



# Mid-Atlantic Crossroads

Advanced Regional Internetworking for  
Higher Education and Research

Office: 8400 Baltimore Avenue  
Suite 102  
College Park, Maryland 20740  
301.405.6666

February 29, 2008

## Welcome

Welcome to the February 2008 edition of the MAX Newsletter. In these updates we highlight current technical activities and policy initiatives amongst our staff, our participants, the Regional Optical Network and national networking communities. Please let us know your thoughts, and especially your suggestions.

## Executive Director Message

As noted last month, MAX has initiated a process to update our mission statement, values, and benefits as inputs into our strategic planning. We believe our participants can benefit by our providing a flow visualization tool on top of the existing query-based prototype to promote and help integrate flow monitoring across the interface(s) you have with MAX into your daily operations support. These measurement reports will include the throughput rates of your key sustained application flows. Think of this as delving into the details and bringing more information to bear on what is inside those average and peak data flows on your MRTG graphs.

By providing these baseline reports, further best practice steps can be taken to improve the performance capabilities for your flows. However, this can only happen with your active support and involvement. Posting FAQ links and pointers to what cable, equipment, and tuning parameters can help your campus infrastructures is certainly a start. It also means we need to work closely on measuring the parameters important to your key application flows. Saying we're in the business of high performance networking is one thing, doing it well is something quite different. We've also begun discussions with Hank Dardy, Chief Scientist at NRL, on collaborations aimed at benefiting MAX federal agencies and universities

from NRL's high performance networking efforts across BOSSnet. Together we can push the envelope and raise the throughput flow levels of your traffic for the benefit of your education, research, and scientific missions.

Peter O'Neil

## Spring is Aurora Season at NASA GSFC

What are the signs of spring? They are as familiar as a blooming daffodil, a songbird at dawn, a surprising shaft of warmth from the afternoon sun. And, oh yes, don't forget the aurora borealis. Spring is aurora season. NASA has deployed a fleet of five spacecraft named THEMIS (short for "Time History of Events and Macroscale Interactions during Substorms") specially instrumented to study auroras.

[http://www.nasa.gov/centers/goddard/news/topstory/2008/aurora\\_live.html](http://www.nasa.gov/centers/goddard/news/topstory/2008/aurora_live.html)

## NSF, Google, and IBM Partnership

The National Science Foundation's Computer and Information Science and Engineering (CISE) Directorate announced the creation of a strategic relationship with Google Inc. and IBM. The Cluster Exploratory (CluE) relationship will enable the academic research community to conduct experiments and test new theories and ideas using a large-scale, massively distributed computing cluster.



# Mid-Atlantic Crossroads

Advanced Regional Internetworking for  
Higher Education and Research

Office: 8400 Baltimore Avenue  
Suite 102  
College Park, Maryland 20740  
301.405.6666

February 29, 2008

In an open letter to the academic computing research community, Jeannette Wing, the assistant director at NSF for CISE, said that the relationship will give the academic computer science research community access to resources that would be unavailable to it otherwise.

[http://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=111186&org=CISE&from=news](http://www.nsf.gov/news/news_summ.jsp?cntn_id=111186&org=CISE&from=news)

[http://www.google.com/intl/en/press/pressrel/20071008\\_ibm\\_univ.html](http://www.google.com/intl/en/press/pressrel/20071008_ibm_univ.html)

## Social Networking Exploration

A pilot project involving dozens of volunteers in the University of Washington's computer science building provides the next step in social networking, wirelessly monitoring people and things in a closed environment. Beginning in March, volunteer students, engineers and staff will wear electronic tags on their clothing and belongings to sense their location every five seconds throughout much of the six-story building. The information will be saved to a database, published to Web pages and used in various custom tools. The project is one of the largest experiments looking at wireless tags in a social setting.

A central question in this research is in the balance between privacy and utility. Are there user-centered RFID applications that are truly useful? If so, how can they be designed to minimize loss of privacy? Finally, if these applications are indeed useful, does the utility outweigh the potential loss of privacy? We seek to answer these questions through careful, long-term user studies in which participation is optional and participants have control over their data and may opt out at any time.

<http://uwnews.washington.edu/ni/article.asp?articleID=39698>

<http://rfid.cs.washington.edu/>

## ACM Turing Award Announced

ACM, the Association for Computing Machinery, has named Edmund M. Clarke, E. Allen Emerson, and Joseph Sifakis the winners of the 2007 A.M. Turing Award, widely considered the most prestigious award in computing, for their original and continuing research in a quality assurance process known as Model Checking. Their innovations transformed this approach from a theoretical

technique to a highly effective verification technology that enables computer hardware and software engineers to find errors efficiently in complex system designs. This transformation has resulted in increased assurance that the systems perform as intended by the designers. The Turing Award, named for British mathematician Alan M. Turing, carries a \$250,000 prize, with financial support provided by Intel Corporation and Google Inc. Clarke of Carnegie Mellon University, and Emerson of the University of Texas at Austin, working together, and Sifakis, working independently for the Centre National de la Recherche Scientifique at the University of Grenoble in France, developed this fully automated approach that is now the most widely used verification method in the hardware and software industries.

<http://www.acm.org/press-room/news-releases/turing-award-07>

## TACC Supercomputer Dedication

Ranger, the most powerful supercomputing system in the world for open science research, entered full production on Feb. 4. Open science research makes clear accounts of methodology, along with data and results extracted therefrom, freely available. Ranger, which will enable the leading researchers in the country to advance and accelerate computational research in all scientific disciplines, was dedicated by the National Science Foundation (NSF) and the Texas Advanced Computing Center (TACC) on Feb. 22 at the University of Texas at Austin.

[http://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=111179&org=OCI&from=news](http://www.nsf.gov/news/news_summ.jsp?cntn_id=111179&org=OCI&from=news)

<http://www.utexas.edu/features/2008/ranger/>

<http://www.rangersupercomputer.com/>

## Tim Killeen to be NSF Assistant Director for the Geosciences

Dr. Arden L. Bement, Jr., director of the National Science Foundation (NSF), announced the appointment of Timothy Killeen to become NSF Assistant Director for the Geosciences. Killeen, currently director of the National Center for Atmospheric Research (NCAR) and president



# Mid-Atlantic Crossroads

Advanced Regional Internetworking for  
Higher Education and Research

Office: 8400 Baltimore Avenue  
Suite 102  
College Park, Maryland 20740  
301.405.6666

February 29, 2008

of the American Geophysical Union, will assume his new post July 1.

In his new role, Killeen will oversee the Geosciences directorate (GEO), which has a fiscal year 2008 budget of \$752 million and supports research in the atmospheric, earth and ocean sciences, including climate processes and changes, the water cycle, and natural disasters such as earthquakes, tsunamis and severe storms.

[http://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=111199&org=olpa&from=news](http://www.nsf.gov/news/news_summ.jsp?cntn_id=111199&org=olpa&from=news)

## ACM Honors Vern Paxson for Network Measurement Research

The Association for Computing Machinery (ACM) has recognized Vern Paxson, a member of Berkeley Lab's Advanced Computing for Science Department, with the 2007 Grace Murray Hopper Award for his research on how to measure Internet behavior. His innovative techniques are used to assess new communications concepts, improve network performance, and prevent network intrusion. They provide both the research community and Internet operators with the tools to improve the operation of this increasingly diverse, decentralized communications infrastructure. Paxson is also a senior scientist with the International Computer Science Institute (ICSI) Center for Internet Research in Berkeley and an associate professor at UC Berkeley. The award carries a \$35,000 prize, and funding is provided by Google, Inc.

Paxson's research on Internet measurement brought the scientific process to the measurement of the Internet's behavior and the conditions under which it operates, raising the practice of Internet measurement to a higher level.

As a result, the research community is able to evaluate new ideas and technologies and identify problems and priorities that are needed for increased efficiency. In addition, Internet operators are able to alleviate traffic congestion, detect attacks, and improve communications reliability. Read more at:

<http://www.lbl.gov/CS/Archive/news022108.html>.

## ORNL Lustre File System Workshop

The NCCS and Sun Microsystems will host a one-day workshop on April 16, 2008, focused on helping application scientists get the most from the Lustre File System.

The workshop will be presented by Oleg Drokin and Wang Di, two file system engineers who are also Lustre developers with Sun. A morning session will present several case studies describing how application IO performance can be improved including ongoing enhancements to IO middleware libraries like MPI-IO and HDF5. The afternoon will have an open discussion about application IO with Lustre. This will offer users an opportunity to describe their applications to Lustre engineers and methods for improving performance. This also provides a forum for users to engage with Lustre developers to discuss future application IO needs and how Lustre can better address user requirements. For more information, or to register, visit

<http://www.nccs.gov/user-support/training-education/workshops/nccs-users-meeting-and-xt-workshop/#lustre>

## National LambdaRail Expands to Boston

National LambdaRail (NLR) has built a new node in the Boston area. Now research and education institutions in New England have a much shorter path to connect directly to the NLR optical backbone. All NLR services are offered at the node including connections to WaveNet (Layer 1), FrameNet (Layer 2) and PacketNet (Layer 3) services. <http://www.nlr.net/services/map/>

## University of Melbourne Initiates Australia's Ultra-Resolution Global Collaboration Laboratory

A powerful next generation ultra-resolution visualization carried over a broadband network linking the University of Melbourne and the University of California San Diego (UCSD) was recently demonstrated.

In an Australian first, this next generation platform - set to revolutionize the way Australia interacts with the rest of the world - allows real-time, interactive collaboration



# Mid-Atlantic Crossroads

Advanced Regional Internetworking for  
Higher Education and Research

Office: 8400 Baltimore Avenue  
Suite 102  
College Park, Maryland 20740  
301.405.6666

February 29, 2008

across the globe - combining high-definition video and audio with the sharing of ultra-resolution visualizations from a broad range of disciplines.

In the last two months, the University of Melbourne has constructed a massive 96 million pixel "OptIPortal" visualization wall - known affectionately as the 'OziPortal' - constructed from 24 x 30 inch LCD screens. For comparison, a standard PC can show about 1-2 million pixels.

This ultra-resolution OptIPortal visualization wall - the largest in Australia - enabled scientists, industry leaders and politicians in Melbourne to demonstrate cutting-edge medical and environmental research to participants in the AALD's West Coast Leadership Dialogue at the University of California San Diego using a novel interactive high-definition television stream over a 1000 megabit/sec ("gigabit/s") super-broadband optical fibre connection.

Bringing the OptIPortal and gigabit/s super-broadband networking together is the cutting-edge expertise of two of the world's leading telecommunications research units - the University of Melbourne School of Engineering's Centre for Ultra Broadband Information Networks (CUBIN) and the California Institute for Telecommunications and Information Technology (Calit2), a UCSD/University of California Irvine partnership.

The link-up was made possible by use of the high-capacity backbone of AARNet, Australia's academic and research network, with a connection to the US West Coast using SXTransPORT on the Southern Cross Cable Network to the Calit2 network in San Diego via Pacific Wave and CENIC in the U.S.

With nearly 100 million pixels in view, compared to one or two million pixels for a typical PC screen, the Melbourne OziPortal's HIPerSpace tiled display provides amazing ultra-resolution visualisation.

It was built in collaboration with the OptIPortal team, including experts at the UCSD and UCI campuses of Calit2, at the San Diego Supercomputer Center, and at the Electronic Visualization Laboratory at the University of

Illinois at Chicago.

<http://www.arnnet.com.au/index.php/id:66059430>

<http://www.optiputer.net/>

## David Reed Testimony to FCC

David Reed, MIT professor and perhaps best known for his e2e paper with Jerry Saltzer and Dave Clark, gave a very compelling argument in regard to Comcast's efforts to throttle BitTorrent traffic management.

<http://www.reed.com/dpr/docs/Papers/Reed%20FCC%20statement.pdf>

<http://web.mit.edu/Saltzer/www/publications/endtoend/en dtoend.pdf>

## IBM's Internet Crime Report

The

IBM Internet Security Systems X-Force® research and development team discovers, analyzes, monitors and records a wide array of computer security threats and vulnerabilities. This report documents their observations and compares trends noted during 2007 with previous years.

[http://www.iss.net/documents/whitepapers/xforce\\_2007\\_annual\\_report.pdf](http://www.iss.net/documents/whitepapers/xforce_2007_annual_report.pdf)

## Google Paper on Malicious Drive-by URLs

Abstract: As the web continues to play an ever increasing role in information exchange, so too is it becoming the prevailing platform for infecting vulnerable hosts. In this paper, we provide a detailed study of the pervasiveness of so-called drive-by downloads on the Internet. Drive-by downloads are caused by URLs that attempt to exploit their visitors and cause malware to be installed and run automatically. Our analysis of billions of URLs over a 10 month period shows that a non-trivial amount, of over 3 million malicious URLs, initiate drive-by downloads. An even more troubling finding is that approximately 1.3% of the incoming search queries to Google's search engine returned at least one URL labeled as malicious in the results page. We also explore several aspects of the drive-by downloads problem. We study the relationship between the user browsing habits and exposure to malware, the different techniques used to lure the user into the malware distribution networks, and the different properties of these networks.



# Mid-Atlantic Crossroads

Advanced Regional Internetworking for  
Higher Education and Research

Office: 8400 Baltimore Avenue  
Suite 102  
College Park, Maryland 20740  
301.405.6666

February 29, 2008

<http://research.google.com/archive/provos-2008a.pdf>

A related paper on malicious and rogue DNS servers:

[http://www.citi.umich.edu/u/provos/papers/ndss08\\_dns.pdf](http://www.citi.umich.edu/u/provos/papers/ndss08_dns.pdf)

## Election Results

For those of you tired of the commercials and want to know the outcome, you can skip ahead to the results. :-)

[http://videos.theonion.com/onion\\_video/2008/02/26/DIE\\_BOLD\\_ITUNES.mp4](http://videos.theonion.com/onion_video/2008/02/26/DIE_BOLD_ITUNES.mp4)

## What On Earth Is 42?

It's 30 years since Douglas Adams' *The Hitchhiker's Guide to the Galaxy* made its debut on BBC radio, but its most famous mystery is still waiting to be resolved.

The radio series - which subsequently became both best-selling book, television series and film - traces the travels around the galaxy of Arthur Dent, after the earth is destroyed to make way for a "hyperspatial express route".

Possibly the most famous line in the whole book is the "answer to life, the universe, and everything" given by the supercomputer, Deep Thought. "I cannot share it with anyone and the secret must go with me to the grave."

<http://news.bbc.co.uk/1/hi/magazine/7283155.stm>

## Member Spotlight

### Howard Hughes Medical Institute

#### New Genetic Barcoding Technique Identifies Dozens of Targets for Cancer Drugs

Howard Hughes Medical Institute (HHMI) investigators have invented a quick and relatively inexpensive method for identifying genes that are indispensable for the growth and survival of colon and breast cancer cells.

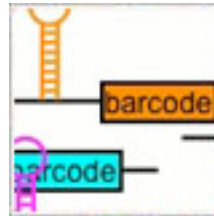
The approach employs a massively parallel cellular system that simultaneously screens thousands of genes. Researchers can use information from the genetic screen to assess the relative impact of each gene on the growth and

survival of tumor cells.

"We're examining as many genes as we can, and eventually every gene in the genome, to figure out which ones are deleterious to tumor cells." Stephen J. Elledge

In two papers published in the February 1, 2008, issue of the journal *Science*, Gregory J. Hannon and Stephen J. Elledge describe their new screening system and identify dozens of potential new gene targets for fighting colon and breast cancer. The researchers hope that their approach will help researchers develop new drugs that selectively kill cancer cells.

HHMI MEDIA



#### Genetic Barcoding Technique

This animation highlights the key steps in the barcoding technique that HHMI researchers Stephen Elledge, Greg Hannon and their colleagues used to discover a number of new drug targets for cancer therapy. [watch movie](#) ▶

Movie: Ji Luo, Elledge Laboratory, HHMI at Harvard Medical School

"We're finding all kinds of potential new targets in our gene lists that are specific for killing cancer cells but don't seem to affect normal cells," says Elledge, an HHMI investigator and the Gregor Mendel Professor of Genetics at Harvard Medical School.

Even better, says Hannon, who is an HHMI investigator at Cold Spring Harbor Laboratory, is that the technique is simple enough that "any investigator can do it without millions of dollars of robotics and other high-tech equipment." The method exploits a powerful cellular mechanism called RNA interference. Discovered just a decade ago, RNA interference likely evolved to help cells fight viruses. The cellular machinery involved in RNA interfer-



# Mid-Atlantic Crossroads

Advanced Regional Internetworking for  
Higher Education and Research

Office: 8400 Baltimore Avenue  
Suite 102  
College Park, Maryland 20740  
301.405.6666

February 29, 2008

ence first identifies short segments of suspicious-looking RNA, and then destroys all identical copies of that RNA. The result: None of the protein that the RNA encodes for gets made.

While RNA interference prevents viruses from replicating inside cells, scientists discovered that they could exploit the process to squelch individual gene products. To do so, they introduce a short segment of RNA that looks like one of the cell's normal genes. The RNA interference machinery grinds into action and shuts down production of the protein made from that gene.

Six years ago, Elledge and Hannon began making a library of RNAs, called short hairpin RNAs, which trigger the RNA interference mechanism. They've now made short hairpin RNAs that can squelch every gene in the human and mouse genomes.

For their new experiments, the pair first identified about 3,000 genes important in cell signaling, growth, and other essential processes. Next, they inserted a gene sequence coding for short hairpin RNAs targeting these genes into retroviruses. Then they infected dishes of normal and tumor cells with the retroviruses, which added instructions to each cell's genome telling it to produce a short hairpin RNA. These short RNAs then triggered the RNA interference mechanism. In effect, each virus halts production of a single protein in a single cell.

In the past, researchers deployed this method to study the effects of turning off one particular gene. But to study the effects of thousands of genes, researchers had to run thousands of separate experiments with thousands of plates of cells.

Instead, Hannon and Elledge developed a "barcoding" method to track a diverse pool of short hairpin RNAs in parallel. In the barcoding method, every short hairpin RNA that is made carries a unique genetic tag. This tag lets the researchers track the effect of thousands of the RNAs in a single pool of cells in a single lab dish. "We

get a mixture of cells where each individual cell has one of these genes knocked down," says Hannon.

If RNA interference knocks down a gene important for cell growth and survival, the cell fails to thrive or dies. At the end of the experiment, the researchers recover only small amounts of the short hairpin RNA associated with that gene. The researchers then know that the gene is a potential Achilles heel for the cell.

In the research reported in the Science papers, the scientists ran many such experiments on normal, breast, and colon cancer cells. The team found dozens of genes that, when eliminated, hinder cancer cells but don't seem to harm normal cells.

"We're examining as many genes as we can, and eventually every gene in the genome, to figure out which ones are deleterious to tumor cells. And when you screen in this unbiased way, you start finding things you couldn't have predicted," says Elledge.

He adds that this kind of functional screen — to see which genes will kill cancer — is complementary to the \$1.5 billion government effort to sequence the genomes of various types of cancer cells.

"If you take all the sequences that will come out of the expensive cancer genome sequencing effort, you're not going to know which ones are important until you do functional analysis," says Elledge. "We're already doing that functional analysis."

Hannon and Elledge are making their library of short hairpin RNAs available to researchers through a collaboration with Open Biosystems, a company based in Huntsville, AL.

"We have a dual goal," says Hannon. "We want to advance our own science, but we want others to use these tools too. The utility of the method is limited only by the creativity of the scientist using it."

<http://www.hhmi.org/news/shrna20080201.html>



# Mid-Atlantic Crossroads

Advanced Regional Internetworking for  
Higher Education and Research

Office: 8400 Baltimore Avenue  
Suite 102  
College Park, Maryland 20740  
301.405.6666

February 29, 2008

## MAX Participants

### Federal Labs and Agencies:

- ATDnet - NRL, LTS, DISA
- D.C. Government
- Energy Sciences Network (ESNet)
- Laboratory for Telecommunications Sciences
- Library of Congress
- NASA / GSFC
- National Archives and Records Administration (NARA)
- National Institutes of Health (NIH)
- National Institute of Standards and Technology
- National Library of Medicine (NLM)
- National Oceanic and Atmospheric Administration (NOAA)
- National Science Foundation (NSF)
- USDA, Beltsville Agricultural Research Center
- U.S. Department of Health and Human Services
- U.S. Department of State (through GWU)
- U.S. Geological Survey
- U.S. Holocaust Memorial Museum

### Higher Education:

- American University
- Baltimore Education & Research Network
- Catholic University
- GEANT
- Georgetown University
- George Mason University
- George Washington University
- Johns Hopkins University

- Johns Hopkins University - Applied Physics Laboratory (JHU-APL)
- Montgomery College
- National Consortium for Supercomputing Applications / ACCESS
- Network Virginia
- Smithsonian Institution
- Southern Universities Research Association (SURA)
- University of California, D.C. campus
- University Consortium for Advanced Internet Development (UCAID / Internet2)
- University of Maryland, College Park
- University of Maryland, Baltimore
- University of Maryland, Baltimore Co.
- Univ. System of Maryland Network
- University of Southern California, Information Sciences Institute / East
- Washington Research Library Consortium

### Corporate and Non-profit:

- Columbia Telecommunications Corporation (CTC)
- Howard Hughes Med. Institute
- Fujitsu Labs of America
- Inter-American Development Bank (IADB)
- Northrop Grumman Corporation
- The Institute for Genomic Research
- Windber Professional Services, Inc.
- World Bank
- The Venter Institute