

ETC on the  
407 ETR



# Canada commits to ITS

**T**he world's first computer-controlled traffic signal system opened in Toronto in 1959. The world's first all-electronic, open-access toll highway, the 407 ETR (electronic toll route) opened in Greater Toronto in 1999. Other innovations have included ramp metering on the Queen Elizabeth Way (QEW) and the COMPASS freeway traffic management system on the QEW and Highway 401, the main route through Toronto and one of North America's busiest highways.

Transit innovations transit have included automated vehicle location and control (AVLC) experiments in 1976-77, fully automated light rail transit (LRT) operations begun in Vancouver in 1980, and robotic transit vehicle cleaning demonstrated in 1987. The very successful Combo smartcard has been used on the Burlington, Ontario transit system since 1995.

Innovations in commercial vehicle operations include the first demonstration of public weigh station bypass operations in North America, along the West Coast. This cooperative US-Canadian project involved both public agencies and private companies. Canadian firms contributed weigh-in-motion and vehicle-to-roadside communications systems. Private-sector innovations included new sensor types and communications technologies first developed and demonstrated in Canada.

## ▼ TRANSPORTATION CONTEXT

Canada's transportation network serves a vast territory with wide variations in traffic and weather conditions. The national road network connects very diverse urban and rural environments, each with its own distinct needs and problems. Urban road and transit

## CANADA HAS PLAYED A LEAD ROLE IN DEVELOPING PRACTICAL ITS INNOVATIONS WITH WORLDWIDE APPLICATIONS, SAYS WILLIAM JOHNSON. HE EXPLORES THE BACKGROUND TO, AND FUTURE PLANS FOR, ITS IMPLEMENTATION

networks are extensive, but rife with congestion - straining to handle ever-increasing demands due to growth in population, trade and travel.

In rural areas, development density is generally low while distances between settlements are great, making it difficult to provide transit services and encouraging car-reliance. Winter weather can make road conditions treacherous.

Canada relies heavily on trucks to move freight, resulting in high traffic densities on intercity routes. Much of this is linked to cross-border trade flows with just-in-time delivery schedules. Being next door to the US, Canada also has to respond to, and harmonise with, US transportation policies.

Canadians are fortunate in enjoying a world-class transportation system that contributes greatly to their quality of life. However, relentless traffic growth on a fixed transport network is creating problems that are evident in every community, including increased congestion, travel delays, reduced safety and increased pollution.

All these impact negatively on Canada's economic competitiveness. Traditional means

of addressing congestion - building more lanes, roads and bridges - are becoming less feasible as they exact a greater fiscally and environmental price. Hence, many Canadian jurisdictions are now turning to ITS to maximise operating efficiency and minimise negative impacts.

## ▼ COMMON GOALS

Canada's provinces are responsible for road transportation and they, with their constituent municipalities, make investment decisions to expand and improve roads and transit services, including ITS deployments. These last have to compete with more traditional priorities and, with tight budget constraints, deployment has often been limited. Despite this, the province of Ontario has led in ITS innovation and deployment.

Meanwhile the federal government has played a major role in supporting transport innovations that meet national goals. It works mainly through Transport Canada (the federal government department responsible for most transportation policies and programmes), but also through other federal agencies such as Natural Resources Canada (energy efficiency), Environment Canada (weather forecasting and air quality), Industry Canada (spectrum management) and the National Research Council (research and development).

Federal and provincial governments began working together in the 1990s on a comprehensive framework for ITS cooperation. The intent was to facilitate an integrated approach to ITS development and deployment across the country. These efforts culminated Transport Canada's release of 'An ITS Plan for Canada: En Route to Intelligent Mobility' at the Sixth ITS World Congress in Toronto in November 1999. It is built on five



Transit user reloading COMBO card on a Burlington bus



COMPASS advises Toronto's drivers

interconnected pillars:

- Partnerships - essential building blocks;
- An ITS architecture - a solid foundation;
- ITS research and technological development (R&TD) - fostering innovation;
- Deployment and integration across Canada - moving forward; and
- Strengthening Canada's ITS industry - global leadership.

Partnerships were envisaged as the most effective means of developing and implementing the Plan; a Transport Canada-ITS Canada partnership guided development of an ITS architecture. (ITS Canada/STI Canada, itself a partnership of ITS professionals and corporate stakeholders, promotes ITS awareness, facilitates government-industry cooperation and encourages ITS deployment).

Completed in 2001, the ITS Architecture for Canada clearly defines user services and subsystems, and the information and data flows between them. Modelled on the US ITS architecture, it has been used extensively by provinces and cities to develop strategic ITS plans. A living document, it is now planned for updating to incorporate recent innovations and new user services.

Under the Plan the Government announced, in April 2001, CAN \$600 million (US\$470 million of matching funds for a five-year Strategic Highway Infrastructure Programme (SHIP). This includes infrastructure investments, ITS deployment across Canada, improvements to border crossings, ITS R&TD initiatives, and better transportation planning. Now being implemented in partnerships with provinces, municipalities, the private sector and academic institutions, it will contribute to a safer and more efficient highway system for all Canadians.

#### ▼ ACROSS CANADA

ITS deployment is growing rapidly, with almost all provinces and urban areas now developing plans and implementing projects.

Strategic plans are under development in the provinces of British Columbia (BC), Manitoba, Ontario, Quebec, Saskatchewan and the Atlantic provinces; and in Calgary, Edmonton, Greater Toronto, Greater Vancouver, Montreal and Ottawa (transit).

A Canada-wide university research network, led jointly by the University of Toronto ITS Centre and Testbed, and the University of Montreal Centre for Research in Transport, has Europe and US partners. Among many individual urban and rural projects, six selected from the Transport Canada ITS database illustrate the variety of issues addressed.

- CoastView (BC) aims to enhance management of hazardous materials and dangerous goods to improve transport safety.
- Video Traffic Management and Traveller Information (Edmonton, Alberta) deploys CCTV to provide information for traffic and incident management, and traveller information images via TV and a website.
- Traffic Signal Priority for Buses and Automatic Vehicle Tracking System (Calgary, Alberta) focuses on bus priority at traffic signals, and collection and analysis of data for validating and adjusting transit schedules.
- Reduce Single Occupant Vehicle Travel in Region of Waterloo (Regional Municipality of Waterloo, Ontario) is a pioneering public-private partnership aimed at implementing, monitoring and evaluating the effectiveness of employer-based transportation demand management.
- ITS for School Bus Drivers (Quebec and New Brunswick) is using ITS to detect children around school buses and warn drivers.
- The Confederation Bridge (Prince Edward Island-New Brunswick) has introduced ETC transponders identical to those used elsewhere in the Atlantic provinces to facilitate interoperability. (See *ITS International*, July/August 2003).

#### ▼ RWIS

Road weather information system (RWIS) technology is currently proposed for imple-

mentation across Canada. Ontario and other provinces began installing individual sites over 10 years ago, to help road managers make better-informed winter-maintenance decisions. Now, over 150 environmental sensor sites at 40km-50km intervals along major highways measure meteorological and road surface conditions. Collected data is transmitted to central processors for integration with that from other sites, and the results combined with Environment Canada weather data to predict road temperatures and conditions up to 12 hours in advance.

It was recognised in 2000 that spanning the entire country would require cooperation between provinces (and territories), Transport Canada and Environment Canada. An RWIS technical working group, formed to develop proposals for national implementation, has developed basic RWIS standards that apply to Canadian conditions and use open protocols such as the US National Transportation Communications for ITS Protocol (NTCIP).

The Transportation Association of Canada's Chief Engineers Council has approved the proposed standards as the basis for a Canadian RWIS specification. Work is now underway on implementation plans, phased over a number of years, for a large-scale, integrated national network.

#### ▼ HARMONISATION

Under the North American Free Trade Agreement (NAFTA), Canada and the US are committed to harmonise trade-related transport activities across their international border. It also pays Canada to harmonise transportation services (including ITS user services) in general.

The use of ITS for identifying and screening of commercial vehicles at roadside stations is not new. Automated inspection using vehicle identification transponders emerged in the early 1990s, first in the West Coast HELP project (BC to California, US) and later in the mid-west AVION-Advantage I-75 corridor project from Ontario to Florida (US).



Typical RWIS tower

Since 9/11, awareness has grown significantly of the potential of ITS in transportation security at border crossings, airports and ports - all now under increased surveillance. Canada and the US are working together on joint solutions to the heightened concerns arising from new security requirements, based on close cooperation with provincial and state highway agencies. Examples include the following.

■ In July 2002, the Quebec government announced a project to develop trade corridor and border crossings between Quebec and New York State (US) by improving the highway and border infrastructure on the Canadian side, enhancing safety and relieving congestion.

■ The International Mobility Trade Corridor (IMTC) project, a bi-national coalition of border and transportation agencies in the Pacific Northwest, focuses on trade, transportation and tourism concerns at border crossings between BC and Washington State (US). (Through its ITS Corporation subsidiary,

TransLink, the BC regional transport agency, acts as regional and provincial ITS champion in BC and Greater Vancouver).

■ In May 2003, the federal and Ontario governments jointly announced a programme to improve border crossings at the Windsor (Canada)-Detroit (US) gateway. Key initiatives are addressing congestion delays, with infrastructure improvements and ITS deployments.

■ Currently in preparation are improvements at two key border crossings between New Brunswick and Maine (US), both with ITS components. Plans are also being finalised for a new international bridge and border-crossing infrastructure for easier Customs pre-clearance.

Harmonisation also extends to basic traveller information services (TIS). Canada is following the US, which has reserved the three-digit 511 phone number for access to TIS and is successfully deploying it nationwide.

ITS Canada, in partnership with other interested stakeholders, is initiating efforts to reserve 511 for TIS across Canada. The service will be based on Canadian content and consistency guidelines, but will establish a common access mode throughout North America - a boon for long-distance truckers, travellers and tourists.

#### ▼ A BILINGUAL COUNTRY

Canada needs to ensure that all Canadians can access information in the official language of their choice (English or French). The federal government is taking the lead by providing documents, websites and information services in both. Other jurisdictions have their own policies and many provide information in both languages, including TIS via the Internet or phone.

For safety reasons, however, VMS are mostly uni-lingual to keep information presented to drivers to a minimum. In future, on-board systems and language translator

programmes may permit drivers to access all TIS in the language of their choice.

#### ▼ THE FUTURE

The initiative that began with unveiling Canada's comprehensive ITS Plan continues today with SHIP. Federal partnerships with provinces and municipalities will co-fund many infrastructure improvements and ITS deployments. Canada-US partnerships will aim to develop a 'smart border' to improve security while expediting legitimate commerce. University-based partnerships will explore new ITS technologies and applications. Canadian industry will benefit from opportunities in a growing, worldwide market.

The future looks bright, as Canadians continue to build partnerships and take advantage of opportunities to showcase their expertise and products - notably at international events such as the 2010 Winter Olympics in Vancouver.

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[www.its-sti.gc.ca](http://www.its-sti.gc.ca) (Transport Canada)

[www.mto.gov.on.ca](http://www.mto.gov.on.ca) (Ministry of Transportation Ontario)

[www.itscanada.ca](http://www.itscanada.ca) (ITS Canada/STI Canada)

[www.tac-atc.ca](http://www.tac-atc.ca) (Transportation Association of Canada)

Queue warning at the Niagara Falls border crossing



The University of Toronto's ITS Test Bed Laboratory

