

Intelligent Transportation Systems: Integrating the Transportation Technologies of Tomorrow in Your Community

8th Annual Urban Transportation Summit

Urban ITS:

What Is It?

Where Is It?

How Does It Work?

Why Do We Need It?

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Intelligent Transportation Systems Society of Canada
March 2, 2010



What is ITS?

intelligent

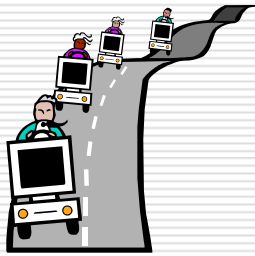
transportation

systems

- Definition
- Description
- Urban Benefits
- Canadian Objectives

What: ITS Canada Definition

- The integrated application of advanced sensor, computer, electronics, and communications technologies and management strategies to increase the safety and efficiency of the transportation system



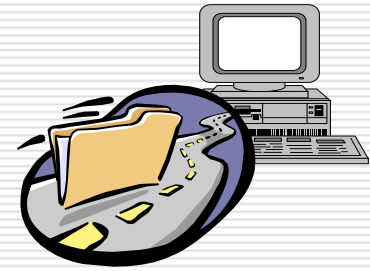
People

+



Goods

+



Information

- Considers interaction and provides an intelligent link between travelers, vehicles, and the infrastructure

ITS is...Simply Put...

- Lives...*
- Time..*
- Money...*
- Energy...and...*
- The Environment...our future*

Where is ITS in Urban Canada?

- Everywhere you look
 - Public transit traffic signal priority
 - Variable message signage
 - Freeway management systems
 - Traffic control centres
 - Sequential traffic signals
 - Automated dispatch and vehicle location
 - Traveller Information Systems

Why ITS?

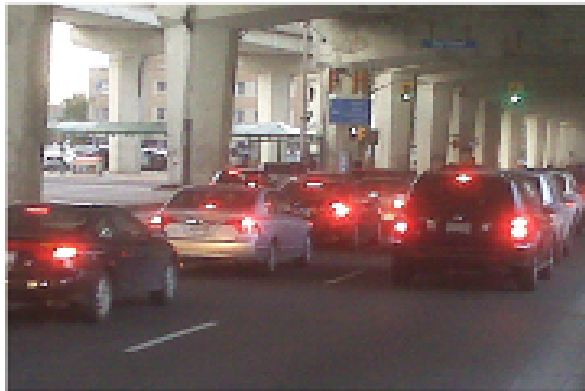
- ❑ Technology explosion
- ❑ Growing transportation demand
- ❑ Constrained budgets
- ❑ Sustainability considerations
- ❑ Data management complexities
- ❑ More efficient use of existing (old) infrastructure

OECD Report (GTA) Just Out....

Traffic gridlock stalling economic activity in the GTA: study

The Canadian Press and 680News staff 2009-11-10 09:25

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TORONTO - A

new international study found that traffic congestion is delaying deliveries, pushing up the cost of food and affecting productivity in the Toronto area.

A report by the Organization for Economic Co-operation and Development (OECD) said traffic congestion in the Toronto area costs the country \$3.3-billion in lost productivity a year.

The OECD said the problems are the result of urban sprawl and decades of underinvestment in public transit by Ottawa.

Transit service in the region has not kept pace with population growth and 70 per cent of commuters depend on vehicles, one of the highest rates in the organization's 30 member countries.

The result is air pollution, some of the longest commutes among OECD countries, and "a direct hit on productivity."

They suggest toll lanes, local fuel and parking taxes, a congestion charge in the city centre and some fees on major routes in the area to cut down on the congestion.

Results...(announced in Toronto November)

- ❑ Commuting time one of OECD's longest
- ❑ High transit usage but highest car use
- ❑ \$3.3 billion economic cost annually
- ❑ 440 premature deaths annually due to traffic pollution (Toronto MoH)
- ❑ Recommends integration and (gulp) congestion charging

Modes Affected

- Ground transportation: automobiles, commercial vehicles and public transit
- Rail
- Marine
- Air



ITS Segments

- Traveller Information
- Traffic Management
- Public Transport
- Electronic Payment
- Commercial Vehicle Operations
- Emergency Management
- Vehicle Safety and Control Systems
- Information Warehousing

NOW



THEN



All interact directly with the urban environment...

1. Traveller Information

- ✓ Route guidance and navigation
 - navigable map databases
 - voice guidance / graphic display
 - 'social networking' channels
 - digital short range communications

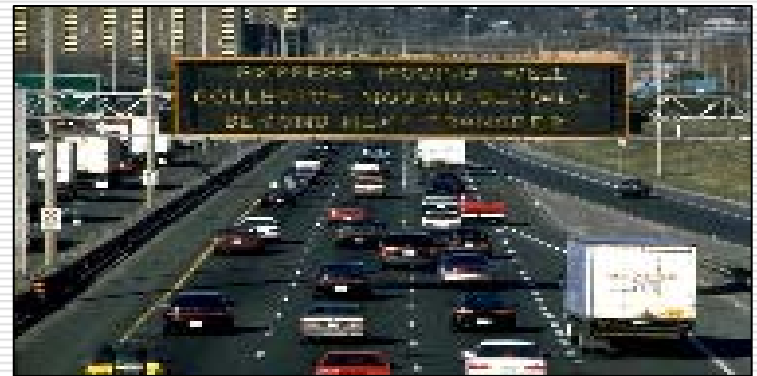


- ✓ Ride matching and reservations
- ✓ Traveller services and safety

2. Traffic Management

Traffic Control – Urban Pioneer Canada

- ❑ 1959 - world's first computerized traffic control
- ❑ 1964 - world's first full-scale digital traffic signals
- ❑ 1997 - world's first all-electronic, open access urban toll highway (ETR 407)



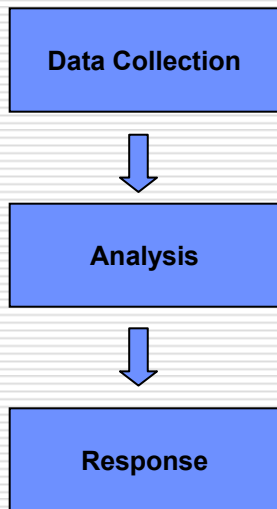
Traffic Signal Example



Example: Retiming of traffic signals

Traditional

ITS



Conduct an 8 hour manual turning movement count

Bring data back to an office for analysis

Go to site to implement changes and observe results

2 Weeks

Collect traffic data using automated systems

Data is communicated in real-time to central control systems

Adjustments implemented in real time

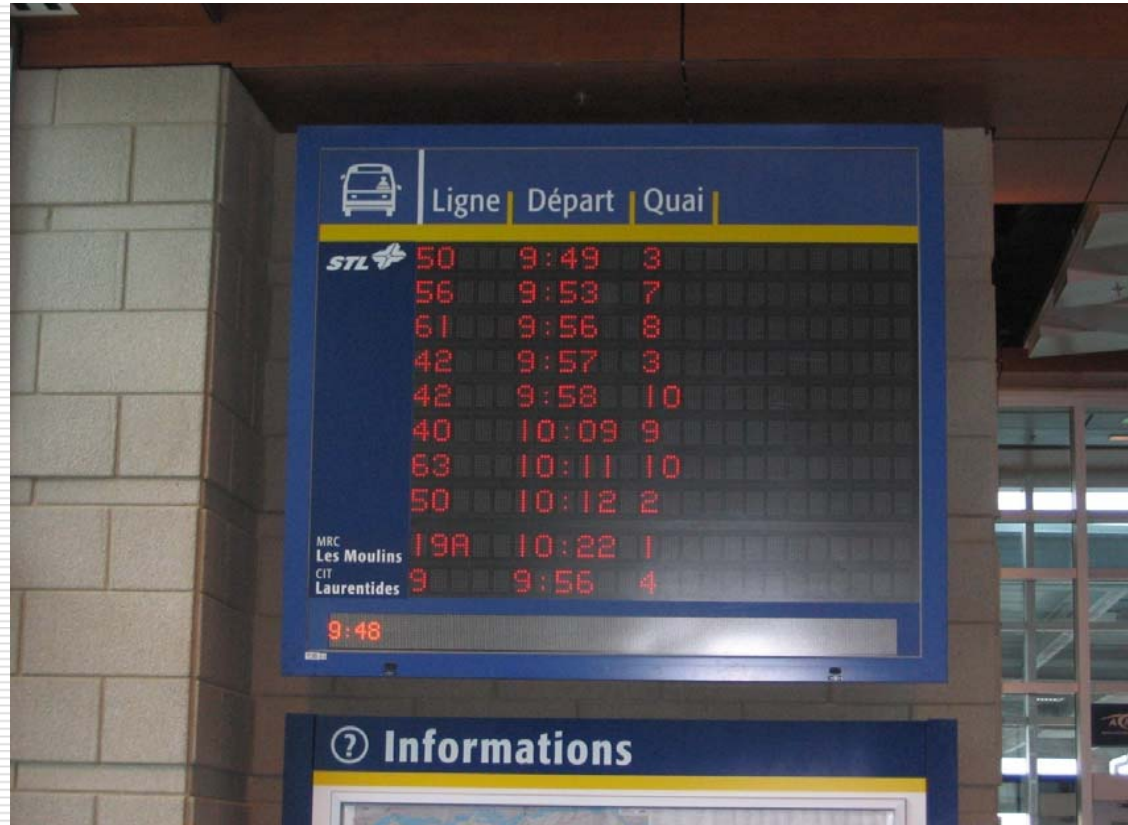
2 Minutes

3. Public Transport

- ❑ Real time, responsive transit information
- ❑ Public travel security and emergency measures
- ❑ Public transport management
 - operate vehicles and facilities, plan and schedule transit services, generate driver schedules, collect fares, maintain vehicles
 - inter-modal co-ordination



...User-Friendly Interfaces



4. Payment Technologies

- ✓ Seamless operation and system interoperability
- ✓ Smart cards
 - transit fare collection
 - calculate tolls on highways and bridges, and manage toll financial process
 - calculate parking charges; manage parking location and payment systems



5. Commercial Vehicle Operations: A Major Urban Variable



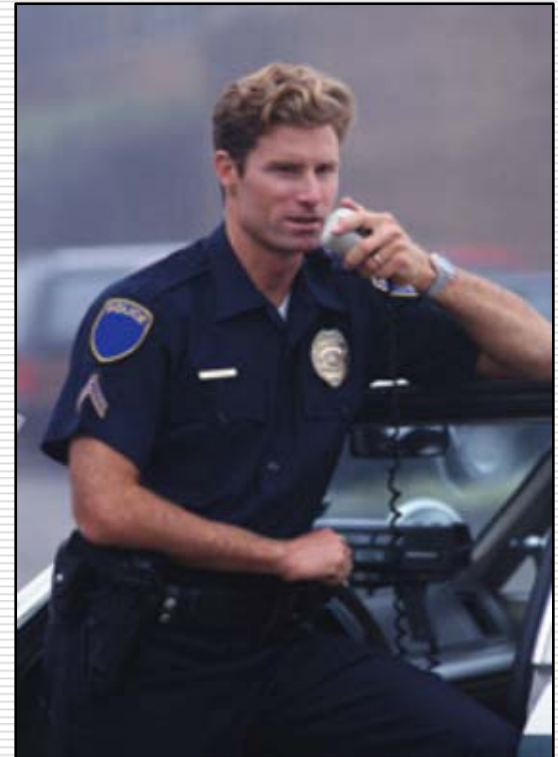
- On-board safety monitoring
- Intermodal management
- Automated roadside inspection
- Hazardous materials/dangerous goods tracking
- Anomaly alerts (driver, route, weather)
- Fleet management

Application



6. Urban Emergency Management

- System components
 - GPS receiver (Cell phone)
 - Dash Pad
- Touching Pad...
 - Alerts central facility
 - GPS-determined location
 - Emergency personnel contacted and dispatched



7. Vehicle Safety and Control

Advanced Driver Assistance Systems (ADAS)

- Road / vehicle / driver interface: precise vehicle position information and motion relative to an accurate digital model of the roadway
- Applications
 - Curve Warning
 - Upcoming Intersections
 - Anomalies



Safety and Security Application



Remote Traffic
Microwave Sensor

8. Information Warehousing

□ Environmental data management

- system-wide integration
- road weather data
- 511 Systems (Canada: 4)



□ Data management

- public sector historically
- private sector emerging

Emerging ATIS / 511 Systems Impacting Urban Transport...

- ❑ 4 in full operation: Yukon, Quebec, Nova Scotia and New Brunswick
- ❑ Alberta and BC close behind with AMA and i-Move
- ❑ Ontario completing business model now



Alberta Example

AMA Camera Reports

**Highway 16: East of Century Road Overpass
Near Spruce Grove**

Friday, September 21, 2007, at 13:10



[Angle 1](#) | [Angle 2](#) | [Angle 3](#)

Air Temperature:	12.5 °C
Pavement Temperature:	18.7 °C
Wind Speed:	14.4 km/h
Wind Direction:	SSW
Relative Humidity:	56 %



[Camera Service Disclaimer](#)

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BC ...

The screenshot displays the iMove Lab website interface. At the top, the logo "iMove Lab" is accompanied by the tagline "Intelligence in motion". Navigation links include "Trip Calculations", "Weather", and "Search". A search bar contains the text "Keeping Greater Vancouver moving". Below this, a navigation bar features tabs for "Motorists", "Transit", "Cycling", "Inter-Regional", "Visitors", and "Commercial". The date "May 29, 2007" is shown. A sidebar on the left lists search options: "Set as default tab", "Search Advisories", "Search Groups of Cameras", "Search Individual Cameras", and "Search Bus Routes". Below this, a vertical menu includes "Map, Cameras, Advisories", "Drive BC Traveller Information", "Highways", "Bridges and Tunnels", "Parking Information", "Park and Ride", "Border Crossings", "Taxis", and "Jack Bell Ride-Share". The main content area features an "Interactive Map" with a version number "3.7" and buttons for "Save", "Reset", "Clear", "Legend", and "Fullscreen Map". A toolbar below the map includes icons for "Events", "Cameras", "Weather", "Roads", "Transit", "Commercial", "Marine", "Air", "Rail", and "Cycling". The map itself shows the Greater Vancouver region with various cities and landmarks labeled, including Sunshine Coast, Bowen Island, West Vancouver, North Vancouver, Vancouver, Burrard Inlet, Port Coquitlam, Coquitlam, Maple Ridge, Burnaby, Surrey, Pitt Meadows, Delta, Langley, Aldergrove, Mission, White Rock, Blaine, Birch Bay, Lynden, and Delta. A scale bar indicates 10 miles and 20 kilometers. The map is powered by Google and uses data from TeleAtlas.

iMove® - Metro Vancouver's integrated, multi-modal web portal for traveller information

iMove Scope

- ❑ Multiple Jurisdictions – serves 21 Metro Vancouver municipalities
- ❑ Multi-Modal (public transit, motorists, air, ferry, bicycling, commercial fleets)
- ❑ Multiple funding partners (federal, provincial, regional, key transportation agencies)
- ❑ Accepts real-time inputs (incidents, congestion, road conditions, weather, schedule delays, cameras, etc.)
- ❑ Web-based data entry by municipalities, project teams, maintenance contractors and agencies
- ❑ Open, standards-based technology platform for future expansion to other Canadian cities.

Funding Partners

**Sponsored by TransLink and the
ITS Corporation of BC**

Funding Partners

TransLink



Transport Canada



Western Economic Diversification



BC Ministry of Transportation



Port Metro Vancouver



Participating Partners

**Greater Vancouver
Municipalities**

Private Sector Providers

Public Safety Agencies

ICBC

UBC



iMove® Operations Concept

Short term

Medium term

Long term

Web Portal



Media

Kiosks

E-mail, PDA's, Phone

511



Dynamic Message Signs

In-vehicle Navigation



iMove Technology Platform - Foundation for the Future

- ❑ Basis for Translink/Vanoc's TravelSmart2010.ca web site – serving millions of Olympic visitors
- ❑ Soon to be incorporated into TransLink's updated corporate site TransLink.ca
- ❑ Under consideration by other major Canadian and US cities
- ❑ Developed in Canada by ITS Canada member firms:
 - RGS Consulting International Inc.
 - Delcan Corporation
 - CGI Canada



Switching Tracks Now...IntelliDrive

- ❑ Previously “VII”. Enable V2V and V2I real-time
- ❑ Imbedding of sensors in both
- ❑ US DOT has 2014 objective to deploy across the USA. Multi-billion \$\$ budgets
- ❑ EU Highly Automated Vehicles for Intelligent Transport (HAVEit) project - \$40 million this year
- ❑ Commercial Applications include:
 - Safety: driver condition, collision avoidance, curve speed warning, driver advisory
 - Travel Information: route selection, travel times, road conditions, collision avoidance, distress
 - Wireless Safety: brakes, lighting, vehicle condition

Bottom Line Benefits

Traffic Management Systems

Significant installed base in North America

- RESCU and COMPASS, Toronto
- Expressway Surveillance and Control, Montreal
- Increases in throughput up to 25%
 - Equivalent to adding 1 lane to 4 lane section
 - Travel time reductions up to 25%
- Regina, Saskatchewan - advanced traffic management systems resulted in:
 - decreased travel time on 8 of 10 routes (12%)
 - fuel consumption and emissions improvements from 23.84% to 41.46%



Benefits.....cont'd

Traffic Management Systems

- Toronto's COMPASS Freeway Traffic Management System
 - Reduced incident duration from occurrence to clearance from 86 to 21 minutes
 - Reduced delays by 5.3 million annual vehicle-hours and annual fuel usage by 11.3 million liters
 - Incident display messages prevented approximately 200 additional accidents annually
 - Annual emission reduction of 3100 tonnes
 - Saves commercial vehicle operators \$55M annually



Benefits...USA Examples

Public Transport

- Kansas City Automated Vehicle Location
 - 12% increase in on-time performance
 - US \$400k annual operating savings

Electronic Payment

- New York City Transit Electronic Fare Payment
 - Annual revenue increased US \$49M in first year

ITS Benefits – Road Example

ITS Investments in smarter roads – **\$100,000 per lane kilometre** – 10% decrease in travel time and delay.



Investments in road infrastructure - **\$1,500,000 per lane kilometre** – from 2 lanes per direction to 3 lanes per direction – 33% decrease in travel time and delay.

A 1% reduction in travel time and delay can be achieved through a **\$45K** per kilometre investment in road construction.

The same percentage reductions can be achieved through ITS at a cost of **\$15K**

Overall Benefits of ITS...

- ❑ Increased safety and personal security
- ❑ Reduced congestion. Sustainability
- ❑ Time savings & operational efficiencies (\$\$)
- ❑ Reduced fuel consumption & emissions (\$\$)
- ❑ Reduced collisions and fatalities (\$\$)
- ❑ Enhanced economic productivity (\$\$)
- ❑ Improved information sharing
- ❑ Enhanced service to the public

ITS: Canadian Vision

- ❑ Improve safety of Canada's ground transportation
- ❑ Increase operational efficiency and effectiveness of ground transportation system
- ❑ Reduce energy and environmental costs associated with ground transportation
- ❑ Enhance productivity and competitiveness
- ❑ Improve the data collection for policy planning, program management and evaluation, traffic operations, enforcement
- ❑ Enhance personal mobility, convenience and security of the ground transportation system
- ❑ Create future opportunities for Canadian companies in the global market place

Specific Canadian Urban Examples

Ottawa: Current Deployment

- ❑ Modern Traffic Operations Centre
- ❑ Over 100 traffic monitoring cameras with full pan/tilt/zoom capabilities at major intersections.
- ❑ Over 1000 signalized intersections operated by state of the art traffic control system with ability to change signal timings in real time during congestion or incidents.
- ❑ Communication link to OC Transpo, STO (Hull, Quebec), MTO, MTQ (Quebec) control centres via phone, dedicated radio channel.
- ❑ Traveller information system by way of VMS, web, radio



Ottawa cont'd

Transit Priority Measures

Exclusive Transitway	32.2 km
CBD Bus Lanes	2.0 km
Woodroffe Bus Lane	2.5 km
Mixed Parkway	3.3 km
Shoulder Lanes	11.5 km
TOTAL	58.7 km



Ottawa cont'd

In Planning

- New Transportation System Management Strategy will include;
 - Improvement in current capabilities to manage the transportation system, including area highways, arterial roads, and public transportation.
 - Expansion of existing ITS capabilities throughout the city to manage traffic congestion due to traffic incidents, work zones, and special events.
 - Provision of traffic and roadway condition information to the public via multiple media platforms (i.e. Website, social networks such as Facebook, Twitter)

..and in Manitoba

- ❑ iBus technology completed at Winnipeg Transit (Transport Canada, Manitoba, Western Economic Diversification)
- ❑ Real-time bus departure information via Internet, Telebus, and electronic signs (iSTOP) being installed at major bus stops
- ❑ GPS embedded in all buses
- ❑ Real-time data transfer for handhelds soon to be completed
- ❑ Includes automated 'next stop' announcements and safety and security audio-video

Here at Home: York Region - Transit

- Real-time bus arrival time VMS at viva stations
- Transit signal priority at signalized intersections
- Web and telephone based traveller information systems
- CCTV monitoring for security



York Region - Traffic

- **Centralized Traffic Control System (CTCS)**
- **CCTV Monitoring at critical intersections**



York Region - Roads

- **Automated Vehicle Location (AVL) on winter maintenance fleet**
- **Road Weather Information Systems (RWIS)**



Toronto...

- ❑ 343 Transit Priority intersections now; 1000 on order
- ❑ ITS employed for Toronto-York-Spadina Subway (construction) traffic management plan
- ❑ Main traffic signal system being replaced with NTCIP-compliant system
- ❑ Smart Work Zone ITS
- ❑ Pedestrian and bicycle detection at major intersections
- ❑ Countdown signals and audible intersections
- ❑ Working closely with York, Metrolinx, 407ETR and others on integration of systems

Some Economic Implications

□ International: Canada-U.S. Border Crossings

- Largest bilateral relationship on the globe
- Customs pre-clearance (RF and Microwave)
- Faster movement in all corridors
 - CalTrans Pilots
 - Asia-Pacific, Continental and Atlantic Gateways
- Security and Safety

□ Domestic

- Productivity (OECD report...)
- Competitiveness
- Infrastructure Deterioration

Future Vision

- ❑ Real time monitoring of people and goods
- ❑ Real time re-routing
- ❑ Vehicle-to-vehicle (V2V) communication
 - DSRC
 - Intellidrive®
- ❑ Vehicle-to-infrastructure (V2I) communication
- ❑ Inter-modal communication and efficiencies (air, sea, land)

Questions?

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INVESTMENT...

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CONFERENCE AND EXHIBITION IN
OTTAWA JUNE 13-16

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