

## Research Report [1 July – 31 December 2009]

<i>Project Name</i>	PlanetLab NZ+
<i>Project Leader</i>	Prof. Krzysztof Pawlikowski
<i>Last Milestone Achieved</i>	1 of 2
<i>Project On Track?</i>	Yes

***The goals of the Capability Build Fund are to raise awareness and enable effective use of KAREN. REANNZ wants to promote the enabling potential of KAREN and its use through creating a community ethos of sharing knowledge.***

### Current Status (500 words max)

*What is the current status of the project in terms of the milestones and its overall goals?*

“PlanetLab NZ+” is the continuation of the successful “PlanetLab NZ” project of KAREN Capability Build Fund (June 2008-June 2009) which resulted in three sites of PlanetLab NZ, at the University of Canterbury, University of Auckland and University of Otago, being fully connected to the global PlanetLab experimental infrastructure via KAREN. An international workshop on PlanetLab NZ, focusing on “NGN/NGI Research and Experimentation”, was also organized and held in Dunedin on the 2<sup>nd</sup> of December 2008; see [www.planetlabnz.canterbury.ac.nz/workshop2008.html](http://www.planetlabnz.canterbury.ac.nz/workshop2008.html)

The work on “PlanetLab NZ+” has begun in July 2009, and it is planned to be finished by June 31, 2010. According to the schedule of the project, during its 1<sup>st</sup> half (July-December 2009) the project’s activities should focus on installation of two PlanetLab NZ servers at the Victoria University of Wellington and on connecting them to global PlanetLab via KAREN. Additionally, during that time, we should organize the next edition of our PlanetLab workshop, devoted to issues related with research on future networking technologies, with a focus on experimental research methodologies which are enabled by PlanetLab NZ via KAREN.

These plans have been achieved and exceeded. The two PlanetLab NZ servers at the Victoria University of Wellington have been installed. Additionally, we have already delivered two servers to the University of Waikato. The remaining two servers, needed for the Auckland University of Technology, are waiting for being sent to Auckland from the University of Canterbury. This is planned to be done well ahead of the schedule, probably already in January 2010, and both University of Waikato and AUT should become parts of PlanetLab NZ, as being connected to the global PlanetLab via KAREN, within next 2-3 months. .

While two servers at the Victoria University in Wellington practically form a new PlanetLab NZ node, from a formal point of view they still need to be registered by the central PlanetLab's administration at Princeton University in the USA. This requires a formal Membership Agreement to be signed by an appropriate IT officer at Victoria University of Wellington. Unfortunately that person has been on a leave from mid December. We have been promised that this formal process will be finalized on the nearest occasion, in January 2010.

The 2nd PlanetLab NZ Workshop on "Next Generation Networks and Future Internet: Research and Experimentation" was held at the University of Canterbury in Christchurch,

on November 6, 2009. The event was attended by 38 participants, representing network research groups from Auckland University of Technology, Massey University, University of Auckland, University of Otago, Victoria University of Wellington, University of Canterbury, University of Duisburg-Essen (Germany) and University of Vienna (Austria), as well as Allied Telesis Labs Ltd.

The workshop was opened by Prof. Ian Town, Deputy Vice-Chancellor of the UC. The program begun with a keynote lecture by Prof. Kurt Tutschku from University of Vienna. This was followed by three plenary sessions. The workshop program and all presentations are available from the PlanetLab NZ website, at [www.planetlabnz.canterbury.ac.nz/workshop2009](http://www.planetlabnz.canterbury.ac.nz/workshop2009).

**Successes (500 words max) specifically comment on the following:**

- *Identify expertise gained through this project to enable KAREN to be used effectively*
- *Identify any new capabilities that have evolved over KAREN through this project*
- *Identify new elements ability in advanced networking techniques learned through this project*

Our experience gained while working on “PlanetLab NZ” (July 2008 - June 2009) has allowed us to progress fast on the tasks associated with “PlanetLab NZ+”. At the end of this project, research groups from six New Zealand universities will use KAREN for accessing the most advanced global experimental networking facilities, allowing them to contribute in leading-edge research on future generations of multimedia computer networks.

Availability of these advanced research facilities have already attracted new research students from overseas: it is expected that 3 or 4 new PhD students will join our Network Research Group at the University of Canterbury during the first months of 2010, to conduct research on various issues related with management of global networking experimental facilities and Future Internet. The first of these students is expected to arrive on February 1, 2010.

Our current activities have been documented on the “PlanetLab NZ” website, at [www.planetlabnz.canterbury.ac.nz](http://www.planetlabnz.canterbury.ac.nz). Additionally, they were reported in four presentations during the 2nd PlanetLab NZ Workshop on “Next Generation Networks and Future Internet (in Christchurch, on the 6<sup>th</sup> of November 2009). These included a special technical presentation on “PlanetLab NZ: Technical Issues” by Joff Horlor from our research group at the University of Canterbury.

Independently from these activities, we have continued our earlier commenced research projects. The results of them were reported in the following six papers, presented at international research conferences and published in the conferences’ proceedings:

- W. Liu, H. Sirisena and K. Pawlikowski. “FoF-R Ant-based Survivable Routing Using Distributed Resilience Matrix”. The 21st International Teletraffic Congress (ITC 21) on Traffic and Performance Issues in Networks of the Future, Sept. 15-17, 2009, in Paris, France;
- W. Liu, H. Sirisena and K. Pawlikowski. “A Novel Resilience Matrix for Survivable Routing in a Distributed Control Architecture”. The 15th Asia-Pacific Conference on Communications (APCC 2009), Oct. 5-10, 2009, in Shanghai, China;

- W. Liu, H. Sirisena and K. Pawlikowski. “Efficacy of Fiedler Value versus Nodal Degree in Spare Capacity Allocation”. The 15th Asia-Pacific Conference on Communications (APCC 2009), Oct. 5-10, 2009, in Shanghai, China;
- W. Liu, H. Sirisena and K. Pawlikowski. “Weighted Algebraic Connectivity Metric for Non-Uniform Traffic in Reliable Network Design”. International Workshop on Reliable Networks Design and Modelling (RNDM2009), Oct. 12-14, 2009, in St. Petersburg, Russia;
- W. Liu, H. Sirisena and K. Pawlikowski. “Utility of Algebraic Connectivity Metric in Topology Design of Survivable Networks”. The 7th International Workshop on the Design of Reliable Communication Networks (DRCN 2009), Oct. 25-28, 2009, in Washington DC, USA;
- W. Liu, H. Sirisena and K. Pawlikowski. “A Novel Distributed Resilience Matrix for Arbitrary Failures in Spare Capacity Allocation”. The 7th International Conference on Information, Communications and Signal Processing (ICICS 2009), Dec. 7-10, 2009, in Macau

A number of other papers have been submitted for international conferences and journals

### **Communications (500 words max)**

*Identify ways that the capability aspects of the project, eg skills or technology developed, have been communicated to the wider community.*

We have continued to keep the current participants of the PlanetLab NZ+” project, and potential future collaborators, informed about our activities by updating information on the website of “PlanetLab NZ”; see [www.planetlabnz.canterbury.ac.nz](http://www.planetlabnz.canterbury.ac.nz). We have also advertised two conference scholarships/travel awards for PhD students intending to work on research projects related with new networking technologies (such as, e.g. NGN, NGI, Future Internet) which would allow them to attend international conferences on global experimental networks/testbeds, and on PlanetLab, in particular. The goal of these awards is to help students in preparing their PhD research proposals; see [www.cosc.canterbury.ac.nz/open/students/funded\\_projects.shtml](http://www.cosc.canterbury.ac.nz/open/students/funded_projects.shtml). They have attracted a number of inquiries from around the world, and there is a chance that 3-4 new PhD students will join us still this year.

All presentations during our 2nd PlanetLab NZ Workshop were broadcasted on-line on KAREN, so we had a number of remote participants who were unable to be physically present during the workshop.

After the workshop, an article entitled "UC hosts workshop focusing on future Internet" was published in the Chronicle of University of Canterbury (vol. 44, no. 20, December 11, 2010); see page 14 at [www.comsdev.canterbury.ac.nz/chronicle/2009/ChronVol44-20.pdf](http://www.comsdev.canterbury.ac.nz/chronicle/2009/ChronVol44-20.pdf) .

### **Top Issues (500 words max)**

*Identify and comment on any current issues or barriers, which will impede your ability to meet the next milestone and the overall goals of the project?*

I do not see any barriers which could effect our ability of meeting the final milestone of this project. The equipment needed for establishing all three nodes of PlanetLab NZ been purchased and the 2<sup>nd</sup> PlanetLab NZ workshop has been organized.



My current concern is related with our ability of organizing the next PlanetLab NZ workshop. Namely, following the success of the PlanetLab NZ workshops of 2008 and 2009, the organizers of two international conferences (ATNAC 2010 and APCC 2010 <http://APCC2010.aut.ac.nz>, planned in Auckland, Oct 31- Nov 3, 2010) have asked me to hold the 3<sup>rd</sup> PlanetLab NZ workshop as part of one of these conferences. The problem is to secure appropriate funding which would allow to continue with these workshops.

**Top Risks (500 words max)**

*Comment on any known or anticipated risks to project: are there any risks that may impede your ability to achieve your next milestones and project goals*

None

**What's Coming Up (500 words max)**

*Next steps in project relating to the specific milestones and project goals coming up - please be as technical as possible. Also include any other goals that relate to building KAREN capability awareness.*

We have purchased all six servers needed for PlanetLab nodes at the Victoria University of Wellington and the University of Waikato (two pairs of PowerEdge Server AS-PER200, Dell(TM) PowerEdge(TM) R200, Rack- Mounted), as well as one pair of HP Compaq dc7900 computer servers (towers, with 3.0GHz Intel Core 2 Duo E8400 processors) for the Auckland University of Technology. All these machines satisfy the strict technical restrictions imposed on PlanetLab servers by the central PlanetLab administration at Princeton University (USA). The servers at the Victoria University of Wellington have been installed. Installation of PlanetLab servers at the University of Waikato is under way, and the installation at the Auckland University of Technology will begin soon. All nodes of PlanetLab NZ will operate as parts of global PlanetLab, and they will be able both to use remote research facilities in experiments conducted from New Zealand, as well as to become parts of global networking experiments initiated from overseas, due to their connectivity with outside world via KAREN.