

"This is our Last Spike"

Final Segment Operational as ORION completes network



The Ontario Research and Innovation Optical Network (ORION), one of the world's largest and most advanced Research and Education (R&E) networks, was officially completed just weeks ago when the last of 22 Points of Presence (PoPs) became operational, in Timmins Ontario.

The ORION network equipment, installed at Northern College, was successfully connected the afternoon of March 31, thereby officially completing the network.

Timmins is located 680 km north of Toronto, and is one of ORION's most northern connection points.

"This is our 'Last Spike' and a truly exciting day for us," said ORION President and CEO Phil Baker, whose team led the design and completion of ORION in record time, spanning 4,200 kilometers of high-speed fibre optic infrastructure, connecting 21 cities, from Windsor to Ottawa, and from Toronto to Thunder Bay.

"What has been achieved is truly remarkable," he said, acknowledging the contribution of ORION partners, including the Government of Ontario, CANARIE, Bell Canada, Nortel Networks, Hydro One Telecom, Cisco Systems and other regional telecom providers and partners.

Northern College, which hosts the Timmins

equipment, expects to connect to the network very shortly.

"We are absolutely delighted that this last link has been completed, bringing leading-edge network capability to Northern College. This network has the ability to move massive volumes of voice, data and video images at light speed to any of the other 21 points of presence on the network," said Fred Gibbons, Acting President.

"While serving as a tool primarily for education and research, the potential to assist and promote economic development throughout the Timmins area is very real," he said.

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Ontario and Michigan R&E networks sign agreement



ORION and Merit Network, the Ontario and Michigan Research and Education (R&E) networks, have signed an historic agreement to interconnect across the Canada/U.S. border, collaborate on advanced networking technologies, and facilitate research in the Great Lakes region.

ORION President Phil Baker and Merit President Hunt Williams signed the agreement at the ORION head office in Toronto March 31, 2004, where Merit and ORION held a one-day summit.

"We are looking forward to future collaboration with ORION and with its participating institutions," said Hunt Williams, President of Merit. "This agreement will extend our networks east and west around the Great Lakes and open the door to advanced collaborations in many fields.

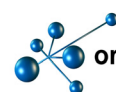
"This agreement is a great beginning," said ORION President Phil Baker. "Interconnecting with Merit will not only join our two networks physically but will also facilitate exciting new collaborations in advanced networking in support of research and education in both Ontario and Michigan." The two networks plan to connect across the Canada/US border at Windsor/Detroit later in 2004, and at Sault Ste. Marie at a later date.

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The ORION Research and Discovery News is a monthly electronic publication providing news and information of interest to users of the Ontario Research and Innovation Optical Network and to the worldwide research and education community.



ORION and partners launch annual Ontario R&E Summit



In what is expected to become the definitive gathering for research and education (R&E) in Ontario, the up-coming Ontario R&E Summit is looking to kick-start a new era of advanced networking and collaboration in the province.

Ontario's research and education community is celebrating -- but also coming to grips with - the completion of ORION the Ontario Research and Innovation Optical Network.

Few jurisdictions can claim to have such an advanced and powerful networking infrastructure, dedicated exclusively to research and education. Networks in the United States, Europe and Asia are now scrambling to catch up to Ontario's lead. But that doesn't mean that ORION is a household name in colleges and universities across Ontario ... at least not yet.

"With the final of 22 Points of presence (PoPs) being turned on in Timmins just a few weeks ago, Ontario's R&E community is only now starting to realize that it has to move quickly to take full advantage of this million network," said Phil Baker, President and CEO.

"We have a connection point in 21 Ontario cities. That makes it much easier for the research and education community to start making serious plans in integrating activities and collaborating over our network," he said.

"That's why ORION was built, so let's get on with it."

Most Ontario colleges, universities, teaching hospitals and several school boards from across Ontario have now or will soon connect to ORION. One of the world's most advanced high speed networking infrastructures, this inaugural Summit represents an opportunity for participants leaders in Ontario's research and education community to meet, discuss, think and plan for the future, using advanced networking infrastructure as a catalyst to innovation. "That's why ORION was built, so let's get on with it," he said.

The two-day conference is exclusively designed for will focus exclusively on collaboration and advanced networking among researchers and educators and, and will encourage the sharing of ideas and strategies to enable Ontario to best benefit from ORION and other advanced networks. The Summit is open to researchers and educators, innovators, scientists, technology specialists, government representatives and policy makers, and private sector R&E partners.

Sessions will include discussions on the direction of research and e-learning in Ontario. An R&E Innovation Showcase session will take a look at some of the most exciting and innovative collaborative research in Ontario today.

One of the most popular sessions is expected to be a Birds of a Feather workshop on "Leveraging the Power of ORION", where representatives from network users will explore how to collaborate and share resources over the network, for such projects as distributed data centres and disaster recovery. Exploring new opportunities to boost "e-science" projects and research is another topic for the conference, while a parallel group is expected to focus on what ORION can represent for the future of digital libraries and resources in Ontario. ORION is also bringing partners who will demonstrate how other jurisdictions are deploying and collaborating over their R&E network resources.

Keynote speakers and special guests will be announced shortly. The two-day Summit will be held on June 14 and 15, 2004, at the Ramada Inn in downtown Toronto. Learn more about the Summit, or register on-line at <http://www.orion.on.ca/events/ontariorandesummit.html>

Final segment ...

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"ORION will transform the way Ontario researchers and organizations collaborate with each other and their colleagues around the world," said University of Windsor President Dr. Ross Paul, Chair of the board of the Optical Regional Advanced Network of Ontario (ORANO), which owns and operates the not-for-profit network.

"The right vision, coupled with a lot of work and strong support ..."

"By bringing us the most advanced optical network infrastructure in Canada, ORION sets the stage for fantastic new developments in research and education throughout the Province.

Our best researchers, teachers and students will now have the high speed and high-powered connections that will allow them to excel in the new digital economy," he said.

"Let me offer you all at ORION who have contributed to this milestone my heartiest congratulations. The right vision, coupled with a lot of work and strong support from the government of Ontario and your partners has led to a world-leading research and education network," said Andrew Bjerring, President of CANARIE, which operates the CA*net 4 national R&E network and funding contributor to the ORION project.

Some 54 institutions and organizations have already signed on to the ORION network, including 19 of Ontario's 20 universities, 19 of 24 colleges, and a number of teaching hospitals, research labs and some school boards.

Many institutions are expected to sign on in the months ahead.

Ontario and Michigan R&E networks sign historic agreement *(continued from previous page)*

The one-day summit included meetings to discuss potential collaborations with leading researchers in particle physics, astrophysics, landscape and urban design, and telecommunications applications at the University of Toronto.

MichNet Director Mary McLaughlin and Backbone Engineering and Technical Support specialist Brian Cashman also met with ORION Project Director Sam Mokbel and his engineering team to plan the Merit-ORION interconnection.

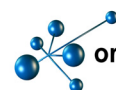
The group also met with GTAnet chair Bob Gagne of York University and Hospital for Sick Kids Technical Director Chip Campbell, and discussed the new GTAnet Toronto-area R&E network and potential collaborations in genomics research.

The Toronto summit follows an earlier visit by ORION officials to Merit's head office in Ann Arbor, Michigan.

Baker expects that the impact of the agreement will position the Ontario and Michigan organizations as key regional partners in reaching across the border to strengthen innovation, new discoveries and mutually beneficial research partnerships.

ORION is also interested in working with the RISQ network in Quebec, and NYSErnet in New York, to establish similar agreements, helping to expand the innovation "ring" around the entire Great Lakes.

Merit Network, Inc. (MERIT), a non-profit corporation governed by Michigan's public universities, owns and operates America's first regional research and education network. It was founded in 1966, Merit supports the high-performance networking needs of Michigan's universities, colleges, K-12 schools, libraries, state government, health care, and other non-profit organizations.



Another Internet speed record ... who cares?



Another Internet speed record was recognized at the latest Internet2 conference in the US last week. But who cares?

A great many people, it turns out, care a great deal about this. For them, this is a deadly serious competition that pushes the envelope of research for the greater benefit of global advancements in science, medicine, industry and manufacturing throughout the world, and many other fields.

The latest advancement involved setting a new Internet2 (R) Land Speed Record by transferring data across nearly 11,000 kilometers at an average rate of 6.25 gigabits per second (Gbps), nearly 10,000 times faster than a typical home broadband connection, from Los Angeles, California to Geneva, Switzerland.

The new mark was announced April 20 in conjunction with the Spring 2004 Internet2 Member Meeting in Arlington, Virginia.

The mark of 68,431 terabit-meters per second, which used the same protocols deployed throughout the global Internet, was set by a team consisting of members from the California Institute of Technology (Caltech) and CERN. The same team previously set a new mark of four Gbps over the same distance using IPv6, the next generation of Internet protocols.

The values and speeds achieved are so large and fast that for many people, these achievements are difficult to fully understand, or appreciate.

One can more easily understand the value of research into faster, more economic passenger jets, for instance. The immediate benefits of data transmission tests at 10,000 times the speed of typical home broadband connections, however, may not be so apparent.

Yet, without this type of research, our top research facilities, colleges, universities, libraries and many school boards would still be functioning in the dark ages, from a connectivity perspective.

Recent studies of network requirements by the U.S. Department of

Energy have shown that high energy physics, astrophysics, fusion energy, climatology, bioinformatics and other fields will require networks in the terabit per second range within the next decade.

"This new multi-stream record is an important step towards next generation Grids where scientists are able to share an ensemble of links based on 10 gigabit per second optical wavelengths efficiently," said Harvey Newman, Professor of Physics at Caltech, US CMS Collaboration Board Chair, and Chair of the Standing Committee on Inter-regional Connectivity of the International Committee on Future Accelerators.

"In order to realize this vision, we are now working on moving these developments into a production setting, and moving on together with our partners to higher speeds and hybrid networks involving both traditional links and dynamically switched optical paths," he said.

Phil Baker, President and CEO of the Ontario Research and Innovation Optical Network (ORION), fresh from the Internet2 Conference, believes that keeping on top of the research underlying such tests is critical to our country's ability to remain innovative, and competitive.

"It's easy to lose sight of the big picture. That's why the challenges involved in setting land-speed records, for instance, are so important. They raise the bar. In the end, we all benefit from the technology solutions and lessons learned," he said.

"The Internet2 Conference provides a great opportunity to meet with colleagues from across the US and around the world, and focus on the transformational changes brought about by the next generation Internet. We at ORION are proud to be part of that and making our own contribution," he said.

You can read more about the recent Internet2 Spring 2004 Internet2 Member Meeting and learn more detail on the Land Speed Record at <http://www.internet2.edu>.



"10,000 times faster than home connection"

T-Space introduces massive digital storage, access and convenience



Build it and they will come. This isn't about some Hollywood fantasy. It's about T-Space: a new state-of-the-art service at the University of Toronto for preserving and distributing digitally formatted research and education

material such as high resolution images, complex data sets, learning modules, documents, audio and video.

T-Space is a practical, efficient, user-oriented service that will revolutionize access to and preservation of research and education materials in Ontario. The space has been built. But will they come?

Building the content of high-tech repositories such as T-Space can be a very slow process. It's usually easier to sell technology if you can show potential users a demonstration project with some content as opposed to a black box, explains Rea Devakos, T-Space service coordinator.

For example, in technical terms, T-Space is certainly very impressive. It uses an IBM P670 server, a SAN main storage running two FASTT 500 storage servers and a backup Tivoly Storage Manager 4.2, tape library with a 100-terabyte (TB) capacity. Combined with the user-friendly, feature filled, almost idiot-proof program interface based on MIT's D-Space open-source technology, UofT has built a very impressive service.

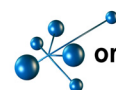
What the technical information doesn't tell the faculty departments and instructors, who Devakos hopes will populate T-Space with their material, is that T-Space provides them with a level of convenience and visibility that they could never achieve on their own, with their own websites.

Where visibility is concerned, for example, T-Space has already attracted the attention of Google. "Our site is Googled weekly and T-Space content has been virtually assured a prominent ranking," Devakos points out enthusiastically, noting that Google normally only crawls sites monthly.

Also, with the university's gigabit connection to ORION through GTAnet, once T-Space becomes linked with other research and education institutions, the data will be far more readily searchable than individual faculty or department websites.

As of the end of March, T-Space was populated by a respectable 1,905 files submitted by eight UofT communities: G7/G8 Research Group, Health Sciences Information Resources (FIS 2135), Institute of Women Studies and Gender Studies (IWSGS), Knowledge Media Design Institute (KMDI), Munk Centre for International Studies (MCIS), OISE/UT, Office of International Surgery (OIS), and the University of Toronto at Scarborough.

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ORION News Briefs

McMaster Reactor celebrates 45 years

McMaster University's Nuclear Reactor marked its 45th anniversary this month, looking back on nearly a half-century of groundbreaking research. The reactor was officially opened on April 4, 1959 by Prime Minister John Diefenbaker, the first university-based research reactor in the British Commonwealth. It's the only Canadian medium flux reactor in a university environment. It is used for neutron beam experiments, isotope production, neutron activation research and neutron radiography research. It is also an educational tool for students in engineering, science and health, and radiation physics. "McMaster is very fortunate to have this facility because we can do so much for people, both here and worldwide," says Mike Butler, manager of reactor operations. "We are conducting research that is helping revolutionize cancer therapies, it is helping date artifacts, and it provides opportunities for academics around the world that they wouldn't otherwise have."

New head of research at UOIT

Kamiel Gabriel, former Associate Dean of Engineering (Graduate Studies, Research & Extension) at the University of Saskatchewan, is now head of research at the University of Ontario Institute of Technology (UOIT). Fresh from a multi-million dollar University of Saskatchewan project in microgravity research, Dr. Gabriel began as the UOIT's Associate Provost, Research and Graduate

Programs on April 1. He will liaise with granting councils, government agencies and industrial partners, assist faculty in attracting research funding, and head the development of graduate programs. He says he is eager to lay the foundations for strategic research initiatives for UOIT. "This university has attracted talented faculty from across Ontario, Canada and the world." Dr. Gabriel has B.Sc. and M.Sc. degrees from the University of Alexandria, a MBA in International Business Studies from the University of Saskatchewan, a PhD in Mechanical and Industrial Engineering from the University of Manitoba, and a diploma in Space Science from the International Space University, Strasbourg, France.

Centres of Excellence now merged

Ontario's four Centres of Excellence officially merged into one entity on April 1, and emerged as the new Ontario Centres of Excellence Inc. - a not-for-profit, member-based corporation. "This is a significant turning point, enabling OCE to leverage the tremendous opportunities available as a united entity and continue to build upon a long-standing, strong Ontario tradition," said Donald Hathaway, President & CEO. "The Ontario Centres of Excellence were founded in 1987, including Communications and Information Technology Ontario (CITO), the Centre for Research in Earth and Space Technology (CRESTech), Materials and Manufacturing Ontario (MMO), and Photonics Research Ontario (PRO). Their purpose is to promote economic development through directed research, commercialization of technology and training

for highly qualified personnel. The Centres are recognized as among the few publicly funded institutions that systematically integrate and manage connections from university to marketplace, to ensure the successful application of innovative science and technology to profitable new businesses.

New Research Chairs include rising stars

Of the \$138.3 million announced for 137 new Canada Research Chairs earlier this month, \$46.6 million was allocated to 10 Ontario institutions, including Tier II chairs awarded to younger researchers. That includes rising stars such as Professor Tom Chau, assistant professor at the University of Toronto Institute of Biomaterials and Biomedical Engineering and a researcher at the Bloorview MacMillan Children's Centre. His funding is for research into "intelligent" tools for the rehabilitation of children with severe and multiple disabilities. This latest round of investments includes \$121.6 million from the CRC Program with an additional \$16.7 million from the Canada Foundation for Innovation (CFI) to provide the infrastructure support for chair-holders to carry out their research. Of the 137 new Chairs, 41 per cent are coming from abroad, either as returning expatriates or as international researchers coming to Canada for the first time. Some 63 universities now host Canada Research Chairs, including 17 in Ontario. To date, total investment to Ontario amounts to \$436.7 million and 454 Chairs, or 61 per cent of the national total. The UofT is the single largest recipient in this round, with 25 projects and just over \$26 million.



T-Space introduces massive digital storage, access and convenience

Continued from page 3 ...

"Right now we're using only about two percent of existing space," says Gabriela Mircea, Project Programmer with the university's Information Technology Services. The storage capacity is now 9 TB and by 2005, the capacity will be 72 TB.

Both Mircea and Devakos are confident that the database will increase once the word gets out about T-Space and its many benefits, such as "tiered-access" which currently enables members to restrict access to the content they put on T-Space. Access can be restricted to users with UofT IPs, but ways of narrowing the level of access to specific IP addresses or through the use of passwords is being investigated.

T-Space, like Google, is a custom portal. Faculty members can embed a search within their web pages, which will allow each document to become searchable. Furthermore, each document will get a persistent URL or identifier that will not change. Anyone who uses the Internet for research knows the inconvenience and frustration that goes with URL's that tend to change all the time.

Because T-Space provides services that make the design, loading and maintenance of content on their site so convenient and easy, faculties don't have to spend their resources trying to design and develop their individual sites. And because T-Space is designed to last as long as UofT has a library system, faculty members have the peace of mind in knowing that their work will also be preserved at least as long as UofT has a library system.

Because Devakos and Mircea are determined to keep the files safe and accessible "500 years from now", there are still some decisions that have to be made about how, in the long term, information is preserved. While html and rtf coding, for example, are believed to be the most durable format because they are open source codes, digital preservation techniques for proprietary software and complex objects are still developing.

"So far, we've received mainly text-based files but we have the storage capacity for much more," says Devakos. "We're getting some videos, and we're working on preparing data sets to be uploaded, but clearly we're expecting the volume and size of files to increase considerably."

ONTARIO RESEARCH AND DISCOVERY NEWS

ORION is owned and operated by the Optical Regional Advanced Network of Ontario (ORANO). You may communicate directly with the Editor of the ORION Newsletter at info@orano.on.ca.

www.orion.on.ca

More information is available at the following three web sites:
<http://TSpace.library.utoronto.ca>, <http://www.dspace.org>, and
<http://libraries.mit.edu/dspace-mit/news/dspace-news.html>

