Eye ON Technology

In This Issue...

The Way of the Future –
Government Clusters

The concept of industry clusters has been around in the private sector for quite some time. The idea has always been that a group of companies working in the same sector can receive tremendous benefits from being located near each other physically. Thus, you can find industry clusters all around the world, from aerospace to biotechnology.

However, government clusters are not quite so common. One of the few examples of government departments forming a significant cluster can be found at the Shirleys Bay campus in Ottawa. Here, an R&D cluster in information and communications technologies (ICT) has been formed at the heart of Silicon Valley North, essentially a government cluster within a larger private sector one.

Canada

Within the Shirleys Bay campus, six different Government of Canada organizations can be found, working together to meet their own specific mandates. By sharing the campus and pooling resources and expertise, they are not only saving taxpayers significant money by reducing overhead costs, but are also able to better collaborate and share information between them, to the benefit of everyone.

As these partners have proven, the cluster concept has tremendous benefits. Down the road, it is possible that even larger clusters could be formed, with government organizations and departments working together in close proximity to deliver the best service possible to Canadians and providing better value for every tax dollar.

Government Organizations at Shirleys Bay:

- Communications Research Centre Canada
- Defence R&D Canada – Ottawa
- Canadian Space Agency
- Canadian Forces Experimentation Centre
- Canadian Forces Electronic Warfare Centre
- Industry Canada's Certification and Engineering Bureau

Saving Lives with Canadian Technologies

In 1982, the rescue of a pilot and two passengers after their plane crashed in British Columbia marked a major milestone in search and rescue. They became the first of over 18,000 people saved thanks to the COSPAS-SARSAT system, a satellite system used to locate emergency beacons anywhere in the world. The Communications Research Centre Canada (CRC) was one of the founding international partners to develop this important technology, starting in the mid 1970's.

Today, CRC is working with its partners to continue to improve the system, making it possible to save even more lives. CRC is acting as the scientific authority for several projects funded by the Canadian Space Agency (CSA) in this area, including a project with Canadian-based EMS SATCOM to develop the next generation ground station for the COSPAS-SARSAT system. These new ground stations will allow the system to access search and rescue payloads on future global navigation satellites, such as GPS, Glonass and Galileo.

Current satellite networks don't provide full global coverage at all times, meaning that there is sometimes a delay of several hours before a satellite is in range to transmit an emergency signal. New innovations using medium earth orbit satellite networks will allow the transmission of the signal to be almost instantaneous. This will, in turn, allow emergency officials to quickly locate the site of the emergency call and save precious time in their rescue efforts.

Along with working on the development of these new technologies, CRC will be participating in international experiments to evaluate and demonstrate the proof of concept for this new satellite technology. CRC will also be setting up tracking antennas that will be connected to the EMS computer equipment to establish Canada's prototype ground station.

For more information about the COSPAS-SARSAT system, visit http://www.cospas-sarsat.org.

Taking HDTV into the Wireless World

HDTV, or High Definition Television, is the big technology in home entertainment today. Television stations are beginning to broadcast in HDTV, and people are beginning to replace their old televisions with new ones capable of receiving HDTV signals. That is opening the door for some very interesting new concepts.

Coming This Fall

CRC's SCARI++ software will soon be available for the Integrity operating system.

SCARII++ is CRC's top-of-the-line development package for Software Defined Radio (SDR), meeting the needs of SDR developers around the world.

For more information, please visit the web site at **http://www.crc.ca/rars** or contact CRC at **info@crc.ca**.

In October 2004 at the IEEE Broadcast Symposium, CRC first demonstrated a new possibility by transmitting HDTV over wireless local networks, also known as WiFi®. By sending HDTV signals between two laptops using a WiFi network, CRC was the first to demonstrate that this concept would be possible. A second demonstration at the National Association of Broadcasters Conference in Las Vegas in April 2005 further demonstrated to the industry the possibilities of this application for HDTV.

The challenge lay in the fact that HDTV, while providing five times the resolution and better image quality than regular television, also requires much greater bandwidth for transmission. CRC was able to show that a WiFi® network connection could carry an HDTV signal to one remote television connected to the network. This would allow a person to roam within a home, or elsewhere within range of the network, continuing to receive their HDTV signal.

Down the road, this breakthrough could allow HDTV reception on portable televisions within a house without the need to run cables everywhere. The technology could also have possible benefits in areas like health and education, where the ability to view high resolution HDTV from elsewhere on the network could translate into new innovations in the way we are treated or the way we learn.

Eye ON Technology

Devices that Sense the World Around Them

Developing enabling technologies that can benefit a broad range of sectors is one of the main benefits of research into communications technologies. One technology that has triggered the interest of researchers around the world, including those at CRC, is sensor networks. Sensor networks use a large number of ultrasmall devices known as sensor nodes, to form a network without the aid of any established infrastructure. In a wireless sensor system, the individual nodes are capable of sensing their environments and either processing the information locally or sending it to one or more collection points through a wireless link.

Through their ability to monitor their surroundings and provide detailed data, sensor networks have tremendous potential to benefit a broad range of sectors. They can be used for many things, including environmental and habitat monitoring, creating industrial efficiencies, traffic control, security and military operations and even improved health care.

However, issues such as external and even internal interference can often cause problems for these networks. Also, because the sensors are normally scattered at random, they must operate in unpredictable conditions. CRC's work on

radio frequency issues related to sensor networks will help make these networks more flexible and resistant to interference. CRC is also looking at how to make the communications functions of these devices as inexpensive and energy efficient as possible, with an ultimate goal of reducing the size and power requirements for these networks. Researchers hope that some day soon, this work to reduce the size of these devices will lead to what is called smart dust. These sensor networks would consist of extremely tiny devices, to support the deployment of a very large number of nodes within a network. The potential benefits of these tiny sensors would be extraordinary.

E-learning in the Key of C

Finding new ways to teach children is always on the minds of teachers. One of CRC's most successful demonstration projects over the past few years has helped teachers with just that challenge: the MusicGrid program. This program brought together students from across the country to learn music and share their experiences using broadband technology.

The success of the program was such that, when the original funding for the program from CANARIE expired in 2004, many of the schools invested their own funds to keep it going on their own, realizing the extraordinary value students were getting through MusicGrid.

Today, CRC continues to support the program and is working on new ways to improve the technology used. Incorporating new High Definition video conferencing will allow better visual quality, allowing teachers to better help students with details such as fingering when playing an instrument. CRC is also working on reducing the time delay in the transmission and processing of the signal by using uncompressed high definition video conferencing, removing up to a full second of delay from the process.
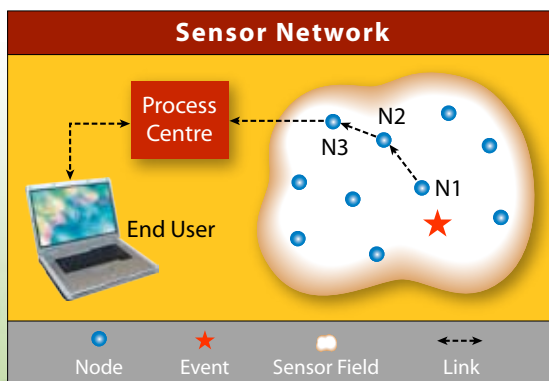
Teachers are still learning how best to teach and engage students in a broadband enabled learning environment. By incorporating these new technologies into the new MusicGrid, researchers hope to be able to determine if improved technology and improved image and sound quality will be reflected in a better learning experience for students.

Furthering Partnerships Between Canada and Europe

Europe represents a tremendous opportunity for partnership and mutual benefit for Canadian organizations conducting research and development activities. In order to take advantage of these opportunities, Canadian organizations, be they universities, government departments or private sector companies, need to know what is available and who to contact.

CRC is Canada's National Contact Point for the European Union's Information Society Technologies (IST) Programme for Research & Development. This R&D program is the primary government funding source for research and development activities in Europe.

Canadian organizations can participate in the IST Programme, but they must partner with European organizations to do so and be able to fund their own activities within the partnership.

In order to facilitate that process, CRC has launched the R&D IST Network. This network is designed to assist Canadian organizations and researchers by helping them keep informed about potential R&D partnership opportunities in the EU. Members of the network receive information about calls for proposals, workshops, summits and other opportunities in Europe. The goal is to support the Canadian R&D community and provide opportunities to expand Canadian participation in the IST Programme.

You can find more information and sign up for the network at www.crc.ca/ist.

New CRC Publications

• CRC Highlights 2004-2005
• Rural and Remote Broadband Access Report 2004-2005

These publications will soon be found on the CRC web site.

CRC's mission is to be the federal government's centre of excellence for communications R&D, ensuring an independent source of advice for public policy purposes. CRC, an agency of Industry Canada, also aims to help identify and close the innovation gaps in Canada's communications sector by:

> engaging in industry partnerships;

> building technical intelligence;

> supporting small and medium-sized high technology enterprises.