

AARNews

	Today AARNet 3	1-3 Years AARNet 3.5	4-6 Years AARNet 4
Research & Collaborative Tools	EN4R LightPaths	D-EN4R NCN	Lambda Paths
Customer Access CPE	1G Access	10G Access	40G Access
Network Services	P2P 1G Ethernet	L3 VPN VPLS	G.MPLS
IP Backbone	10G	40G	100G
DWDM Backbone	Near National 40 x 10G	National 80 x 40G	National 80 x 100G

AARNet Network Roadmap

CEO's Report

I am pleased to report a very successful QUESTnet2008 Conference held this year at the Royal Pines Resort and hosted by the Queensland University of Technology. At the conference, AARNet was excited to demonstrate its new OptiPortal in joint partnership with QCIF, the Queensland Cyber Infrastructure Foundation. This demonstration coupled with the Eduroam Help Desk added significant interest to many of those who attended.

QUESTnet2008 also gave AARNet the opportunity to formally announce several new products and services. In particular, we have responded to significant interest across the sector for a 10 Gbps access product which is now available to AARNet members. In order to achieve this, an appropriate network upgrade was made with an investment of just on \$1 million and it will improve AARNet members' access to the network from 1 Gbps to 10 Gbps allowing Australian researchers to collaborate at greater capacity on international research projects in high bandwidth demanding initiatives. This upgraded access will also increase the adoption of OptiPortal technology amongst research and education institutions.

In addition, we announced that from 1 July all domestic peers will be classified as On Net, and as an attempt to move away from volume charging we have introduced a new "port-based" capacity product specially designed for on campus university student residences.

AARNet has forged a joint agreement with ARCS (the Australian Research Collaboration Service) to provide EVO, a video desktop collaboration tool for researchers and AARNet has reached agreement with ARCS and the developers at Caltech regarding a shared support arrangement in Australia.

Finally, we have also been working with our vendors to develop a possible trial of 40 Gbps equipment which would be one of the first of its kind in Australia and would place AARNet near the forefront in the provision of network capacity. As you can see from the table attached to this report, we have launched our Network Roadmap for the future. This diagram of the roadmap shows how we intend to align AARNet3 with your needs over the coming years, ensuring that the network backbone is linked to the customer access layer and to the appropriate research and collaboration tools that will address your future network needs.

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The timing of the Network Roadmap links in well with the development of the next iteration of our strategic plan which is currently underway. As I travel around the country it is pleasing to receive positive feedback from you about the work our team is doing. However, it is even more important at this time that we hear from you regarding your needs for the future as we finalise our plans through to 2012 over the coming months.

Please don't hesitate to contact me directly or any of the AARNet team, as we value your feedback.

Chris Hancock
Chief Executive Officer



Mahmoud Abo-Elwafa, Kent Adams, Chris Hancock and Ross Gorham at QUESTnet

FOCUS ON...

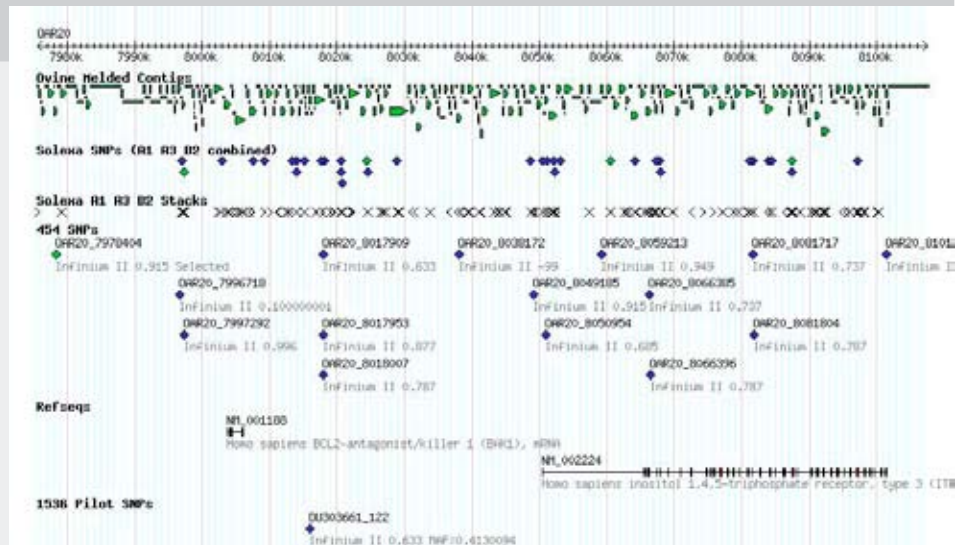
Network underpins sheep genome breakthrough

A cutting-edge new tool to pinpoint the genetic differences responsible for a variety of commercially important traits in sheep is about to be released by an international consortium, including researchers from CSIRO in Australia.

Designing this first generation, Single Nucleotide Polymorphism (SNP) genotyping chip will enable scientists to characterise the genetic variations at approximately 60,000 different positions in the sheep genome.

AARNET has played a critical role in the work to develop this new SNP chip which has the potential to revolutionise the future selection and breeding of sheep globally.

The International Sheep Genomics Consortium (ISGC) undertook this work using two of the latest sequencing technologies. 454 sequencing was used to construct an assembly of the sheep genome from six animals derived from different breeds. This draft assembly was based on a virtual sheep genome framework, itself constructed using the genome sequence of the cow (which is closely related to sheep). Solexa sequencing was used to sample ~5% of the sheep genome from 60 different individuals at much greater depth to identify SNPs with a high level of confidence. A larger number of SNPs of lower confidence were also identified from the genome assembly.



A section of the draft sheep genome assembly browser showing the location of SNPs.

Sequencing was undertaken in New Zealand (University of Otago) and in two different locations in the USA (Baylor College of Medicine, Texas and Illumina, California). Large amounts of data (numerous files of multiple Gigabytes) were transferred to AgResearch (Invermay, Otago, New Zealand) and CSIRO (Brisbane, Queensland, Australia).

During the course of the project sequence data and analysis results were repeatedly transferred between Australia and New Zealand over the joint AARNET/KAREN network, providing a significant saving of time over the alternative, slower networking routes. Most of the analysis in Australia was undertaken using the CSIRO Bioinformatics Cluster facility in Canberra and the HPSC in Melbourne again involving transfer of considerable amounts of data between these sites and Brisbane over AARNET.

The results of the analyses will soon be available to researchers around the world via a number of websites, including the sheep genome browser, enabling researchers to view the SNPs in the context of the sheep genome assembly.

The sheep genome is the first mammalian genome to be assembled in the Southern Hemisphere and by researchers not affiliated with a large sequencing facility. The work was funded by an International Science Linkages grant (Australia), Ovita (New Zealand), Sheep Genomics (a joint venture between Meat and Livestock Australia and Australian Wool Innovation Ltd) and Genesis Faraday.

Papua New Guinea

AARNET met with PNG Government officials and the Minister to sign an MOU to ratify the establishment of a new Satellite network connecting PNG Universities to the AARNET network. This is a significant collaboration and further consolidates our already strong presence in the region joining the University of the South Pacific in Suva as well as our other Pacific colleagues.



Chris Hancock and the Hon. Michael Ogie, Minister of Higher Education, Research, Science and Technology in Papua New Guinea

SPOTLIGHT ON...

International Sheep Genomics Consortium - CSIRO

Brian Dalrymple

Project Role: Project leader of the Australian segment of computational analyses for the ISGC projects

Technical Skillset: PhD biologist, Bioinformatics scientist, Manager

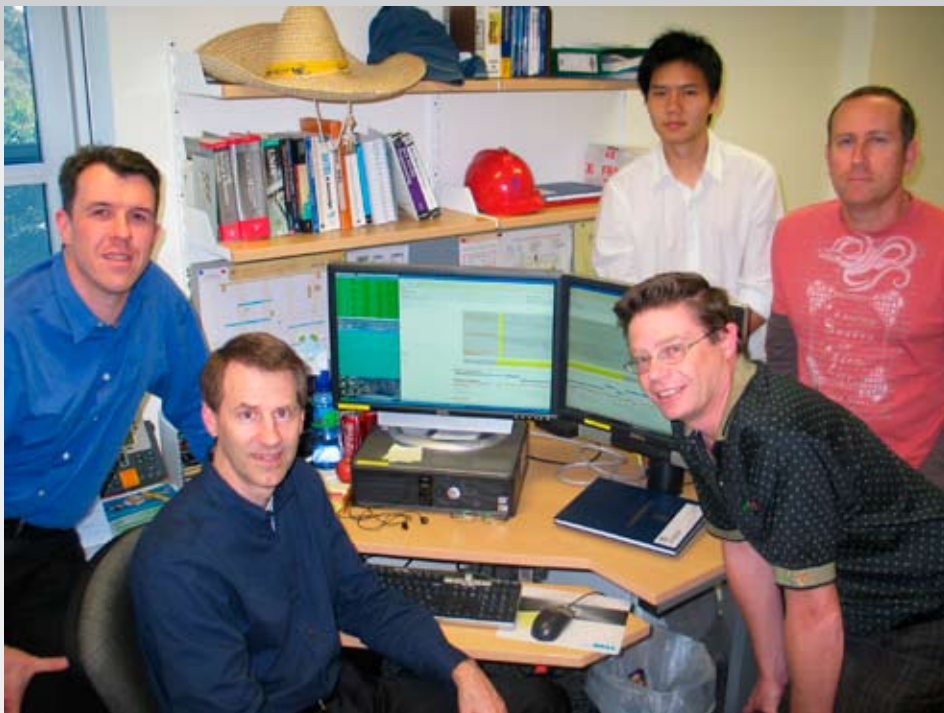
Brian leads the genomics/bioinformatics group in CSIRO Livestock Industries, which has a major focus on the sheep and cow genomes. The sheep genome assembly and SNP chip design projects are two of several large projects undertaken by the group. Brian trained as a biochemist, but subsequently as a member and then leader of many molecular biology projects became very interested in the management and analysis of large genomics datasets. This has progressed from analysis of microbial genome sequences to mammalian genomes and now to molecular systems biology. Brian has no formal training in programming or computer science, but enjoys winging it.

David Townley

Project Role: Project coordination and data analysis

Technical Skillset: Bioinformatics Scientist, PhD biologist

David coordinated the interaction between the Australian and New Zealand groups involved in the project. His previous experience working with our collaborators across the Tasman provided smooth channels of communication and ensured that rapid data transfers were achieved using AARNet and its kiwi counterpart KAREN. David has 10 years bioinformatics experience, with emphasis on the biology side of the field from his background in molecular genetics. He has considerable experience in genome annotation and analysis and in this project David identified the SNP from our Solexa sequencing, comparing the data from 60 sheep to the genome assembly generated as part of the collaboration.



The Australian sheep computational team from left to right, David Townley, Wes Barris, Brian Dalrymple (front), Dave Tang (rear), Sean McWilliam, absent Abhi Ratnakumar

Wes Barris

Project Role: Bioinformatics

Technical Skillset: UNIX & Perl guru, High Performance Computing

As the resident expert in automating tasks that would normally require manual intervention and large amounts of time, Wes created the framework upon which large amounts of data can be processed using two different computing clusters located in different cities. Wes' strong programming background was critical in piecing together the processing pipeline required to deal with data whose individual components numbered in the millions. Wes' expertise was also used to provide to researchers the results of this computation via web-based applications.

Sean McWilliam

Project Role: Bioinformatics

Technical Skillset: Biology, Information Technology

Having spent many years in the laboratory in the areas of molecular biology and functional genomics, several years ago he moved into the area of bioinformatics. Sean has expertise in the areas of database management and java programming with particular application to the modelling and representation of biological information.

Abhi Ratnakumar

Project Role: Bioinformatics

Technical Skillset: Perl Programmer

Abhi joined the project as her first job after obtaining her BSc. Abhi worked on the construction of the first and second versions of the virtual sheep genome, which provided the essential framework for the assembly of the real sheep genome. She has recently left the project to start her studies for a PhD at Uppsala University, Sweden.

Dave Tang

Project Role: Bioinformatics

Technical Skillset: Perl Programmer

Dave joined the SNP discovery project during the first pilot phase as a budding bioinformatician and provided database support and technical assistance. Dave's roles varied from the implementation of a SNP database to the development of the web interface for the display of data from the pilot SNP discovery project and in assisting with the identification of candidate SNPs for a 1.5k SNP chip.

Customer Dashboard

AARNet has developed a personalised Customer Dashboard, which is accessed via the AARNet website. The Dashboard is targeted at IT Managers and Directors, making network traffic growth, utilisation and billing information more accessible. A trial is currently in progress, including five IT Directors, drawn mainly from the AARNet Advisory Committee. Later this year, following the trial, we plan to release to all our customers.

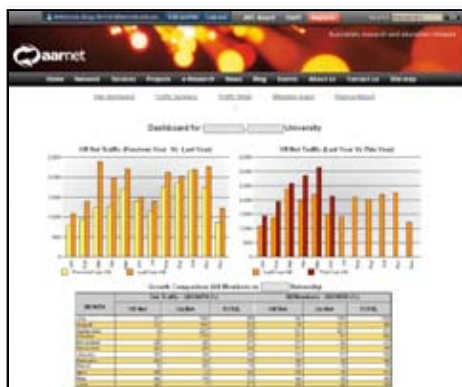
The Customer Dashboard will provide the following reports in the first release:

- Graphs showing customer traffic growth over the previous 2 years.
- Customer traffic growth vs the average across all customers (to assist customers benchmark their traffic growth against the sector).
- Detailed reports of traffic volumes by type, with drill-down to monthly or daily figures.
- Utilisation graphs, showing how heavily their AARNet3 connection is being used.
- A finance report, showing YTD traffic charges.

To complement the customer dashboard, a range of more detailed technical information and tools are also now available. These tools are targeted at technical staff, who prefer to look "under the bonnet". (Contact the AARNet NOC for access)

Based on customer feedback and requests, the range of reports offered will be improved and expanded over time, so your ideas are welcome.

For more information, contact Doug Farmer:
doug.farmer@aarnet.edu.au



Throughput Tests With 10 Gbps AARNet Connections

As AARNet releases its new 10 Gbps capable connection to the AARNet network, we have performed some throughput testing between our Canberra and Perth Offices. The AARNet Canberra and Perth offices have been chosen as a test bed for the new 10 Gbps cpe product. In recent testing presented at the QUESTnet conference, we achieved a sustained TCP throughput of almost 9 Gbps between Canberra and Perth. We've also gained some useful experience in overcoming some of the hurdles that prevent full utilisation of this faster networking technology over a long distance.

The new services will be configured with a 5 Gbps rate limit to avoid congesting the AARNet 10Gbps backbone. We are expecting to lift this rate limit as we upgrade the backbone.

The next step with our testing is to test throughput on the 10 Gbps SX-Transport link across the Pacific to the USA.

Port Based Service

AARNet has developed a port based service in response to significant demand from universities for a product tailored to student use in general and on-campus student residences in particular. A port based service is based on bandwidth (megabits or gigabits per second) rather than traffic volume (megabytes or gigabytes), and can be capped at a given bandwidth allocation (e.g. 10 megabits per second). The advantage of this approach is that usage cannot exceed the capacity of the service, and customers can budget for the cost of the service in advance.

AARNet will be further developing the port based service once MPLS capability is added to the network later in the year. In particular, it should be possible to offer a port based off net service while retaining an unrestricted on net service.

Conditions of sale & pricing information available on request from Rob.Ewin@aarnet.edu.au



GLIF Connections Worldwide

GLIF Maps

Recently the Global Lambda Integrated Facility (GLIF) published maps (May 08) that show the bandwidth that has been made available for experiments from Research and Education networks around the world. AARNet participates in GLIF with capacity on both the Optical National Backbone (domestic) and SXTransPORT (international to the US) being identified as available.

These maps are an invaluable resource as they assist in identifying connectivity options when planning experiments that require dedicated bandwidth. Most recently the Australia Telescope National Facility (ATNF) conducted real time e-VLBI correlations in Australia with Telescopes connected from China and Japan. Using these maps assists in identifying connectivity, in this experiment SXTransPORT (a joint initiative between AARNet and Southern Cross Cable Networks (SCCN)) was used to obtain connectivity between Australia and the US, with capacity on Gloriad (US to China) and JGN2plus (US to Japan).

MCU Working Group Reports

The MCU Review Group has now officially ended with the publication of a report detailing the creation of a user friendly booking and bridging service. This service has received interest from a number of universities that are now interested in joining their Codian MCUs to the shared pool thus creating greater value for all.

A spin off activity has started with Flinders University and AARNet to provide ISDN video conferencing as a pilot service to determine if a sustainable service is possible. There has been renewed interest in ISDN video conferencing for locations that are unable to gain access to IP connectivity based on physical access or because of unrealistic costs to deploy IP connectivity and as an alternative to institutions managing their own ISDN circuits and gateways. Some examples of use include smaller sites that require video to access real time medical training materials or for administration and interviews between multiple campuses. The trial is likely to include a small number of organisations, if you are interested in participating, please let us know as soon as possible at realtimecomms@aarnet.edu.au. More details are on a factsheet at http://www.aarnet.edu.au/library/AARNet_ISDN_Pilot.pdf.

AARNet has also completed work with Tandberg to create a similar booking and bridging solution for REANNZ (NZ NREN) and their customers; this was completed in early July. REANNZ will now work with AARNet to develop and deliver a new platform for booking and bridging services post 2009 when the current platform ends.

A new project group will be formed early next year to explore desktop video conferencing services and carbon calculators to enable greater adoption and use of video conferencing by end users and for them to easily demonstrate the value of that use in carbon savings. To know more about that group please contact Jason Bordujenko at AARNet.

The final report of the MCU Review group can be accessed at <http://www.aarnet.edu.au/Article/ProjectDetail.aspx?p=63&id=18>.

AARNet would like to express sincere thanks to the MCU Review group, especially to Steve Cox (Flinders University) as Chair and to Codian and Tandberg for their software and infrastructure expertise that led to the group delivering outcomes that went well beyond original expectations.

Horsham Water Conference

The AARNet Applications and Services team provided equipment and streaming expertise for the GWMWater Schools Water Conference on 13 June at University of Ballarat's Horsham Campus supported by the Victorian State Government's Smart Water Fund.

The conference was the second in a three-year program designed to empower secondary students with knowledge about water issues, while at the same time exposing them to an adult-style forum.

For several months students have been working on research to challenge their thinking about current water usage for themselves as individuals and as part of a local community, and the larger scale implications.

Prior to attending the conference students investigated what changes, if any, need to be made to ensure a sustainable future for themselves and their children.

AARNet equipped the conference with a high definition endpoint for the duration of the conference. Web streaming to schools unable to attend the event in person was provided via the Ballarat MCU and the AARNet streaming and recording infrastructure.



GWMWater (Victoria) hosted this years' 'Is OUR water use sustainable today, tomorrow and beyond?' Conference for year 9 and 10 students in Horsham and surrounding areas



Arno Besse (University of Ballarat) setting up for the conference at the Horsham University of Ballarat campus

VoIP Service Achieves Objective

AARNet implemented the VoIP service in 1999 to reduce the high costs to its members associated with long distance telephony, and it achieved this objective with great success. The service was especially valuable to AARNet member institutions with multiple national sites (e.g. the CSIRO and the Australian Catholic University), or regional campuses (e.g. the University of Newcastle, Charles Sturt University and the University of Ballarat).

AARNet is phasing out the VoIP service, and from 1 December 2008 only "on net" calls and access to gatekeeper services will be supported, while "hop off" or "toll bypass" calls will no longer be routed after that date.

The VoIP service has operated with little modification since its development, and its continuation would require an equipment upgrade, new customers, lower call rates, a new billing system, and additional investment in compliance with Government call interception regulations. In summary, the business case for a VoIP service is no longer as strong as it was ten years ago.

Domestic Peering And On Net

Network peers are non-customer organisations with which AARNet mutually agrees not to charge for the exchange of network traffic. Most AARNet peer organisations are outside Australia, but there is a small group of peers in Australia, including commercial ISPs (e.g. Internode), Internet exchanges (e.g. WAIX), and content sources (e.g. the ABC).

From 1 July, domestic peer traffic will be classified as on net. This is a major benefit for subscription based customers with only a small cost to AARNet. The benefit to customers is that they will no longer pay the off net traffic charge (currently \$5 per GB) for content provided at relatively low or zero marginal cost to AARNet.

BITS AND BYTES

- The eduroam project group held a successful hands-on technical workshop at the University of Sydney in May. Full details can be found online at <https://wiki.aarnet.edu.au/display/eduroam/2008/05/29/eduroam+Technical+Workshop>
- A report into the use and impact of peer-to-peer real time communications applications has been completed by the University of Wollongong with support from AARNet, ACU, USYD, UNE and CDU. Richard Caladine will talk about this report at upcoming RTC roadshows. The report is accessible on the AARNet blog at http://www.aarnet.edu.au/Blog/archive/2008/07/03/peer-to-peer_RTC.aspx
- Eduroam services were available at QUESTnet this year. The stats were 51 users from 16 eduroam Institutions connected successfully using a variety of devices including the "one laptop per child" device. A help desk for end users was key to its success with a number of institutions "federating" to eduroam for the first time at the conference. Complete details about this group can be found at <https://wiki.aarnet.edu.au/display/eduroam/Home>
- AARNet has worked closely with QUESTnet to support the recording of conference talks; these will be available online soon. Please see the website for more.
- AARNet has launched a new recording service to complement and enhance the existing booking and bridging service. More details are contained in specific AARNet factsheets.
- Work is underway with AARNet and Flinders University to deliver an ISDN Video Conferencing pilot service. For more information please see our factsheets or contact realtimecomms@aarnet.edu.au
- An exploratory group has been formed to investigate IPv6. For more details about this group see <https://wiki.aarnet.edu.au/display/IPV6/Home>
- Factsheets detailing a range of AARNet's applications and services work are now available from the publications section on the AARNet website at <http://www.aarnet.edu.au/Content.aspx?p=56>
- Access to past Ozeconferences are now available from our content server at <http://tcs.aarnet.edu.au>
- The RTC roadshow kicks off in September; registration is now open. The event will be on one day this year and will include different keynote speakers from commercial and academic worlds that will be broadcast live as "Ozeconferences" whilst on the road...
 - » WA (Perth) - Sept 11
<http://www.aarnet.edu.au/Article/EventDetail.aspx?p=65&id=77>
 - » SA (Adelaide) - Sept 16
<http://www.aarnet.edu.au/Article/EventDetail.aspx?p=65&id=78>
 - » IC (Melbourne) - Sept 28
<http://www.aarnet.edu.au/Article/EventDetail.aspx?p=65&id=79>
 - » NSW (Sydney) - Sept 23
<http://www.aarnet.edu.au/Article/EventDetail.aspx?p=65&id=80>
 - » QLD (Brisbane) - Sept 25
<http://www.aarnet.edu.au/Article/EventDetail.aspx?p=65&id=81>

Mirror Traffic Growth

mirror.aarnet.edu.au and the AARNet System Administration team had cause for celebration on 14 May. For the first time in the mirror's history over 1 terabyte (1000 gigabytes) of data was delivered to users within a single 24 hour period. The major generator for the traffic was the release of the Linux distribution, Fedora 9.

Of a total of 1,235 gigabytes, 930 gigabytes was delivered via the web, 231 gigabytes was delivered via FTP and the remaining 74 gigabytes was sent through the Rsync service. The average data delivery rate was just shy of 15 megabytes a second, which is the equivalent of a fully utilised STM-1 fibre service or recording a compact disc every 48 seconds. Many of the popular archives see a 200 to 1 ratio on content delivered to customers against what mirror.aarnet.edu.au has to download from international sources. The advantages being less congested international links and faster delivery for local users.

mirror.aarnet.edu.au recently had a revamp in both appearance and functionality under the hood. It's a full time job maintaining a mirror service with hundreds of archives, and we thank all members who both use and communicate with the team with requests and issues.

Any questions, requests and issues are welcome at mirror@aarnet.edu.au or by using the feedback form located on the AARNet website.

Staff Profile - Mick Blue

Mick joined AARNet in June 2007 and works as part of the Infrastructure Development Group. His role includes various tasks such as initial route designs, contractor negotiations and quotations, Telstra and NextGen liaison, construction quality assurance and link test and turn up.

Previously to AARNet Mick worked for NextGen Networks in the role of field engineer as part of the Operations and Maintenance team in the northern region. His first exposure to AARNet was in 2005 when contracting to Visionstream where he worked on the installation and commissioning team that installed the new AARNet CISCO DWDM equipment between Sydney and Brisbane.



Mick is currently completing a Bachelor of Information Technology Degree externally through Southern Cross University. He has two subjects remaining and hopes to have these completed by the end of semester 1, 2009.

In his spare time he likes to go fishing in his newly acquired boat, early morning rides on his motorbike, pottering around the veggie garden, and working on the one project that may never finish, his 1973 Mazda RX3.

Conference Report

TERENA Networking Conference 2008

TERENA is the Trans-European Research and Education Networking Association, and its Networking Conference TNC2008 was hosted by BELNET, the Belgian NREN in Bruges from 19 to 22 May.

There were over 500 delegates at the conference, representing every NREN in Europe, plus a few others (notably Australia, Canada, USA, Japan, Brazil). Delegates were mostly technical or managerial members of the NRENs, plus a few from universities actively involved in networking, plus a smattering of other folk who have a large stake in their NREN.

All of the sessions were recorded and broadcast live, and the recordings, abstracts, full papers, and slides are all available on the conference website at <http://tnc2008.terena.org/>.

The plenary sessions were especially good, and the parallel sessions covered a wide variety of mostly technical issues although their quality was patchy. Perhaps the most important aspect of the conference was the wonderful opportunity it afforded to "network" with colleagues from other NRENs, and to find out what they are all up to.

Some of the more interesting plenary sessions included a session by Josh Howlett from JANET in the UK on the variety of identity management systems that applications like FaceBook and SecondLife are using.

One spectacular plenary session was delivered by Huib-Jan Van Langevelde, the Director of JIVE (Joint Institute for Very Long Baseline Interferometry in Europe (www.jive.nl)) who gave a live

demonstration involving telescopes in Europe, Central and South America and South Africa.

The most interesting parallel session was a panel debate on the lessons to be learned from GEANT2, the pan-European network.

Ozeconference

AARNet has established regular information sessions via video conference aimed at encouraging the uptake and use of technologies. OzeConferences support regular discussions on a broad range of ICT, Network, Applications and Service related issues and developments.

OzeConferences allow guest speakers to feature a topic of interest to the Australian research and education sector and present this online, giving an interactive opportunity for discussion and questions. AARNet OzeConferences are web streamed live as well as recorded for later playback.

The diverse range of topics and enhanced management of the OzeConference experience has led to greater participation across the Research and Education sector. Major changes have been developed in the areas of improved data collection, the control of end-points by a new "front door", the inclusion of back channel chat capabilities and focusing on finding the right audience and topics of interest.

Ozeconference topics in 2008 have covered: Wireless security, Video Room Design Essential, Internet Industry Association Update and Tandberg Solutions Update. Recordings of previous OzeConferences are available at <http://tcs.aarnet.edu.au>. Select 'OzeConferences' from the drop down list in the top left-hand corner of the page.

Future Events

AARNet Advisory Committee
2 October, Melbourne

AARNet Board and Strategic Planning Meeting
27-28 August, Melbourne

Internet2, Fall 2008 Member Meeting
13-16 October, New Orleans

APAN26
4-8 August, Queenstown, New Zealand

Caudit Annual Meeting
16 October, Sunshine Coast

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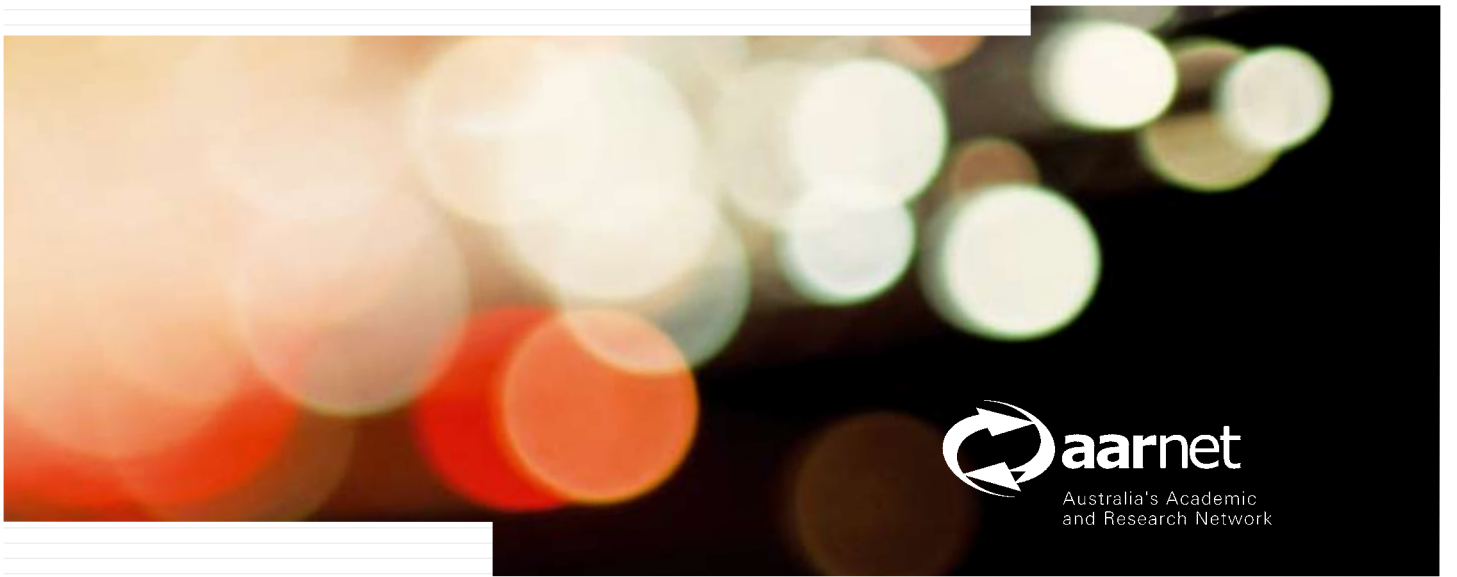
If your institution can demonstrate an interesting/innovative use of the network please contact aarnews@aarnet.edu.au

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Bruges, best-preserved medieval city in Europe but still connected to the information superhighway and location for TNC2008



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