



Internet2 Fall 2007 Member Meeting
San Diego, CA, USA
8-11 October 2007
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Through REANNZ the KAREN community is affiliated to Internet2. Internet2 holds spring and fall member meetings that typically attract attendees from both the leading US research universities and state colleges, as well as a collection of international attendees. This trip was partially supported by the KAREN Capability Build Fund.

The full programme including a number of the presentations will be found at <http://events.internet2.edu/2007/fall-mm/>

International Day

Monday, 8 October had both morning and afternoon sessions dealing with various international linkages of Internet2. The morning dealt with emerging NREN's. Of possible interest to New Zealand institutions is the South Asia Special Interest Group based at the University of Indiana. More information can be obtained at <http://southasia.indiana.edu>. The highlights of the morning session were the video attendance of doctors from a children's hospital in the Gaza Strip and an interview with researchers in Nepal.

Internet2's International Task Force met in the afternoon. I updated the group on the status of KAREN. The presentation may be viewed at <http://events.internet2.edu/2007/fall-mm/sessionDetails.cfm?session=3492&event=273>. I was followed by an update on Japan's national research and education network.

Catherine Stöver presented an inspiring presentation on GEANT's international activities. GEANT clearly believes that research is a *global* activity and that European research will benefit from global interconnectivity. For example TEIN2 which connects Australia to nine Asian countries receives 80% of its funding from the European Union through GEANT. GEANT also sponsors a 45Mbps link to ERnet in India and has projects in Africa, Latin and South America. I asked how the Europeans saw medium to long term funding and Catherine was very clear that international links should be funded 50:50 by the connected countries.

Kevin Meynall presented an update from TERENA. TERENA publishes an annual NREN compendium. This year's version is available at <http://www.terena.org/activities/compendium/>. TERENA has wrapped up their IPv6 training! Their training materials are available at <http://www.6diss.org/>.

JANET has created a prototype collaborative site, <http://www.janetcollaborate.ac.uk/>, designed to assist teachers and lecturers to find collaborators and then carry out the collaboration.

A personal observation was that there was a substantial medical presence at this session. This is a group that seems to be absent from the KAREN community at the moment.

Collaboration and Trust

Much of the middleware technology discussion at the conference covered various aspects of trust, identity management and federation. Bob Morgan suggested that Dave Clark's well known "end-to-end" principle from the mid-eighties had become a "trust-to-trust" principle with individual institutions establishing elements of trust. Given these trusted anchors well designed systems could mitigate the impact of untrusted elements.

Bob also made an interesting observation that was reinforced by other sessions at the conference. Increasingly students, staff and entire courses are making use of services outside the university. These are mostly from the social networking arena, Facebook, YouTube, Second Life, etc. The challenge is to understand how this shifts the balance of power between the institution and the

individual. For example, who is responsible for the contents of a Second Life site set up as part of a course?

Bob presented a status report on Shibboleth. Shibboleth 1.3 currently has over 500 production installations. The beta of Shibboleth 2.0 was released on 1 September and while the working group could not agree on a date for the production release it was agreed that it would be "real soon now." A significant goal of Shibboleth 2.0 is a cookbook guide allowing it to be operational within ninety minutes.

Several other examples of Shibboleth were presented during the conference.

- Clemson uses Shibboleth with its student portal.
- <http://healthsciences.org/> has committed to the use of Shibboleth.
- SWITCH has deployed Shibboleth for both authentication and authorisation over 75% of the Swiss higher education sector.
- The European grid EGEE uses Shibboleth amongst 240 institutions in forty five countries.
- The Europeans are looking at better support for short lived virtual organisations.

The InCommon Federation currently has in excess of sixty members, forty six higher education and seventeen service providers. Expansion is slow as lawyers in the higher education sector are in no hurry. A key development is the move within the Internet2 community to separate the certificate authority from the trust architecture. Scott Cantor claimed there were seventy good reasons for this, a few of which are:

- improved key management,
- facilitates service providers joining multiple federations,
- issues of certificate authorities within SAML federations are largely separate from other issues, and
- keys in meta data must be distributed anyway.

There are currently fifteen plus research and higher education access management federations in some stage of development. InCommon are finding that these federations have been built on different assumptions which then makes it more difficult than envisioned to establish inter-federation agreements.

Jane Charlton, Nicole Harris and Mark Tysom discussed different aspects of JISC's Access Management Federation. It went live last year and is planning a two year transition from Athens to Shibboleth. JISC is responsible for 641 institutions. At the date of Jane's presentation there were 108 members of the Federation. JISC expects to achieve 50% of the Higher Education sector and less than 20% of the Further Education sector by the middle of 2008.

The UK Access Management Federation is based on a simple set of rules:

- Make accurate statements to other members.
- Keep federation systems and data secure.
- Use personal data correctly.
- Resolve problems within the federation. (Avoid legal battles.)
- Assist federation operator and other members.

JISC is currently carrying out a study into Access Federation policies across nine countries. They are trying what can actually be accomplished between two or more countries. The final report will be available from www.jisclegal.ac.uk/access in January 2008.

JISC's future work includes tools to support e-Research and multiple affiliations as well as to help manage federation information. We can take heart that if New Zealand's current focuses is on joining the AAF we can expect lots of supporting tools to become available in the not too distant future.

Network Advances

The new Internet2 architecture was introduced during a plenary session. The initial deployment has a capacity of 100 Gbps which is easily scalable to 200 or 400 Gbps. The IP network

component offers the same well known services: IPv4, IPv6, jumbo frames and multicast. Four peering points are provided for peering with commercial service providers. In addition there are both static and dynamic circuit switched light wave services. Static services can be provisioned within minutes. See figure 1 for an example of dynamic services.

CALIT2

CALIT2 figured in both a keynote presentation by its director, Larry Smarr, and an afternoon long visit. CALIT2 is an interdisciplinary lab at the University of California San Diego. It is staffed by one hundred computer scientists and another hundred

application researchers. The lab has 100 industrial partners. In his keynote Larry discussed the planning of a building for CALIT2 based on the assumption that available bandwidth is or will become infinite. This translated into 10Gbps to each individual and 24 fibres to each lab. In a unique use of fibre CALIT2 holds a genomic database of several hundred terabytes in fibre storage. The database has users in forty eight countries, but not New Zealand. While CALIT2's capability is certainly beyond anything New Zealand can strive for in the foreseeable future it does provide a useful "future" data point.

The visit to CALIT2 enabled us to view first hand many of the services that Larry described in his keynote to the KAREN workshop in July. This included high definition video from a submersible exploring the fumaroles on the ocean floor off the California coast and video at four times the resolution of HDTV. We also experience three dimensional video of a trip to the centre of the universe, the simulation of a tornado and the simulation of a Julian set complete with a musical accompaniment. Those presentations used standard polarising glasses. These were trumped by "the cave" which allowed users to walk through a protein. There were other displays from both CALIT2 and the San Diego Supercomputer Centre that covered a range of applications.

Education

National Research and Education Networks support education in the tertiary sector as well as research. The two education sessions that I attended had a common theme of trying to entice more students into science, technology, engineering and mathematics by providing learning environments that were closer to their experience before coming to university: immersive, multiplayer games, social networking and collective learning through sharing and reading each others work.

Bill Mitchell and Terry Stewart of MoreNet described a regional robotics competition. Secondary students are given a parts kit and have to design and build a robot. The actual competition was streamed over the Internet. Children and their parents at home could watch and interact with the robots. A followup study showed that participating schools had higher overall science scores. An

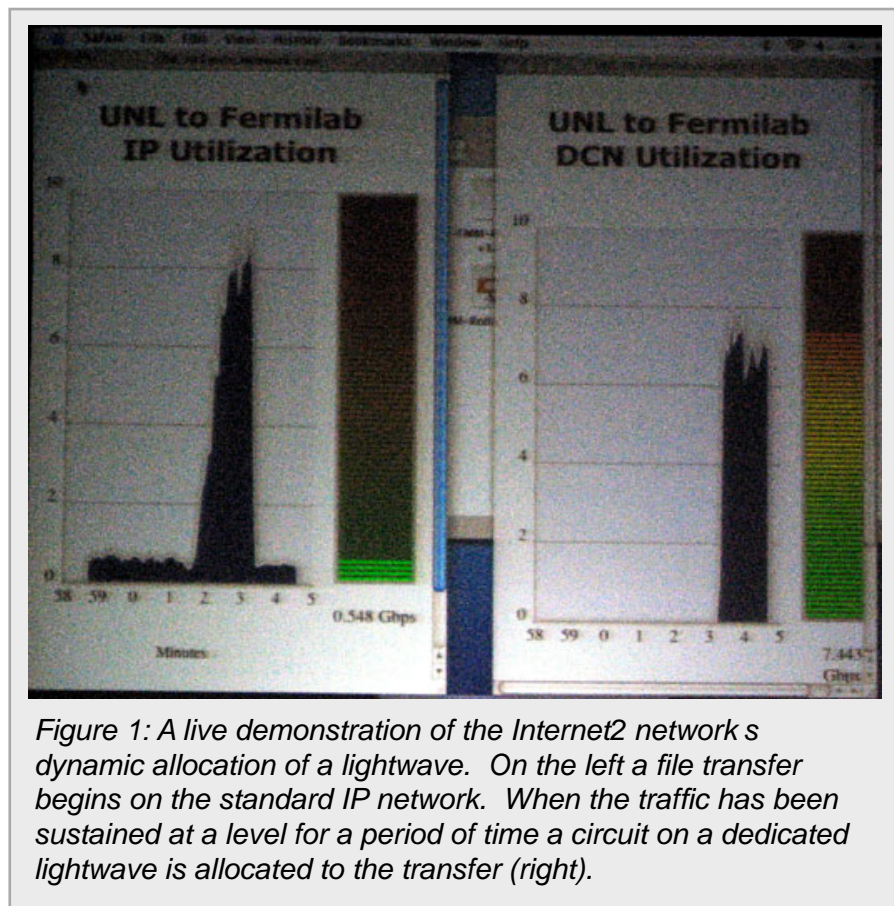


Figure 1: A live demonstration of the Internet2 network's dynamic allocation of a lightwave. On the left a file transfer begins on the standard IP network. When the traffic has been sustained at a level for a period of time a circuit on a dedicated lightwave is allocated to the transfer (right).

emphasis of their presentation is that it is our responsibility to show the public what can be done with an advanced NREN.

Randy Stout from the Kansas City Board of Regents emphasised how much students enjoyed and learned by getting involved and doing things. Simulation environments were a powerful tool for allowing students to do this at home as well as in the school lab.

Karen Elinich presented the Franklin Institute programme. This includes web based resources with substantial video content at <http://www.fi.edu/learn/>. She showed examples built on fifty year old case files and how they can be used in the classroom. Many of their examples contain on line versions of originals such as Hollerith's patent of his punched card machine or Marie Currie's original paper on the extraction of plutonium. The Franklin Institute also sponsors access grid session in which teachers get to spend time with real scientists. They have found that this can greatly increase the teachers confidence in specific areas.

David Stroud explained how NASA was trying to encourage students into science and technology. NASA runs an Explorer School programme, <http://explorerschools.nasa.gov/portal/>, in which targeted schools receive special attention for three years. A programme of greater use in New Zealand may be the visualisaiton made available from NASA's sensor web of twenty seven satellites. As an example see http://www.nasa.gov/mission_pages/hurricanes/multimedia/AtlanticHurricanesWithJeff.html.

Charlie Green, Kathleen Kyzer and Larry Taylor from Information Technology Services at the University of North Carolina - Chapel Hill discussed how UNC was approaching virtual worlds. They emphasised that lecturers needed the tools to reach today's kids. They identified problems also seen in New Zealand - students failing to attend lectures or read tests. They presented a video of the UNC Second Life site which included a presentation space, a meeting place with powerpoint support, learning spaces and display galleries for collections of either student work or artifacts place by the lecturer. They are in the process of build different laboratories.

Their experience with virtual worlds includes the good:

- Virtual worlds augment the classroom adding a new experience. Students really benefit from having a laptop.
- Multimedia can be produced without expensive equipment. For example, Second Life has a video capture feature.
- Virtual worlds provide a collaborative environment for group projects allowing students to work both synchronously and synchronously;

the bad:

- Virtual worlds typically have a steep learning curve for both staff and students. It takes the first week to learn to walk, talk and fly. UNC recommends a two to four hour opening workshop to gain familiarity with Second Life.
- Platforms tend to be relatively unstable, about 90% availability.
- Resource discovery can be difficult. The lecturer must employ descriptive meta data to help students;

and the ugly:

- Student computer problems. Some students personal computers were so unreliable they had to borrow university computers.
- Sexual harassment and "griefing".
- The perception that "this is just a game".

One way forward to set a programme in which students teach staff.

The Way Forward

The Fall Meeting closed with a panel that considered the problems and challenges faced in moving forward. Three presentations focused on applications.

Paul Avery is a high energy physicist from the University of Florida. He presented the well known flood of data that the Large Hadron Colliding Experiment will generate. Still in science, Alan Whitney, the director of MIT's Haystack Observatory, outlined the benefits of global eVLBI and also the demands. The eVLBI "telescope" can not only look deep into space, but can measure the movements of tectonic plates, changes to sea level and movements of earth in space. A typical experiment uses 20 stations each generating 1-4 Gbps and a total of 5-40 TB of data.

Alan presented an interesting benchmark, a 747 vs. an NREN. A fully loaded 747 can carry about 140 petabytes of data. On a 24 hour flight that is about 10 TB/sec at an estimated cost of \$250,000 per flight.

Tom Knab from Case Western Reserve presented the case for the arts and humanities. Tom was the only speaker at the meeting to have won a Grammy. Tom stated that stage one of eResearch had been faster, better and cheaper. Now we were heading into stage two in which we change the way we do research. He presented several examples to demonstrate that the humanities will also require resources. This included the Institute for the Visualization of History (<http://www.vizin.org/>) and HASTAC (<http://www.hastac.org/>).

This session was chaired by Fran Berman, the Director of the UCSD Super Computer Center. Fran pointed to GEON - the GeoSciences Network - and Open Science Grid (<http://www.opensciencegrid.org/>) as examples of where we were going then addressed some of the key issues in the development of eResearch. She indicated that good infrastructure should be non-memorable: predictable, pervasive, cost effective, scalable, interoperable, etc. A burning question is data reliability. We don't really understand what we mean by this much less how we might measure it.

Fran concluded by urging organisations to establish appropriate and measurable five year goals and then a plan for achieving those goals. She indicated that there are difficult questions. How do we evaluate progress? How will we measure our return on investment? And importantly, how do we measure our impact on the community?

Conclusion

This was my third consecutive Internet2 Fall Meeting and fourth of fifth overall. The continuity is beneficial in itself as I am well known to different constituencies of the Internet2 community as well as the organisation itself. There has been a clear trend over the years in which I have been attending these meetings. As Fran Berman stated above good infrastructure should be non-memorable and certainly the infrastructure technology is less and less in evidence and the emphasis is on collaboration and applications. There is now adequate experience with NREN's that users have made their destinations known and the emphasis is on the tools needed to achieve those destinations. The Internet2 meetings remain an inspiration and an opportunity to think about choices in New Zealand's future.