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## The Future of SatCom in Canada: R & D Labs

Paul Bush

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## R & D Labs

Recognizing the need to evaluate and test emerging technologies and applications, Telesat has recently made a significant additional investment to its existing R&D lab. The upgraded facility is a 4000 square-foot area dedicated to satellite-based broadband trials and demonstrations. The R&D Lab hosts active computing platforms that are networked over satellite and linked by a common theme of connecting Canada and Canadians. On-going trials are managed from a hub area and a network control centre within the Lab. The lab is designed to provide both a development environment and an educational and demonstration area.

The R&D lab is fully equipped with broadband test equipment for MPEG, IP and ATM and wide-area access to the Internet and to Ca\*Net4 via the Gigapop gateway at CRC. Fibre ring for Gigabit Ethernet is nearing completion that will interconnect high tech companies in Ottawa.

Each month numerous visitors, including senior executives and foreign dignitaries, tour the Telesat's R&D lab to view selected demonstrations. Since its inception, the updated lab has made a significant contribution to changing preconceived notions on the wide-ranging applicability of satellite technology to serve all sectors and all regions of Canada.

Most of the projects supported by the lab are partnerships with industry and research organizations, building a strong foundation for long term cooperation. These include ESA, CSA, Industry Canada, CRC, TETRA and CANARIE. The R&D lab hosts many concurrent applications that are continually updated based on demand and changing priorities.

Current projects include:

### i) Advanced Satcom

The lab is the prime integration area for the first North American multimedia hub based on an MF-TDMA return channel developed by EMS Technologies (Montreal). The 384 kbps to 2 Mbps return channel and 14 Mbps forward link channel, is a standards-based new-generation VSAT, capable of supporting link speeds for broadband applications using lower cost terminals. The star configuration, combined with the on-demand bandwidth management algorithm, supports many simultaneous users for future services.

During the fall of 2002 and until June 2003, the hub will be used in the Schoolnet-3 trial, using Ku-band to provide Internet and high speed communication capabilities to trial participants. In mid 2003 the hub will be transitioned to the experimental Ka-band payload on Nimiq2. Work is currently underway in preparation for upcoming Ka-band testing. New hub transmission facilities are

currently being constructed for testing various suppliers' equipment, looking forward to Anik F2 commercial service solutions.

#### ii) Schoolnet-3



The R&D lab currently supports thirteen schools in the Schoolnet-3 Trial, providing services, technical support and training. The main video server in the lab stores MPEG-1 format videos that can be requested by end users and distributed to the schools after hours.

The lab has two demonstration stations to emulate the school systems. These demonstration systems double as test beds for video conferencing, Internet caching, TCP Protocol Enhancement Proxy (PEP) over satellite, and streaming video distribution.

#### iii) Information Kiosk



A Government of Canada information kiosk is connected over satellite link and provides immediate access to government services information such as the Job Bank and departmental information servers.

The kiosk promotes not only accessibility of information to Canadians wherever they are across the country, but also the integration with satellite technology. The satellite link to the kiosk is shared with other traffic to demonstrate the 'Smart Communities' concept.

#### iv) Telecommuting Trial



Building on the previous concept of Small Office Home Office (SOHO), the lab expanded the concept into a telecommuting trial involving twelve Telesat employees working from home.

The system used TDMA technology providing high-speed satellite links utilizing Ku-band space using a 4-watt SSPA with a 1.2 meter antennas. The 2-way satellite links provide IP telephony, Video Conferencing, VPN access to corporate resources, files sharing, and high speed Internet access. This trial enabled the participants to perform their regular functions from home without the 1-2 hour commute. The successes from this trial, which is currently winding down, will be carried into future projects and services.

#### v) Interactive Home Applications



The popularity of the Internet has spawned interactive applications between computer users. The applications include first person target gaming, multi-user racing, and e-conversations such as chat groups.

Telesat's lab demonstration set-up provides an area for users to compare performance between workstations networked to the Internet via satellite and via terrestrial links and for the developers to optimize applications to the characteristics of satellite networks.

#### vi) HDTV

Live programming from Canadian broadcasters that currently transmit high definition programming on Anik and Nimiq are received on a small dish antenna and projected in the lab in a simulated home cinema. The screen viewing angles and multi-channel sound are designed for typical HDTV home viewing and future digital cinema. The viewing room also provides a basis for investigation of cinema digital delivery networks. In early 2003 the lab will also be providing

testing facilities for CDTV's Picture Quality Assessment Group evaluating picture quality on a variety of monitors using the ATSC standard.

vii) Remote Surveillance

Building on a digital recording system from March Networks, a remote video surveillance system has been implemented in the R&D Lab to demonstrate the types of applications that can be used with satellite networks. Remote management and monitoring of unmanned sites, as part of a satellite based IP network, could provide Government and Enterprise a comprehensive security plan.