren Schaefer (Media Partner)
Brian Ireland (Graduate & Visitor Experience)

Project Outcome:
Configured Access Points
Survey Wireless network covered area
Tested cameras at Kaka feeders

Project Team & Academic Supervisor:
Vihar Naik (21203137)
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Steve Cosgrove (Academic Supervisor)

Wireless Bridge
Wireless link to camera
AP used for Upper Valley

Whitireia NEW ZEALAND
ZEALANDIA THE KARORI SANCTUARY TRUST
TE MĀRA A TĀNE
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able to use their wireless network capable electronic devices in the valley.

3. THE CAPSTONE PROJECT

The students undertaking this project negotiated this project with marketing and visitor experience staff from Zealandia as their client. They undertook a number of stages in their research.

3.1 Installation of Access Points

Facilities Management staff from Zealandia assisted the students with installation of wireless Access Points (APs) for survey. The APs were supplied by Allied Telesis, and configured by the students.

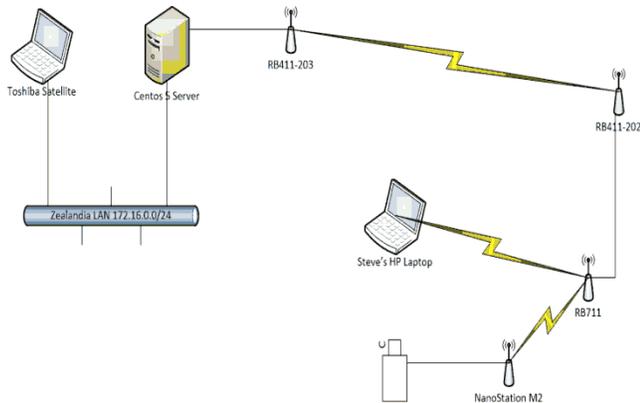


Figure 1: Logical diagram of network used for this research

3.2 Wireless Survey

Various surveys were undertaken with AirMagnet software, which provided an understanding of wireless penetration through bush, areas of good wireless signal strength and areas subjected to interruption.

Some of the areas surveyed can be found on a Zealandia map (<http://www.visitzealandia.com/plan-your-visit/sanctuary-valley-map/>) Areas surveyed included: Valley View Track; Top Dam; Round the Lake Track; Tui Glen Track; Heritage Area; Tui Terrace; Shag Tree; Round Lawn; Discovery Area; Tutara Research Area; Feeding stations for Kaka, Takahe, Kakariki, and Hihi;



Figure 2 Yellow shading indicates area of potential wireless connectivity.

3.3 Applied Wireless Trial

Another objective of this project was to test video quality over a wireless bridge. The students tested video at the Kaka feeders near the Top Dam, using the logical network structure illustrated in Figure 1.

4. CONCLUSION

In bush area wireless penetration makes difference because of obstructions especially when it gets wet. Some listed areas where Zealandia can put an IP camera and screening at visitor centre. Zealandia will be able to provide wireless internet connection for visitors.

5. FURTHER RESEARCH

This project tested the implementation of a wireless bridge, and evaluated potential for use of wireless access devices within the Zealandia valley. Further research could focus on detailed requirements for putting Access Points within the valley to provide significant areas with wireless coverage for high signal strength and high bandwidth.

In this way researchers and visitors could make use of public Wi-Fi to in the future.

6. REFERENCES

- 1 Digby A P, Bell B D, Teal P D M, 'Kiwi conservation acoustics', *eResearch NZ Conference* (Wellington, 4 July 2012).