



# Mid-Atlantic Crossroads

Advanced Regional Internetworking for  
Higher Education and Research

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

December 31, 2007

## Welcome

Welcome to the December 2007 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

During the rush leading up to the holiday break several important tasks were finalized. MAX and UMATS engineering staff worked to complete equipment updates, changes, and new interconnections at the Baltimore PoPs. These efforts now allow BERnet members to establish new dedicated research connections in addition to their shared routed service capabilities. Several equipment moves and new installations were finalized in College Park and McLean PoPs. With the new equipment in place, multiple participant connections, including NGIX and AWAVE, were transitioned to new interfaces as well. Coordination of these cut overs and turning up the MRTG monitoring graphs went well.

A two-day in-depth training on the Fujitsu network management system was held onsite working with the equipment in place to establish detailed element monitoring. These events bring to a close Phase 1 of the MAX network upgrade with documentation updates to be posted on our website in the next couple weeks.

The purchase order for Phase 2 is being developed and will be submitted to the university for

review and approval. This will allow us to replace the original LUXN optical equipment across the fiber ring from College Park and the District of Columbia.

We hope everyone enjoyed time over the holidays with family and friends and look forward to the new year ahead. Best wishes to all, and many thanks for your ongoing collaboration and support.

- Peter O'Neil

## GENI Solicitation Released

The GENI Program Office has announced the release of their first request for proposals. As stated up front,

“This solicitation is not requesting research proposals – rather, it is requesting engineering Development and Prototyping (D&P) proposals to inform GENI’s planning and design. As such, this solicitation is requesting proposals for engineering subcontracts, not for research grants.”

The solicitation and system overview documents are available from:

<http://www.geni.net/GS01/GS01.html>



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## The Green Grid

The Green Grid is a consortium of information technology companies and professionals seeking to improve energy efficiency in data centers around the globe. The Green Grid takes a broad-reaching approach to data center efficiency focusing on data center "power pillars" that span the gamut of technology, infrastructure and processes present in today's data center environments. The consortium's working focus includes research, standards writing, published studies and continuing education.

<http://www.thegreengrid.org/home>

## Memory Access in Computers

Paper Abstract: As CPU cores become both faster and more numerous, the limiting factor for most programs is now, and will be for some time, memory access. Hardware designers have come up with ever more sophisticated memory handling and acceleration techniques—such as CPU caches—but these cannot work optimally without some help from the programmer. Unfortunately, neither the structure nor the cost of using the memory subsystem of a computer or the caches on CPUs is well understood by most programmers. This paper explains the structure of memory subsystems in use on modern commodity hardware, illustrating why CPU caches were developed, how they work, and what programs should do to achieve optimal performance by utilizing them.

<http://people.redhat.com/drepper/cpumemory.pdf>

## Gordon Bell's Law for the birth and death of computer classes: A theory of the computer's evolution

Paper Abstract: Bell's Law explains the history of the computing industry based on the properties of computer classes and their determinants. The paper posits a general theory for the creation, evolution, and death of various priced-based computer classes that have come about through circuit and semiconductor technology evolution from 1951. The exponential transistor density increases forecast by Moore's Law (1965, 1975) being the principle basis for the rise, dominance, and death of computer

classes after the 1971 microprocessor introduction.

Classes evolve along three paths: constant price and increasing performance of an established class; supercomputers – a race to build the largest computer of the day; and novel, lower priced "minimal computers". A class can be subsumed by a more rapidly evolving, powerful, less expensive class given an interface and functionality. In 2010, the powerful microprocessor will be the basis for nearly all classes from personal computers and servers costing a few thousand dollars to scalable servers costing a few hundred million dollars. Coming rapidly are billions of cell phones for personal computing and the tens of billions of wireless sensor nets to unwire and interconnect everything. In 1951, a man could walk inside a computer and by 2010 a computer cluster with millions of processors has expanded to building size. More importantly, computers are beginning to "walk" inside of us.

[http://research.microsoft.com/research/pubs/view.aspx?tr\\_id=1389](http://research.microsoft.com/research/pubs/view.aspx?tr_id=1389)

## Overcoming Bias

The [Future of Humanity Institute](#) at Oxford University supports an effort to help people sort personal beliefs that more closely match the consensus of reality as we know it. Over the last several decades, new research has changed science's picture of how we succeed or fail to seek the truth. The heuristics and biases program, in cognitive psychology, has exposed dozens of major flaws in human reasoning. Microeconomics, through the power of statistics, has shown that many facets of society don't work the way we thought.

Overcoming Bias aims to bring the implications home. We want to avoid, or at least minimize, the startling systematic mistakes that science is discovering. If we know the common patterns of error or self-deception, maybe we can work around them ourselves, or build social structures for smarter groups through the lens of the cognitive sciences: Cognitive psychology, evolutionary psychology, microeconomics, applied statistics, social psychology, probability and decision theory, even a bit of Artificial Intelligence.

<http://www.overcomingbias.com/welcome.html>



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## Google and the Wisdom of Clouds

“As this concept spreads, it promises to expand Google's footprint in industry far beyond search, media, and advertising, leading the giant into scientific research and perhaps into new businesses. In the process Google could become, in a sense, the world's primary computer.

"I had originally thought [Bisciglia] was going to work on education, which was fine," Schmidt says late one recent afternoon at Google headquarters. "Nine months later, he comes out with this new [cloud] strategy, which was completely unexpected." The idea, as it developed, was to deliver to students, researchers, and entrepreneurs the immense power of Google-style computing, either via Google's machines or others offering the same service.

What is Google's cloud? It's a network made of hundreds of thousands, or by some estimates 1 million, cheap servers, each not much more powerful than the PCs we have in our homes."...Unlike many traditional supercomputers, Google's system never ages. When its individual pieces die, usually after about three years, engineers pluck them out and replace them with new, faster boxes. This means the cloud regenerates as it grows, almost like a living thing.

In building this machine, Google, so famous for search, is poised to take on a new role in the computer industry. Not so many years ago scientists and researchers looked to national laboratories for the cutting-edge research on computing. Now, says Daniel Frye, vice-president of open systems development at IBM, "Google is doing the work that 10 years ago would have gone on in a national lab."

[http://www.businessweek.com/print/magazine/content/07\\_52/b4064048925836.htm](http://www.businessweek.com/print/magazine/content/07_52/b4064048925836.htm)

## Impacts of Information and Communication Technologies on the Environment

A new report from ITU-T shows how Information and communications technologies (ICTs) contribute to global warming, but also how they can be used to monitor cli-

mate change, to mitigate its effects, to improve energy efficiency and to reduce carbon emissions in other sectors of the economy. The report -- ICTs and Climate Change -- is the third in the new series of Technology Watch Briefing Reports, launched by ITU-T in October 2007. It was been submitted for further discussion at its 3-7 December meeting. It is planned that an ITU symposium on this topic will be held in 2008.

[http://www.itu.int/ITU-T/newslog/PermaLink\\_guid\\_9ba8a\\_a93-e90d-4e9b-859c-b94b6d57c424.aspx](http://www.itu.int/ITU-T/newslog/PermaLink_guid_9ba8a_a93-e90d-4e9b-859c-b94b6d57c424.aspx)

[http://www.itu.int/dms\\_pub/itu-t/oth/23/01/T2301000003\\_0002PDFE.pdf](http://www.itu.int/dms_pub/itu-t/oth/23/01/T2301000003_0002PDFE.pdf)

## BCnet Adopts Green Broadband Strategy

Our friends and colleagues in British Columbia Canada have adopted a Green Broadband strategy as part and parcel of their disaster recovery and virtualization planning. Not only is this initiative expected to have enormous benefits for the BC university research community, it is also expected to provide significant advantages to BC businesses and government.

As Bill St. Arnaud from CANARIE writes, "BCnet and other optical R&E networks are starting to realize that they can play a critical role in helping mitigate the impact of CO2 emissions from cyber-infrastructure and other carbon intensive facilities on university campuses."

"Many universities are spending millions of dollars on building new facilities to host the demand for new cyber-infrastructure equipment that is essential to the future of scientific discovery. A big part of the cost of such facilities is the new electrical and air conditioning systems required to power and cool these systems respectively, which of course has a large carbon footprint."

"But rather than building carbon intensive data centers on campuses, some leading edge universities are starting to look at relocating these systems to zero carbon data centers which may be at distant sites off campus, or even sharing these facilities through grids across several campuses. Not only does this reduce the carbon impact of



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such systems, it also provides for disaster recovery in the event of major disruptions such as earthquakes, fires, etc.”

“Many university computer clusters are often under utilized. But by sharing these facilities through grids and other means their carbon impact can be significantly reduced. And in some cases universities, Virtual Organizations or R&E networks can earn real dollars through carbon offsets, by sharing these facilities and increasing their overall utilization.”

“Of course, all of this is only possible, if the universities are attached to a high speed optical research network. Relocating or sharing cyber-infrastructure systems off campus only works if researchers and students can still have the same performance and throughput as if these facilities were located next door on campus. This can only be achieved by a high speed optical network.”

“And yet collaboration and sharing of cyber-infrastructure is often a tough sell to many researchers, even though many recognize it is the future of science and research. The inertia in the way they currently carry out their research can be a powerful disincentive to move to the world of cyber-infrastructure. But saving the climate may provide a more compelling moral incentive to these researchers to encourage collaborate and share these cyber-infrastructure facilities in the exciting new world of eScience and eResearch. So universities and research networks like BCnet who implement green broadband strategies can help accelerate their researchers to move to the world of cyber-infrastructure and leading edge science.”

## The Story of Stuff

From its extraction through sale, use and disposal, all the stuff in our lives affects communities at home and abroad, yet most of this is hidden from view. The Story of Stuff is a 20-minute, fast-paced, fact-filled look at the underside of our production and consumption patterns.

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

## Voting Machine Security

The state of Ohio has released a comprehensive study of voting machine security and the report leaves you with the conclusion that paper ballots will be safer for a while longer. The Ohio Secretary of State reveals insufficient security, poor implementation of security technology, lax auditing and shoddy software maintenance.

<http://www.sos.state.oh.us/sos/info/EVEREST/14-AcademicFinalEVERESTReport.pdf>

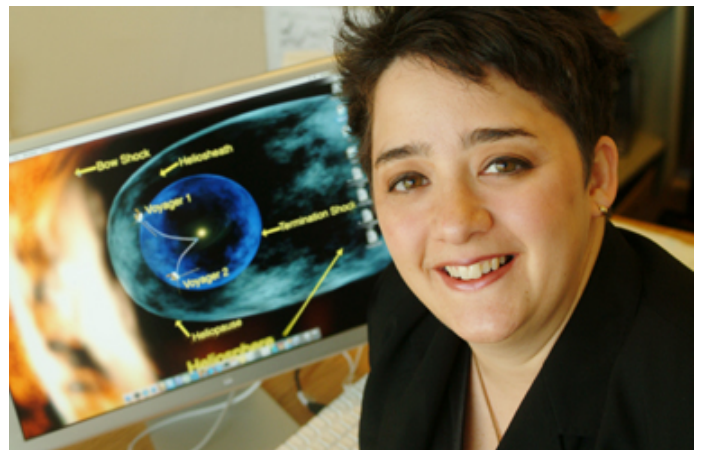
## Member Spotlight

### George Mason University

Professor’s Findings Confirmed: Solar System Is Asymmetric

By [Tara Laskowski](#)

New observations from the Voyager 2 spacecraft, which on August this year crossed the edge of the solar system known as the termination shock, are confirming astronomy professor Merav Opher’s model of a bullet-shaped solar system.



Opher, assistant professor of physics and astronomy, and her colleagues Ed Stone of the California Institute of Technology and Tamas Gombosi from the University of Michigan published a paper in Science magazine earlier



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this year that suggested the direction of the local interstellar magnetic field, located just outside of our solar system.

Their model also strongly suggested that the solar system is asymmetric. While scientists thought the northern and southern hemispheres would be similar, Opher's team has found that the southern hemisphere is more compressed due to the pull of the magnetic field. Even the eastern and western hemispheres don't look the same, giving our solar system more of a bullet shape.

Opher's model was confirmed with data on the location of the termination shock as well as particle energy recently gathered by Voyager 2. Although Voyager 2 was preceded by Voyager 1, which crossed the termination shock in 2004, Voyager 2 had a working instrument that was able to measure plasma flows of the area. This instrument was not working on the Voyager 1 spacecraft.

“We are thrilled that Voyager 2 confirmed our model that the solar system is squashed by the interstellar magnetic field,” says Opher. “And now that we have data from two spacecrafts in this region, more surprises will come.”



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## MAX Participants

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- 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:

- 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