

Global Positioning Technologies

# Geomatics



Natural Resources  
Canada

Ressources naturelles  
Canada

Canada

## What is Geomatics?

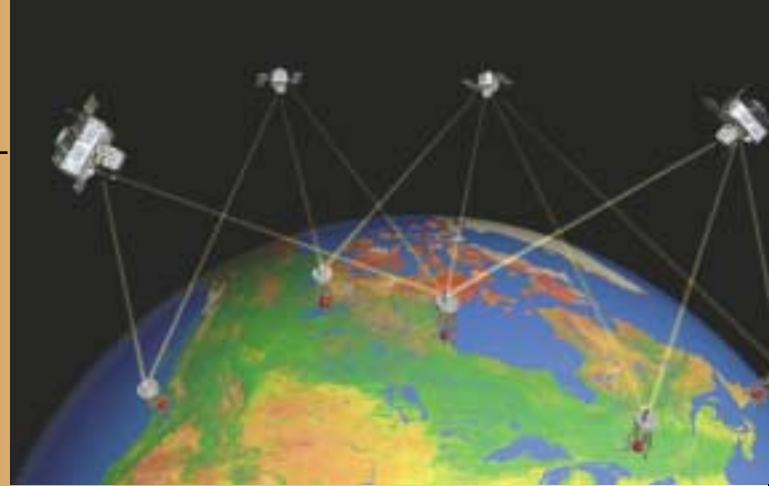
Geomatics is the science and technology of gathering, analyzing, interpreting, distributing and using geographical information. Geomatics encompasses a broad range of technologies that can be brought together on a common spatial reference system to create a detailed but understandable picture of the physical world and our place in it. These technologies include:

- GEOGRAPHIC INFORMATION SYSTEMS;
- GLOBAL POSITIONING;
- REMOTE SENSING;
- DIGITAL MAPPING; and
- CADASTRAL SURVEYING.

## A Vibrant Technology Sector

Canada has earned recognition as a world leader in the field of geomatics — one of the fastest growing technology sectors over the last decade. The Canadian geomatics community provides software, hardware and value-added services to help clients resolve problems and seize opportunities in areas such as:

- the earth sciences;
- infrastructure management;
- the environment;
- land management and reform;
- natural-resource monitoring and development;
- development planning; and
- coastal-zone management and mapping.



## The Canadian Advantage

Canada's knowledge and expertise in geomatics are the result of decades of research and development, and practical application. Through an understanding of our diverse geography, we are managing our resources and the environment for the benefit of present and future generations.

Canadian-developed geomatics products and services are now being used throughout the world. Our clients range from government agencies in industrialized and developing nations, to large and small businesses, and remote communities.

Partnering with the Canadian geomatics community, which welcomes international collaboration through joint ventures or strategic alliances, will give you full and favoured access not only to these products and services, but to some of the world's leading geomatics experts.

*Why not put the  
Canadian advantage to  
work for you?*



# The Global Positioning System



**T**he Global Positioning System (GPS) is a constellation of satellites whose signals to Earth have enabled a revolution in the way we move people, goods and information; build communities; manage the environment; predict the weather and natural disasters; and respond to emergencies.

Originally designed as a military navigation system, GPS has produced explosive growth in a variety of commercial applications, with the Canadian geomatics community at the leading edge in many areas.

## How GPS Works

GPS satellites beam signals to Earth, where they are picked up by receiving devices that range from hand-held units to more sophisticated vehicle-mounted and stationary equipment. The signals are used to determine the receiver's position on the ground — sometimes within a matter of millimetres — at any time. Combined with other geomatics technologies and integrated with the spatial reference system, GPS data can be used in a wide range of applications, including locating and tracking vehicles and other objects, managing infrastructures, time-stamping information and images, and navigating between points on the globe.

The Canadian geomatics community has responded to the phenomenal growth of GPS applications by developing products, services and expertise in a wide range of areas, including:

- infrastructure management;
- environmental applications;
- reference systems;
- agriculture and resources;
- scientific applications; and
- transportation.



Source: Bombardier/Canadaair



## Transportation

GPS technologies are dramatically improving transportation on land, at sea and in the air.

GPS has been called the most significant development in air navigation and control since radar — and with good reason. It has led to improved safety by allowing better management of the air corridors, and it has reduced fuel consumption by helping to establish more efficient routes and schedules. Canadian-manufactured GPS equipment is now widely used in on-board navigation systems, as well as at remote airports to help guide aircraft.

At sea, GPS helps vessels reach their destinations safely and efficiently, and is used by enforcement agencies — including the Canadian Coast Guard — to establish and patrol jurisdictional boundaries and Exclusive Economic Zones.

The largest transportation market for GPS lies in land navigation and vehicle positioning. Using Canadian-developed technology and GPS data, companies are managing vehicle dispatch and monitoring vehicle location, thereby improving their productivity and competitiveness. GPS technology is also being used to dispatch police, ambulances and firefighters in emergency situations, reducing the response time and saving lives. Canadian companies have developed a vehicle-mounted GPS system that records road conditions and roadside features, maps transportation corridors and performs other useful functions.



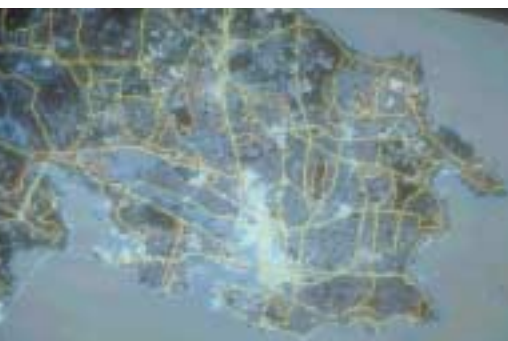


## Infrastructure Management

Modern society is supported by a wide range of infrastructures, including sprawling communications networks, expansive highway systems and complex power-distribution grids. These systems are essential to our daily lives, but they are also expensive and time-consuming to plan, build and maintain.

GPS is dramatically improving the efficiency and reducing the cost of infrastructure development and operation.

GPS equipment and software, produced in Canada, are being used to speed up such everyday tasks as building roads, causeways and other structures, as well as the not-so-ordinary challenges of redefining borders, providing elevations for the world's tallest peaks and navigating to the North Pole.



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## Agriculture and Natural Resources

GPS has many potential agricultural and natural-resource applications — in fact, it is now being used to increase crop yields. In “precision farming,” the combination of a GPS receiver and GIS information stored in a tractor’s on-board computer can map a field and provide information about an area’s fertilizing or harvesting needs. GPS is then used to guide the application of the fertilizer or the path of the harvesting equipment. Canadian companies have developed the technology and are working with other partners to establish a world market.

In the natural-resource sector, Canadian technology is used by forestry companies to record the location of trees within forests and to make decisions on which trees to cultivate.



Source: © Ron Gamett/Birds Eye View



## Environmental Applications

GPS offers tremendous potential to monitor and help alleviate society's impact on the environment.

One of its uses is to support the investigation of hazardous-waste sites, the mapping of ecosystems, the monitoring of oil spills and clean-up efforts, and the tracing and mapping of airborne pollutants. GPS is also providing important information on ice and ocean currents, and is being used to track the movement of wildlife — from individual animals to entire herds.

In the area of weather forecasting, GPS satellite signals can provide precise information about atmospheric pressures, relative humidity, activity in the ionosphere and other factors that affect the weather.

## Scientific Applications

Canada is at the forefront of developing GPS techniques that provide centimetre-level or better accuracies over very long distances. The scientific applications are numerous. For example, Canadian geophysicists are using GPS to determine continental drift, to assist in the prediction of earthquakes and to coordinate timekeeping around the world.

A highly accurate GPS reference system established by geodetic surveyors as part of an integrated global system enables the enhanced positioning accuracy needed for most applications. Canadian geomatics engineers are also recognized as world leaders in helping countries establish their own reference systems which provide the basic infrastructure fundamental to sharing geospatial data and orderly development.



## Why a Canadian Geomatics Solution?

The Canadian geomatics community is a respected and competitive player in international geomatics markets. The more than 1500 Canadian geomatics firms provide nearly \$2 billion worth of geomatics products and services annually, and many firms maintain offices and support capabilities abroad to meet the needs of clients.

At the federal government level, the Geodetic Survey Division of Natural Resources Canada provides leadership in developing global-positioning applications and technologies. In addition, the Geomatics Industry Association of Canada (GIAC) assists its members in developing new business in Canada and around the world through promotional, educational and advocacy activities. The Canadian geomatics community can provide the expertise to respond to international geomatics project opportunities.



### *Canada offers you:*

- ***A PARTNERSHIP APPROACH TO GEOMATICS APPLICATIONS***

The geomatics industry, along with federal and provincial governments and the academic sector, often work in teams to develop technology and expertise and to deliver services.

- ***FLEXIBILITY, RESPONSIVENESS AND CREATIVITY***

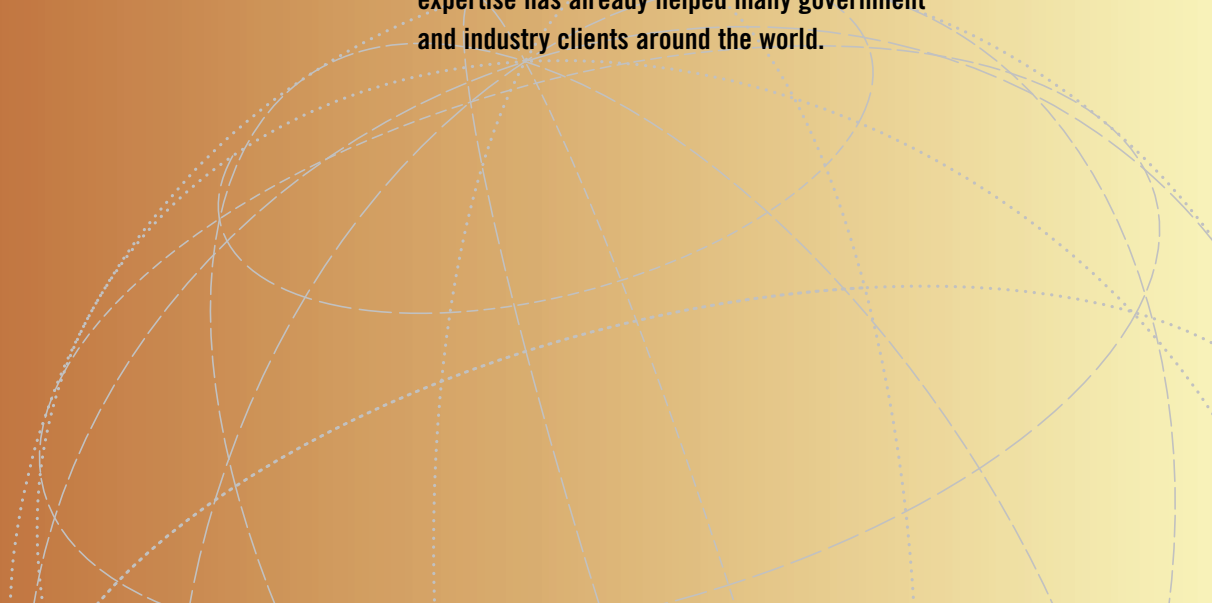
The industry can provide value-added products and services that are tailored to the unique requirements of individual clients. Technology transfer and skill-sharing are important elements of many export arrangements.

- ***A COMMITMENT TO TECHNOLOGICAL INNOVATION***

Working together, government, industry and universities continue to explore and develop new geomatics applications and technologies through cooperative research and development.

- ***A FOCUS ON SOLUTIONS***

Canada can provide multi-disciplinary, integrated solutions to problems related to the natural and the developed environment. Canadian geomatics expertise has already helped many government and industry clients around the world.





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**Cover image:**

GPS satellite (Boeing),  
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