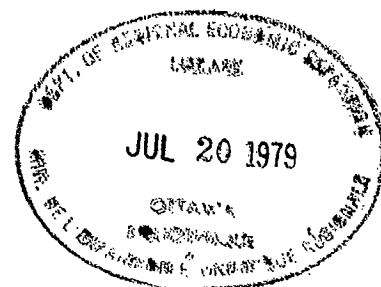


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CANADIAN TELECOMMUNICATIONS
OVERVIEW REPORT



Prepared by
Bureau of Management Consulting
Services for the Department of
Regional Economic Expansion

Contract # 2819
May 1979

OVERVIEW OF TECHNOLOGICAL COMPETITIVENESS - COMMUNICATIONS

	Carrier Services	Data/Control	Video/Audio	Other Electronic
Feasibility/ Requirements	3	3 ⁻	1	3 ⁻
Systems Design	3	3 ⁻	?	2 ⁻
Project Management	3 ⁻	3 ⁻	?	?
Civil Engineering	2	?	?	?
Equipment Engineering	3	?	?	?
Fabrication	3	3 ⁻	2	3 ⁻
Installation	3	3 ⁻	?	?
Operations	3	2	1	2
Systems Management	3	3 ⁻	1	3 ⁻

KEY:

0 No competence	2 International possibility
1 Domestic only	3 Demonstrated international competence
- Indicates gaps	? Not know or not applicable

Headings

Carrier Services - Services provided by telephone or telegraph companies (and supporting services)

Data/Control - Equipment used to transmit data for processing or system control

Video/Audio - Broadcasting, support equipment

Other Electronic - Avionics, sonar, radar (selected electronic equipment)

Summary and Highlights: Communications Industry

- Northern Telecom is one of Canada's largest firms (medium scale in international terms) and has had recent market success in the U.S., especially with its switching equipment. However, it has not had good overseas experience and has concentrated its marketing (with a few possible exceptions) in the North American market. Northern is a multi-national and increasingly the foreign business is being supported by foreign plants, although most of the R and D remains in Canada
- Although the telecommunications subsector is the healthiest one in the electronics sector (imports roughly equal exports so no trade deficit) and the technology is well respected, there are many factors inhibiting international marketing. These are presented in fuller detail in the Annex.
- Many products are too sophisticated for broad application in developing countries (e.g., software-controlled switching equipment, data equipment, fibre optics, mobile radio). There might be a limited market for communication-related equipment to help control modern industrial plants being built by Canadian contractors abroad (pulp mills, mines, etc.)
- Canada has taken recent steps to strengthen the satellite subsector of the industry recently and awarded the prime contract for the Anik-D satellite to Spar. This should boost the international prestige of Spar and help marketing, but the effects will not be felt for a few years and the market is limited. At present, there is a limited market in developing

countries for earth-station equipment and antennas (e.g. Brazil sales, TIW and Spar).

- This industry is characterized by extremely rapid technological change. At the same time telephone and telegraph equipment demands heavy capital investment which must be paid off over several years service. This means that R and D costs are high and the risks are correspondingly great.
- Telecommunications carriers tend to do their own system design and specification which limits the opportunities for consultants to gain experience (and market based on that experience). Bell Canada International has recently started to market its expertise, but if the recent decision of the CRTC to include its profits in the rate base is upheld, it will discourage this type of operation. Generally Canadian prices appear to be quite high.
- Foreign buyers are looking increasingly to turn-key operations. Consortium formation is particularly difficult because of the large number of foreign controlled firms who must refer decisions to head office or the large costs for smaller firms. Elinca has been formed to try to capture some international business but success not yet proven (only major contract as yet is tied aid)
- DOC and CIDA are starting a project to study the communications requirements in less-developed countries, the capability of the infrastructure to support systems (roads, etc.) and possible Canadian assistance roles. This might help identify markets.

- For cable, it is easier to transport the technology than the cable. Thus, for example, Canada Wire and Cable have established licensing agreements for offshore use of its technology to produce cable. In the longer term, cable will be replaced by fibre optics.
- The technology of telephone systems is moving towards the technology of computing systems and software is used (rather than hardware) to control the newer systems. This allows more flexibility for the user, but may be too sophisticated for underdeveloped countries. Software control has the problem that a system fault can easily put the whole telephone exchange out of service (in older systems, only part of the exchange would be out of service)
- In related systems, such as avionics (aviation electronics) and word processing, Canada has some world leaders, but the market potential in underdeveloped countries is limited. CAE of Montreal is one of the best known manufacturers of aircraft simulators, as is AES of Montreal in word processing systems.
- The military market is important in communications, but is difficult to gauge because of the restricted specifications. There have been sales in the U.S. of such equipment (e.g. Canadian Marconi) but we do not know if there are other similar opportunities elsewhere.
- There are a number of small Canadian companies (e.g. Sinclair Radio Labs) capable of very high quality, sophisticated design and manufacturing. However, these products have equally sophisticated uses and are unlikely

to be sold to developing countries who need basic systems.

- There are mixed feelings about the role of CCC. The most useful role would be that of prime contractor, but there are evident difficulties (no assets for financing, government prestige too closely tied to construct). There are some products for the program for export market development (PEMD), but other complaints that the level of support is insufficient.

Annex: Factors Inhibiting Marketing of Telecommunications Equipment

1. Different Standards

One of the chief barriers to the export of telephone equipment (except telephones themselves) outside North America is the different standards in the remainder of the world. In the past, major redesign was necessary to fit Canadian products into service abroad. The cost of these design changes made the Canadian product too expensive in the prospective market (which was relatively small) since the domestic market was too small to support the development costs. This is changing as software becomes the method of control, since software is easier to change than hardware.

2. Different State of Technological Development

The North American market is relatively mature and the principal area for greater profit comes from establishing new products or services and productivity gains from automation. These products and services are not of interest in developing countries where the aim is to get a working system of plain old telephone service. The rate of growth in North America is slow, but it has such a large base that the absolute growth is far greater than that in underdeveloped countries. To operate and maintain the modern sophisticated equipment is beyond the capability of the underdeveloped country.

3. State Control in Developed Countries Outside North America

Given the two factors above, one might suppose that the technological redesign for international markets might be justified for other developed countries (Europe and Japan). However, in all these countries there are state utilities who use strong non-tariff barriers to inhibit the import of telephone equipment. These markets are essentially closed to outside manufacturers. The best way to get into these markets is to establish a branch plant or license the product to a foreign manufacturer. Moreover some foreign governments, notably Japan, heavily subsidize development costs, giving their manufacturers a cost edge.

4. Market Size

Northern Telecom was able to achieve its current position largely on the basis of a relatively captive market, its parent Bell Canada. Other countries have larger domestic markets, so their manufacturers can spread development costs over a broader base and thus reduce the price of their products considerably.

5. Repeat Business

Telephone equipment is installed in the form of a basic unit, with growth handled by adding to the basic unit. Therefore, whoever installs the basic unit gets the extensions, since the equipment is not

interchangeable. Certain foreign manufacturers give a low initial price and then charge a disproportionate amount for extensions (a somewhat unethical but effective practice).

There is a further tendency to install the equipment of a single manufacturer to reduce the costs of holding spares and training for maintenance. Unless the equipment of a manufacturer is extremely poor in performance in durability, there is a tendency to remain with the same manufacturer. In many former colonies, a manufacturer from the former colonial power established a presence in the colony and hence obtained a foothold in the market.

6. Buyer Requirements

Most countries demand a local presence before sales can be made to the state telecommunications utility. Except for Northern Telecom, most Canadian manufacturers are either already subsidiaries (in which case the parent would set up a presence in the new market) or are too small and specialized to take the risk of establishing overseas branches.

CROSS-SECTIONAL ANALYSIS - CARRIER SERVICES

Description:

- This covers all the systems and equipment to support telephone or telex-like services. It includes communications satellites (as they are integrated into the domestic network), mobile radio, and radio telephony as well.

Strengths:

- World-rank manufacturer of equipment (Northern Telecom)
- One of best operating telephone systems in world
- Large investment and demonstrated successes in R & D

Gaps:

- Market highly fragmented for certain types of equipment (many foreign subsidiaries) so not competitive for export
- No telex switching equipment manufacturing

Special Factors:

- Cost of equipment/services appears to be high, perhaps because overly sophisticated for international market
- International specifications may differ so domestic equipment cannot be sold
- Accessible international market small relative to North American growth
- Northern Telecom has essentially turned back on overseas market

Major Firms and Capabilities

Northern Telecom

- head office Montreal
- subsidiary of Bell Canada (high Canadian ownership)
- designs, installs and manufactures (full range of switching and transmission equipment and telephone apparatus; cable, fibre optics)

GTE Automatic Electric

- Brockville
- foreign subsidiary (U.S.)
- designs, installs and manufactures (switching equipment, telephone sets)

ITT Canada

- manufacturing in praries
- foreign subsidiary (U.S.)
- Manufactures (telephone sets)

Canada Wire and Cable (& subsidiary Canstar)

- Toronto
- develops and manufactures (cable, technology, fibre optics)

Mitel

- Ottawa
- Canadian owned
- designs and manufactures (PBX, tone-pulse converters, custom integrated circuits)

Canadian Marconi Company

- Montreal
- foreign subsidiary (U.K.)
- designs and manufactures (military radio-telephone equipment)

Bell Canada International

- Ottawa
- Canadian subsidiary (Bell Canada)
- consulting services (operations, systems design and management)

Intel Consultants

- Ottawa
- Canadian
- consulting (feasibility and systems design)

Hoyles Niblock International

- Vancouver
- Canadian subsidiary (Monenco)
- consulting (systems design, project management and operations)

Cantel

- Vancouver
- Canadian
- consulting (feasibility, design evaluation, project management)

SNC

- Montreal
- Canadian
- consulting (project management, some design capability)

GTE Lenkurt

- Burnaby, B.C.
- foreign subsidiary (U.S.)
- designs and manufactures (transmission equipment)

Elinca

- Ottawa
- consortium
- turn-key supplier (primarily transmission)

Spar Aerospace and Spar Technology

- Toronto and Montreal
- majority Canadian ownership
- designs and manufactures (satellites, microwave systems)

SED Systems

- Saskatoon
- Canadian?
- designs and manufactures (satellite ground stations)

Raytheon Canada

- Waterloo, Ontario
- foreign subsidiary (U.S.)
- manufactures (small ground stations, microwave)

Andrews Antenna Canada

- Whitby
- foreign subsidiary (U.S.)
- manufactures (antennas)

TIW Systems

- Toronto and Trenton
- Canadian subsidiary (Warndk -Hersey)
- designs and manufactures (antennas)

CROSS-SECTIONAL ANALYSIS - DATA

Strengths:

- Limited number of good designs
- Operational experience in data networks

Gaps:

- No large-scale capability

Special Factors:

- Expertise primarily in small companies
- Very limited markets in developing countries

Major Firms and Capabilities

Bell Canada International

- consulting (design and management; data networks)

Gandalf

- Ottawa
- Canadian
- design and manufacture (data modems)

A.E.S. Data

- Montreal
- Canadian
- design and manufacture (word processing equipment)

Leigh Office Products

- Waterloo, Ontario
- Canadian
- manufacture (teletype terminals)

Digital Devices

- Montreal
- Canadian?
- designs and manufactures (portable data terminals)

Volker-Craig

- Waterloo, Ontario
- Canadian
- design and manufacture (teletype compatible video data terminals)

CROSS-SECTIONAL ANALYSIS VIDEO/AUDIO

There are very few manufacturers of this equipment in Canada. In view of the domestic market size, they are unlikely to be competitive internationally. They include:

MacCurdy Radio

- designs and manufactures (audio broadcasting equipment)

Central Dynamics

- designs and manufactures (video equipment)

CROSS-SECTIONAL ANALYSIS - OTHER ELECTRONIC EQUIPMENT

This includes equipment technologically similar to radio or data equipment. There are a few specialized manufacturers with high-quality designs with some international roles. However, there is no broad range capability.

Strengths:

- World leader in aircraft simulators for training

Major Manufacturers and Capabilities

CAE

- Montreal
- Canadian
- designs and manufactures (aircraft simulators; avionics equipment)

Hermes

- Dartmouth
- Canadian?
- designs and manufactures (marine radio, sonobuoys)

Nautical Electronics

- Halifax
- Designs and manufactures (radio beacons, transmitters)

Glenayre

- designs and manufactures (mobile equipment, alarm systems)

List of Contacts - Communications

The following list comprises organizations and people contacted during the overview study of the communications industry. In addition, there are some suggestions made for possible later contact. Where applicable, a brief statement of the quality of the contact is provided.

Northern Telecom Canada, Ltd.

931-5711

5311 Dorchester West
Montreal, Quebec

- Bill Simpson
President, Northern Telecom International
- Charlie Shiu
Marketing, NT

Suggested for more detailed information about NT plans (to supplement information obtained privately from BNR)

- W. F. (Bill) McGee
Manager, Bell Northern Research (NT subsidiary), Ottawa

Personal contact used to gather overview of Northern strengths, thrusts; poor for follow-up because of company confidentiality

Canstar Communications

293-9722

1240 Ellesmere Ave.
Toronto, Ontario

- Aidan Furlong

Interview on visit to Ottawa jointly with John Young of DOC; helpful, thorough overview of major companies

Elinca Communications

233-5671

100 Bronson Ave.
Ottawa, Ontario

- James R. Williams
Vice-President and General Manager

Helpful interview restricted to history, scope of Elinca experience

Intel Consultants

Suite 709, 77 Metcalfe St.
Ottawa, Ontario

- F. Gall
President

Interview not particularly congenial and limited information.

Spar Technology Ltd.

457-2150

Ste. Anne de Belleview, Quebec

- Jim Johnson
Marketing

Suggested as a useful person to describe Spar role (out of town on our visit to Montreal)

Department of Communications

300 Slater Street
Ottawa, Ontario K1A 0C8

- John Young
Industrial Resources Development

996-3058

Helpful (jointly with Aidan Furlong) overview of major firms.

- Don Kettle
Industrial Research Development

996-0727

Suggested contact; apparently just completed a study of communications R & D

Restrictive Trade Practices Commission

359 Kent Street
Ottawa, Ontario

- F. Roseman

Suggest contact with economics expertise; RTPC has been looking at vertical integration in telecommunications industry

Department of Transport

Place de Ville
Ottawa, Ontario
Telecommunications and Electronics Div.

- J. Bradley 992-5016
Superintendent, International Relations

Interview, mainly on perceived problems with government support programs (level, coordination, recognition); little technical content

- Don McNeill 996-3757
Chief, Quality Assurance

Brief interview; specific knowledge concentrated on reliability and contractor performance of limited usefulness for overview.

Other contacts suggested or visited are listed with contacts for electrical power (Petrie at ITC, CCC, EDC, trade associations)

INTERVIEW NOTES - ELINCA

May 17, 1979

Met With

James R. Williams - V.P. and General Manager
Elinca Communications Ltd., Ottawa
233-5671

1. References

- should contact Electronics Division, IT&C who are experts in communications field
- Frank Petrie (Overseas Projects) has the whole profile of the export market
- See Don Kettle, DOC re Communications Industry in Canada; he did a study of companies doing R&D in communications

2. ELINCA

- is a consortium of five companies - four are manufacturers (technical know-how and equipment) and one (SNC) is the management company
- provide the total package in telecommunications field
- PLANTRONICS just joined in January 1979, membership has evolved
- each project usually has a different mix of companies
- have to go outside for construction and civil work; try to use Canadian companies to raise the Canadian content unless costs are prohibitive
- ELINCA is reasonably unique, have been in the business for five years
- took three years to plan the consortium

3. Why ELINCA was Formed

- recognized that telecommunications is big business (estimated at \$22 billion of work available last year, 50% of it in North America)

3. Why ELINCA was Formed (cont'd)

- \$6 billion available in less developed countries, a lot of it in Saudia Arabia
- big jobs are usually available only to 'big' organizations; if you have to bid on piece-meal basis you probably would not get the opportunity to bid
- must be able to bid on total, turn-key jobs
- must be able to assimilate the large risks
- ELINCA looks like, or gives the appearance of a large company
- consortium acts as the prime contractor with the bids passed through 'as-is' with no mark-up
- either pro-rate the risks (if no one company has full responsibility for an aspect) or divide the risks according to responsibility
- if two companies in ELINCA make identical equipment they would both bid on the contract (usually one or the other has the best product and they agree on it)

4. Current Work

- Bidding on:
 - India - Telex Switching Centre - \$7 million
 - Guinea - \$95 million for Microwave, Earth Station and Telephone Switching; ELINCA was invited so not facing competition (bidding on half of the project - \$40 million)
- Working on two contracts now:
 - (Government of Senegal, PANAFTEL)

5. How to Get Business

- going out to find the business by the use of business agents in the Third World
- get business by 'luck'
- ELINCA consortium often results in more work for its companies acting, at a later date, on their own

6. Problems (Third World/Major Project)

- countries cannot always pay (financing is a problem)
- unstable countries mean political upheavals; projects may not be able to complete on time
- delays are common (eg. time to get import permits)
- currency swings (Peru)
- no insurance to cover the risks

7. EDC

- is fine in terms of meeting its mandate which is a laudable one
- is very Canadian conservative
- will only invest in a country which has a good credit rating (in this case the country can usually afford commercial rates)
- EDC usually offers a point or a point and a half above the cost of money (9 - 9.1/4%)
- Commercial Banks offer 13%
- EDC is a good place to go but it does not like to take risks
- can't compete with other foreign governments (eg. France who offered Guinea 100% of the amount at 8 1/4%; ELINCA could only offer 55% of the amount at 9 1/2%!)
- Note that if the government has political interests, EDC may get pushed into cooperating but they will use the Government Account at no risk to them (Section 31 of their Act)
- rate negotiations are between the borrower (foreign government) and EDC
- EDC will not move outside a good business risk
- EDC is good to have but this is not adequate in international financing competition

8. CCC

- was to procure export business on a government to government basis
- tried to expand mandate so could do consortia activities for major capital projects but industry felt that government should not market in the International market place
- government would have to assume 100% liability if CCC was the prime contractor (industries start negotiating at 0% and up); the government's reputation would be at stake; this makes for an unreal position in the market place.
- CCC moved to IT&C now as an arms-length Crown Corporation, like EDC (viewed as outside of government departments)
- CCC now needs financial commitment so it can work with companies like ELINCA; CCC would provide risk-overrun protection - thus paying part of an over-run as well as keeping part of the profits
- concepts are articulated but not in place (needs \$)

9. IT&C Ultimate Risk Insurance

- provides insurance for over-runs due to undefined risks
- not in place as yet
- company must pay a premium and submit to risk analysis studies, but no part of the profit has to be given up

10. PEMD (IT&C)

- good program
- under Section E, ELINCA was the guinea pig for financing the start-up of a consortium
1st 3 years - provides \$50,000/year
- Sections A, B, C, D deal with marketing activities which are not normal to a company or they are for a country not usually dealt with
(1/2 travel costs plus \$85/day)
- marketing activities are supposed to be 50% covered but it is closer to 30% in reality
- can bring agents to Canada
- support for Trade Fairs

11. Problems in Consortia Formations

- no big legal problems unless companies have U.S. parents; European parents prefer to do the marketing from a foreign base
- no indigenous problems
- for small companies, the fixed consortium marketing budget may be a lot of money (proportionately) (eg. \$150,000/year)
- only make money about once every 9 months
- PEMD program applies to this consortium fee, reducing the total marketing fee
- lots of ad-hoc consortia but buyer looks down his nose on these as he wants continuity and a continuing entity

12. PANAFTEL

- bid as a turn-key job but ELINCA only got 70%
- working on for 1 1/2 years
- 3 Telephone Switching Centres went to a French company (CIDA decision); switches used are obsolete
- did building design but did not erect
- CIDA is not comfortable with total turn-key operations
- starting to build; equipment is on the site now

13. Government of Senegal Contract

- building tall tower (200 metres)

INTERVIEW NOTES - telephone 16/5/79

Dave McGuinness
Assistant General Manager, Engineering Services
Northern Canada Power Commission (NCPC)

Re: "Modular Concept" Remote Diesel Generator Design

- NCPC has designed a self-contained module consisting of diesel motor, generator, switch gear and control, and building that can be assembled in the south and transported to a northern site in one piece.
- serves two purposes:
 - the unit is air transportable by Hercules aircraft and can be flown in for emergency replacement or permanent installation where sea shipment is unreliable or not available
 - the unit needs no special on-site foundations, infrastructure, etc., except fuel supply and electrical distribution
- these specially designed units operate in adverse weather conditions with minimum operator requirement, with special 3-point mounting to allow for structure shifts without causing misalignment problems and the unit has self-contained retractable wheels for local transportability with limited equipment from airstrip or beach to power site
- NCPC has its sixth unit going in soon
- maximum power unit is 750 KW
- NCPC does design, then goes to tender separately for motor (Cummins or Caterpillar), generator (Brown Boveri), control and switching (local Edmonton), building (Avco, Brytex) and overall assembly (local Edmonton)
- they have briefed DND (including slides) on this unit and are willing to brief any government agency interested
- they have also designed a similar unit using gas turbine engine but found no one well qualified in Canada to supply unit - they contracted with U.S supplier for 30% savings

INTEL INTERVIEW NOTES

May 17, 1979

Met With

Mr. Gall - Manager of INTEL Consultants Limited, 77 Metcalfe St.
(Suite 709)
- 236-2311

1. INTEL

- 12 people in company - 6 to 7 Professional Engineers, a mathematician and a physicist
- member of The Consulting Engineers of Ontario
- offer consulting services in telecommunications area
- do design, supervise the building of the telecommunication system
- part of Acres previously

2. Major Projects

- microwave link which was part of Pan African Tel. (PANAFTEL) Network, crossing 5 African countries
- INTEL were the architects of the system - they did the 'whole ball of wax'.
- decided where located, what was to be used, height
- determined size and specs for the 3 International Telephone Exchanges
- assisted the government in going to tender
- have done similar types of jobs in South America and the Middle East

3. Future Projects

- hope to work on the conversion of a national telephone system to a private company, like Bell
- telephone companies do similar work to INTEL in Canada (ie. they are competitors)

4. Trade Commissioner Services (IT&C)

- provide 'fair' help in assisting in trade between Canada and the foreign country
- will set up meetings, arrange for proper contacts, provide knowledge of the government structure and its regulations
- used to be superb 10 years ago but are not so effective today

5. EDC

- has positive things to say about them
- lively, competent bankers
- act with good speed - speed is vital, need decisions to be made fast
- can negotiate a rate but only to a degree
- Canada needs to fight and 'wheel and deal' if it is to win contracts - EDC tends to cling to International rules for doing business

6. CCC

- potentially could be very important, has enormous potential
- have dealt with CCC but never 'sailed through' with a project
- INTEL being a small company does not view CCC as a competitor (others may do so)
- CCC should act as the project leader and prime contractors; they should then do the sub-contracting
- they should learn of telecommunications projects and then put together a package
- original mandate was to be the prime contractors on a government to government basis
- CCC capability linked to the quality of the person assigned - hard to keep a good person on one job if the contract gets delayed for a few months
- tend to react more to foreign governments who are coming in to buy rather than assisting Canadian exporters

7. International Competition

- try to avoid international competition because they invariably lose (prices too high); horrendous mark-up makes our prices too high
- need more flexible financing and better interest rates
- should be able to blend soft (CIDA) and hard (prime lenders) money to result in a more marketable rate; can't blend CIDA and EDC money - they have to be shown separately!
- German, British and Japanese have no such inhibitions re blended money
- Canadians always have to follow the rules!

8. Consortias

- illusory, difficult to put together
- seem simple but ...
- severe difficulties in Canada in ratifying a consortium because the big companies are usually subsidiaries of U.S.A. in communications area - except for Northern Telecom; problems blending policies and legal rights - always have to check with the head office
- INTEL has been a member of a consortium

9. Suggested Role for CCC

- if CCC were to function according to its Act:
 - project would be given to CCC
 - CCC would sub-contract to supplier companies who would be happy to sell to a Canadian client and would be more willing to give the best possible price (they will get paid quickly)
 - CCC would wield more of a threat than INTEL re payment of bills
 - CCC would knit together the necessary companies
 - CCC's main focus would be to contract with the foreign country, maybe also act as the project manager

10. Problems in Foreign Market

- never know if they will get paid (INTEL is missing \$10,000 from a small job in Bogota, Columbia)
- after a contract is signed, there are often special regulations re when payment can be made
- costs about \$80,000 per year to keep an INTEL employee overseas - can't afford full-time agents

11. Export Business

- over a long period, 50% of INTEL business is export
- if can do a project in a country it often leads to a future contract
- get work by 'word of mouth'
- use agents to speak for them (a locally accredited rep) - this is the only possible way of marketing for a small company

12. Canadian International Reps

- Canadian reps on agencies such as

World Bank

International American Development Bank

International Telecommunication Union (Geneva)

are acting more as international civil servants rather than agents of Canada.