Status of ICT in Canada

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SYTACom

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McGill

Outline:

- ICT in the Canadian Economy
- Broadband in Canada
- Highlights of Canadian Telecom Development
- Poles of Relevant Canadian Research Excellence

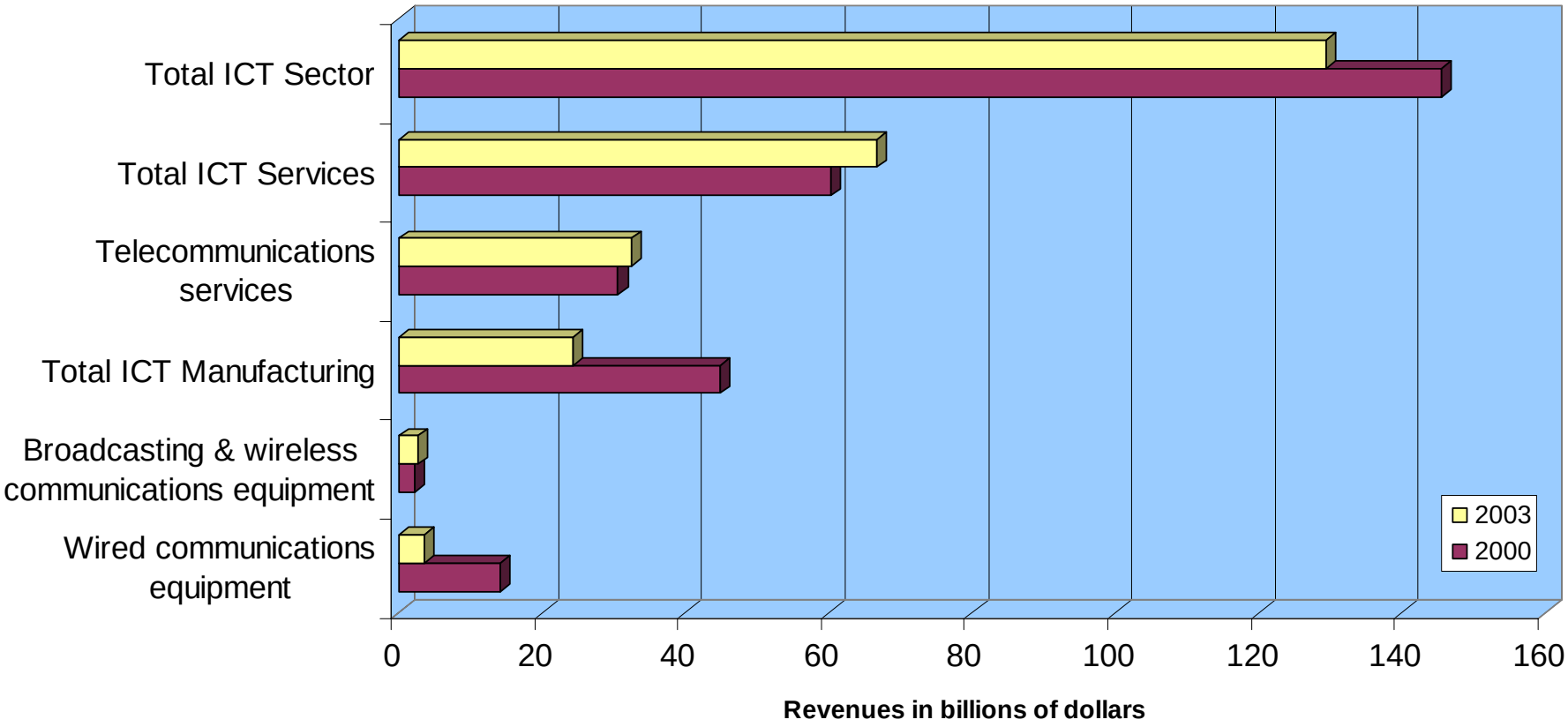
ICT Contribution to the Canadian Economy

	1997	2003
ICT contribution to Canadian GDP	$32.7B	$54.8B
Percentage of Canadian output	4.0	5.4
ICT employment	443,710	542,403
Percentage of Canadian employment	3.2	3.4

- **In 2003**
  - **Average Annual Earnings - ICT** **$52,600**
  - **Canadian Average Annual Earnings** **$35,862**

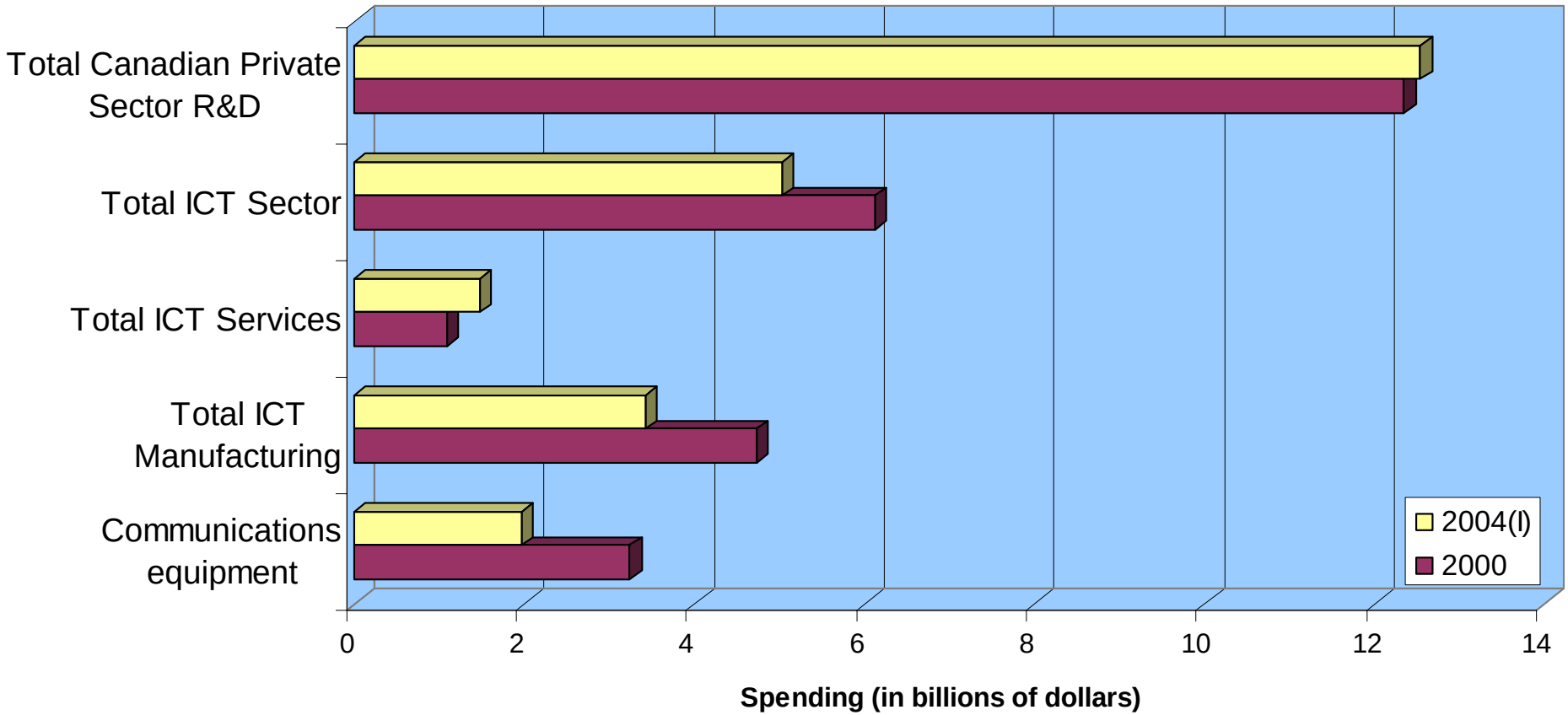
Source: Industry Canada, Statistics Canada

ICT Contribution to the Canadian Economy (2)



Source: Industry Canada, ICT Statistical Overview

ICT R&D Spending in Canada



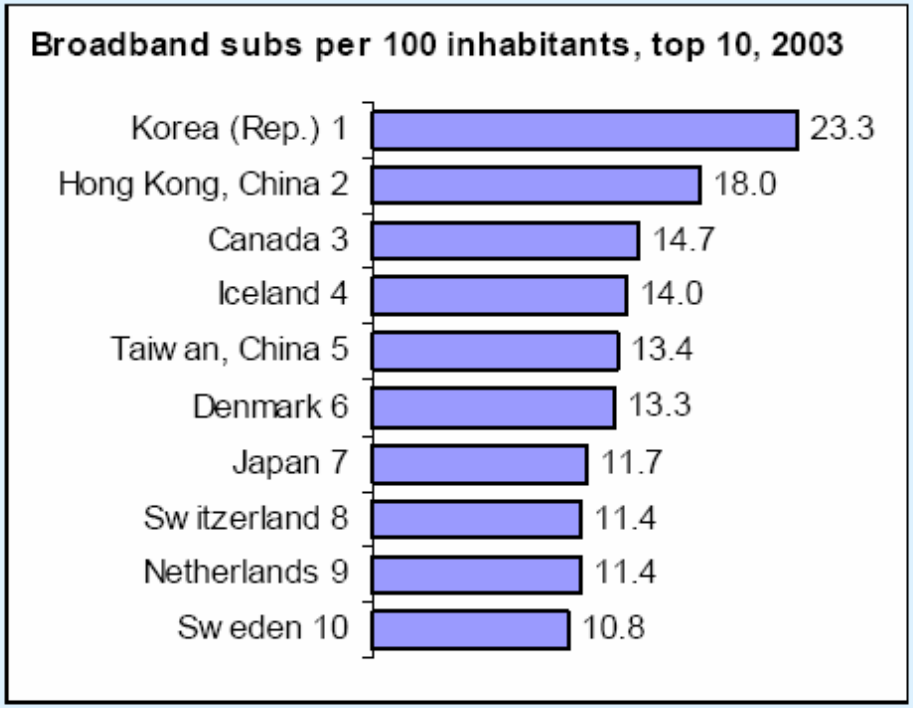
Source: Statistics Canada 2003 survey, updated Nov 2004

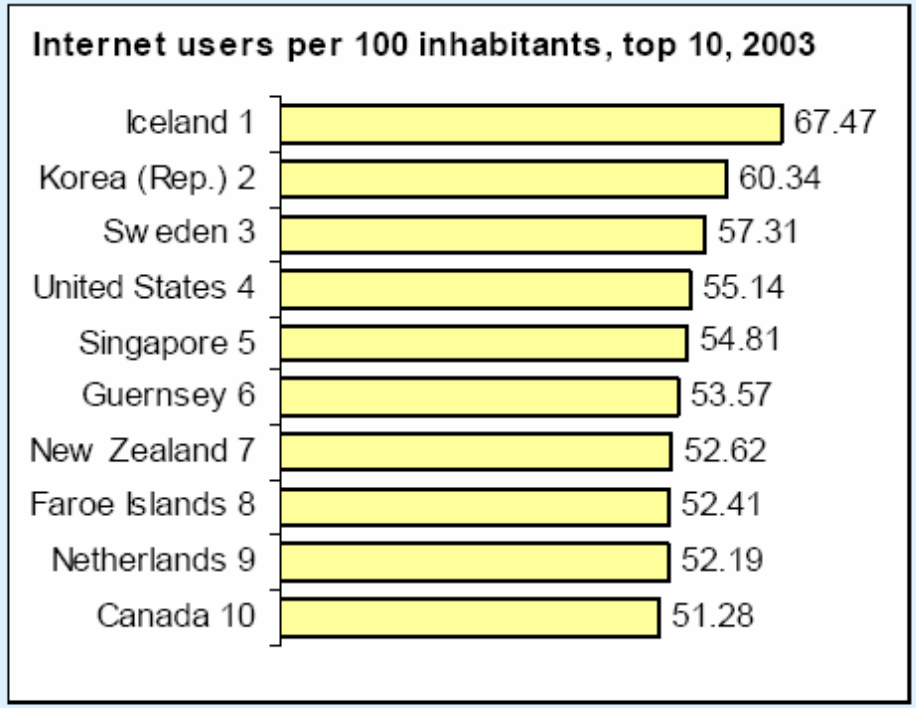
Leading Canadian Telecom Corporate R&D Spenders

	Rank in Cdn Top 100	FY 2003 Expenditures
Nortel Networks	1	$2,788,985,000
Bell Canada	2	$1,000,000,000
Ericsson Canada	7	$232,000,000
Research in Motion	25	$91,030,000
Telus	41	$47,500,000
BCE Emergis	42	$46,200,000
Motorola Canada	46	$45,000,000

Source: RESEARCH Infosource, "Canada's Top 100 Corporate R&D Spenders"

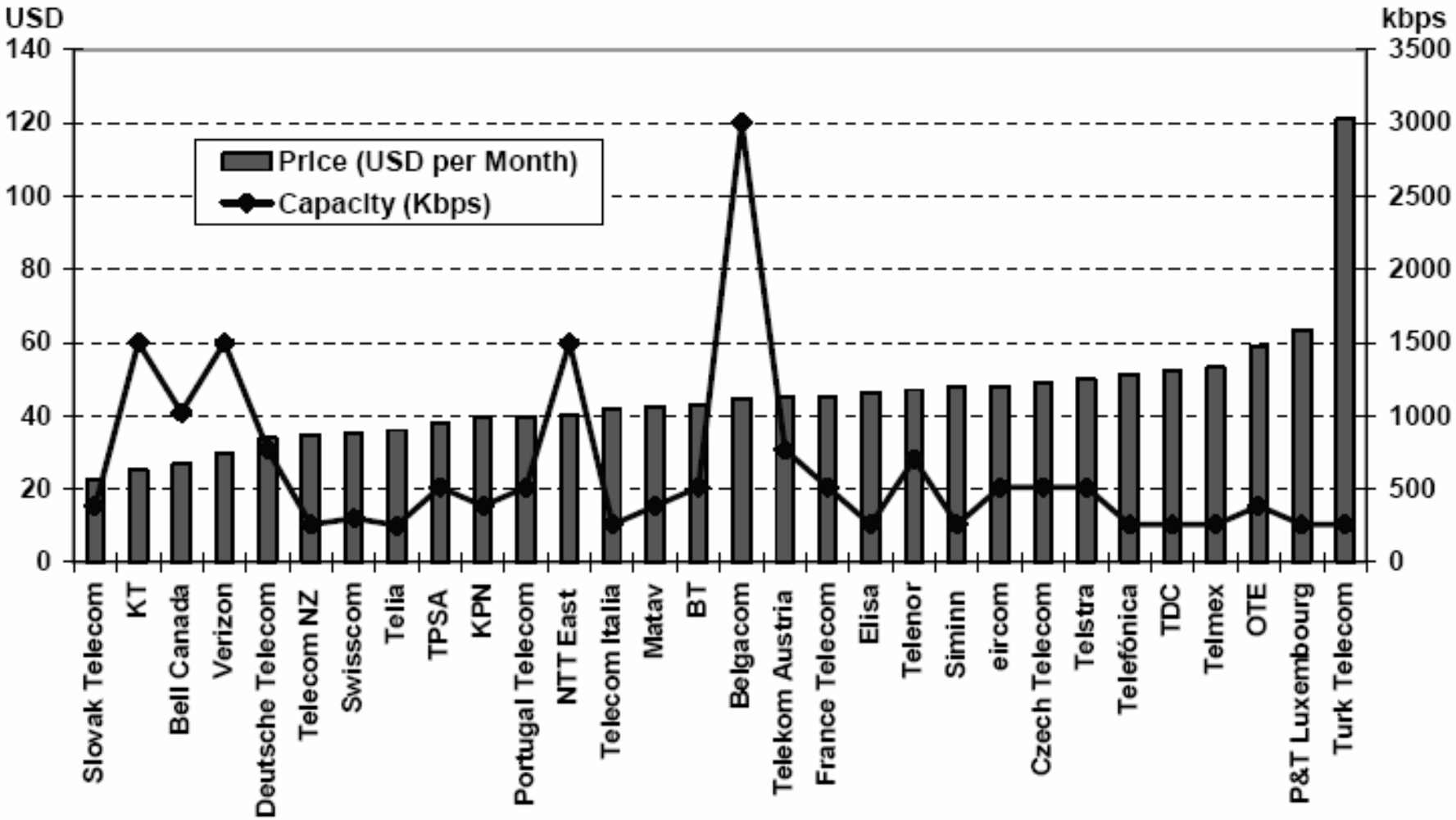
International 'Connectedness' Indicators





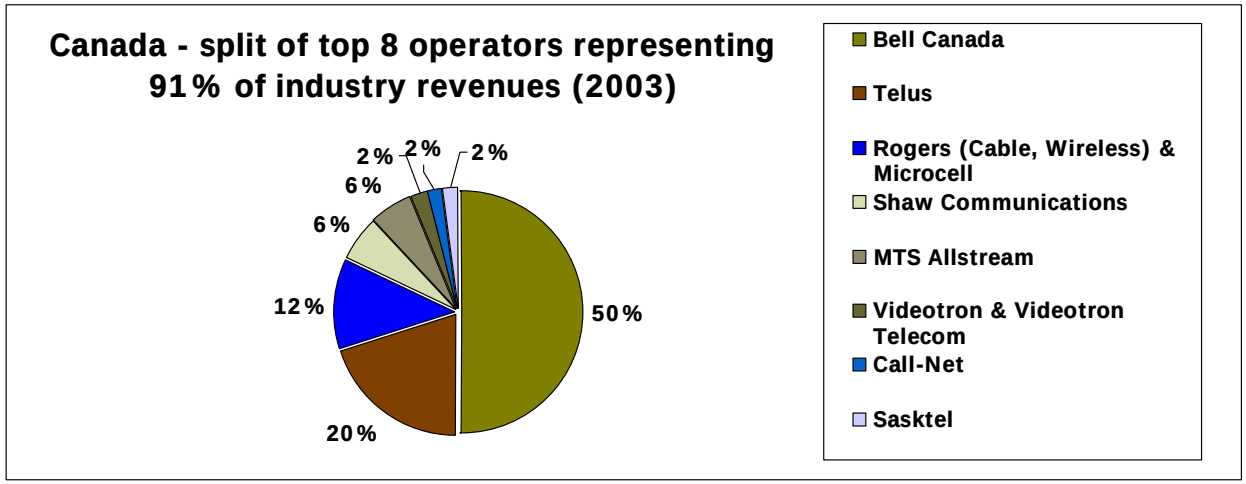
Source: ITU World Telecommunication Indicators Database

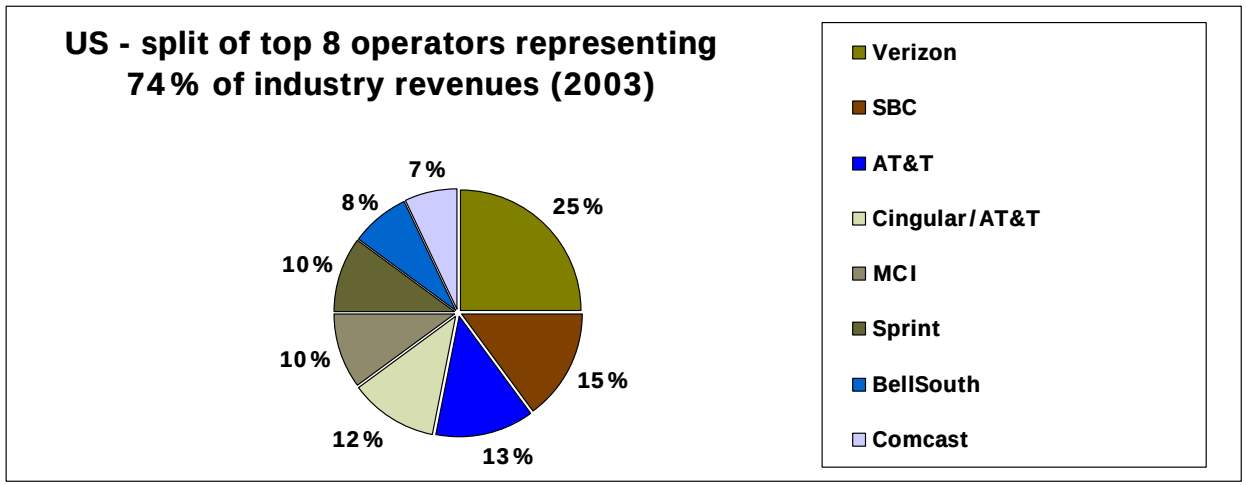
DSL Access Prices - Int'l Comparisons



Source: OECD, "Benchmarking Broadband Prices in the OECD", June 2004

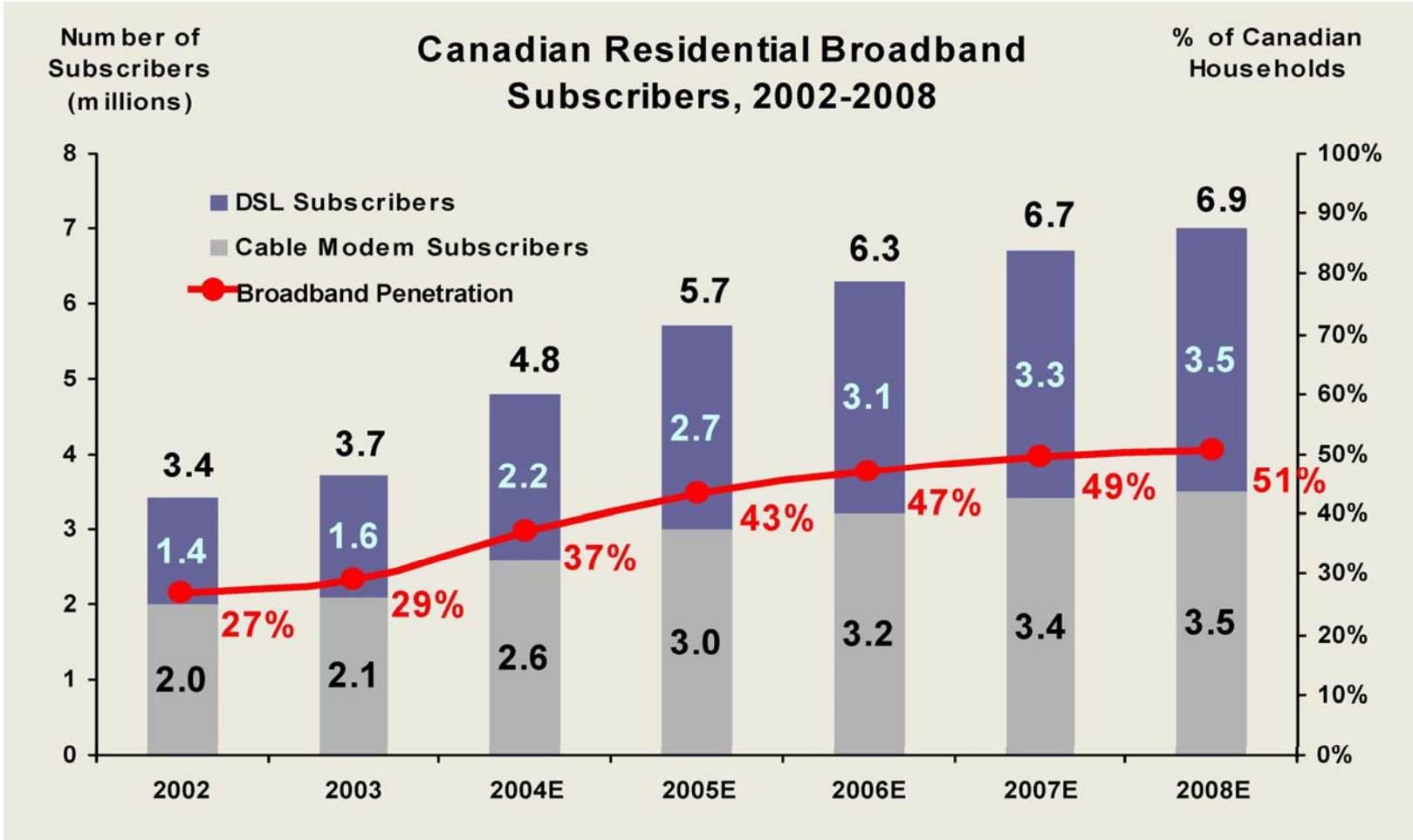
Operator Market Shares – Can/US



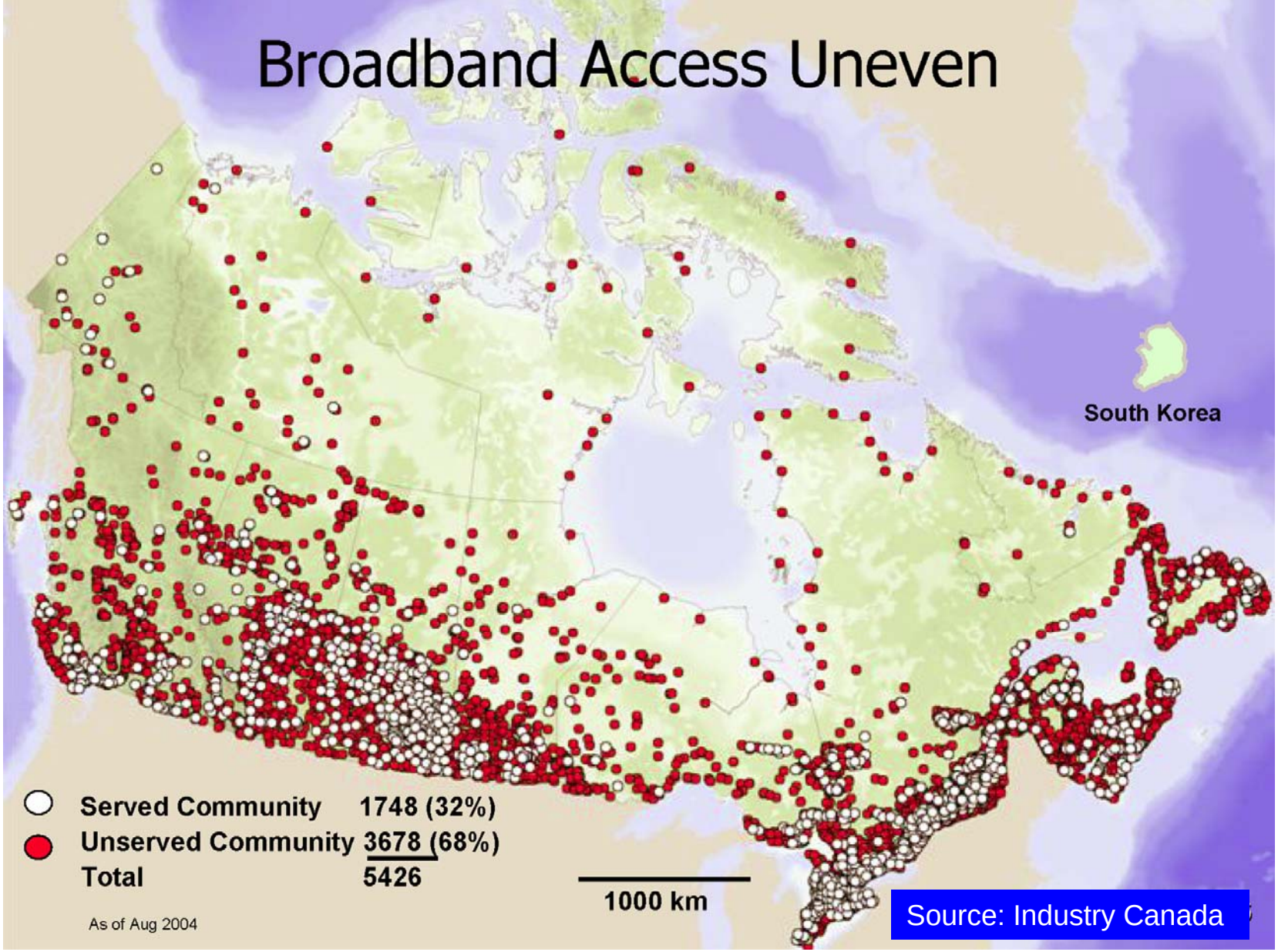


Source: Lemay-Yates Associates, courtesy MTS

Canadian Residential Broadband subscribers



Source: Yankee Group


Broadband Access Uneven
South Korea
Served Community 1748 (32%)
Unserved Community 3678 (68%)
Total 5426
As of Aug 2004
1000 km
Source: Industry Canada

Regional Industrial Concentration

Total value added in telecommunication equipment manufacturing (1999)

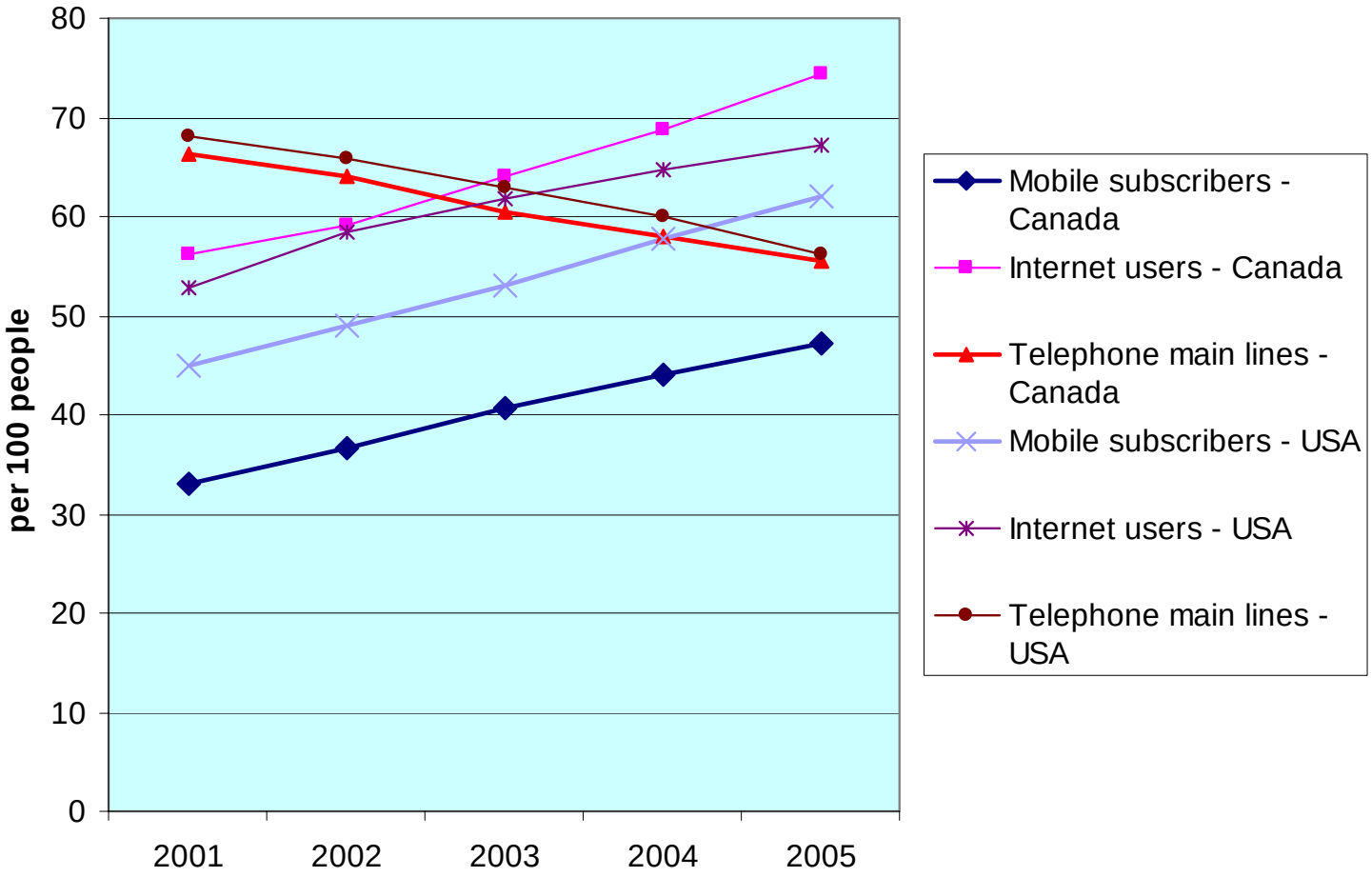
Quebec	42%
Ontario	39%
Other Provinces	19%

Percentage of US PTO telecommunications patents invented in Canada by city (1976-2002)

Ottawa	58
Toronto	22
Montreal	17
Other Cities	3

Source: Niosi, J. Canada's Regional Innovation Systems (McGill-Queen's, 2005)

Canadian Telecom



Source: Economist Intelligence Unit

Highlights in Canadian Telecom Development

- 1874
  - Alexander Graham Bell invents telephone (Brantford, Ontario)
- 1882
  - Bell Telephone Co. of Canada launches manufacturing division in Montreal; becomes Northern Electric in 1895
- 1958:
  - Northern implements first coast-to-coast microwave system
- 1962:
  - Alouette 1 satellite launch makes Canada 3rd country in the world to have satellite in space;
  - subsequent Hermes and Anik programs developed by Communications Research Centre gives Canada world's first domestic satellite communications system
- 1979:
  - Northern launches DMS-100
  - World's first full-featured local/toll digital telephone switching system

Poles of Relevant Canadian Research Excellence

Networks/Consortia

TRLabs: http://www.trlabs.ca/

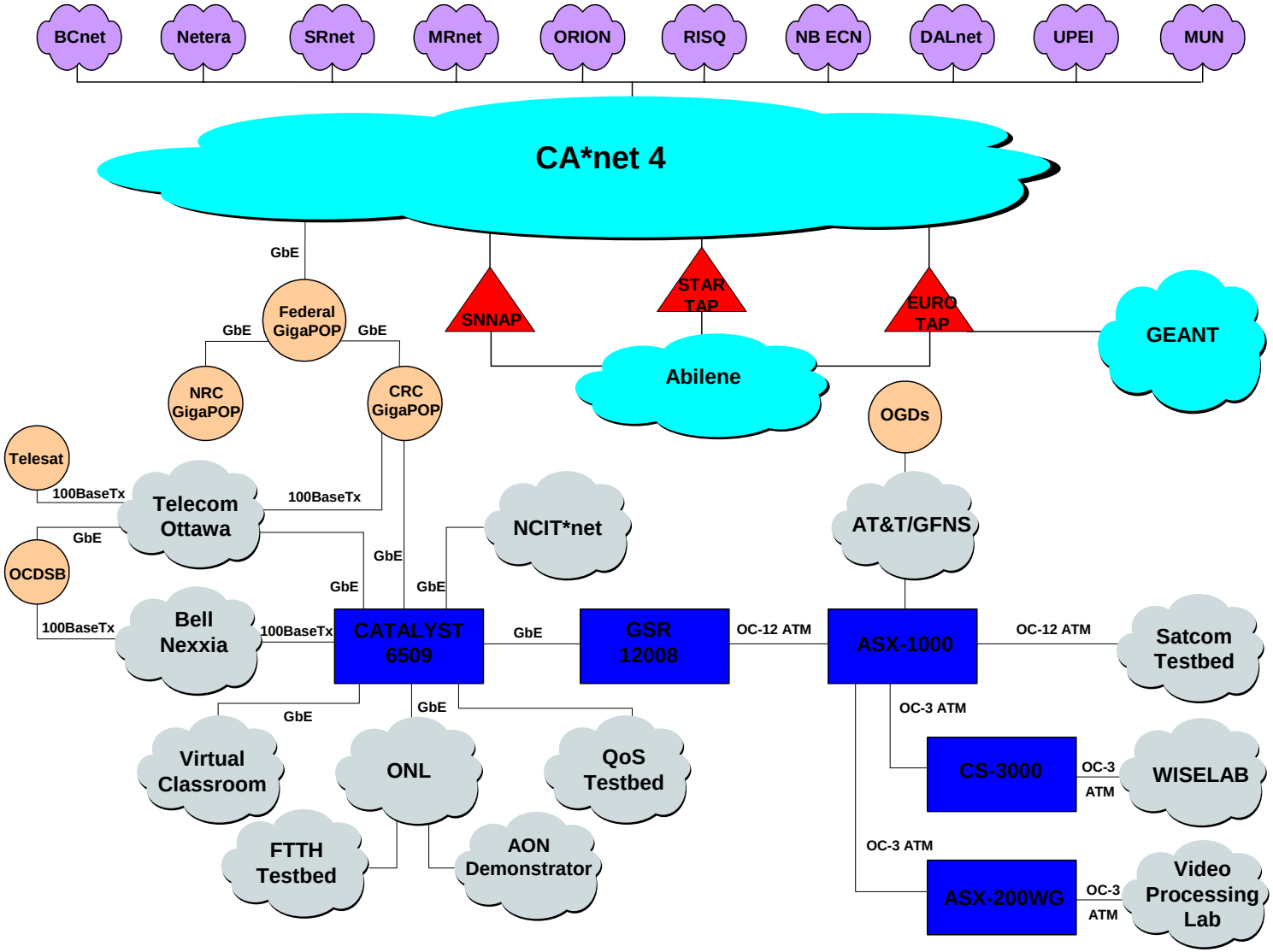
- Western-Canadian based research consortium in telecommunications;
- 5 research labs – Edmonton, Calgary, Saskatoon, Regina, Winnipeg
- Largest ICT research consortium in Canada – 56 partners, 256 researchers, $10M/yr budget

Poles of Relevant Canadian Research Excellence (2)

CANARIE: http://www.canarie.ca/

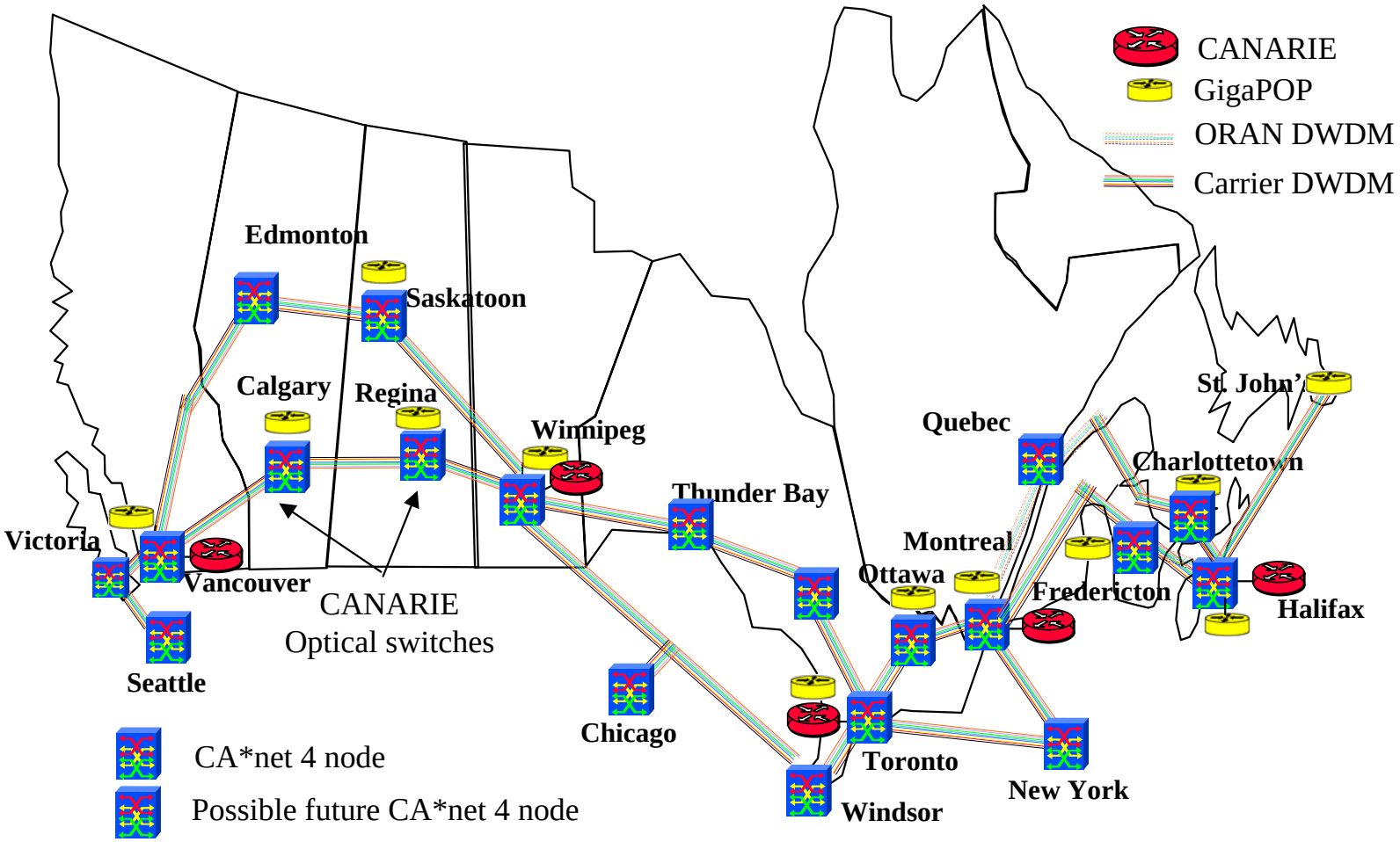
- Canada's advanced Internet development organization; not-for-profit corporation founded in 1993 by federal government
- Deployed CA*net 3 in 1998, world's first national optical Internet research and education network
- Currently deploying CA*net 4:
  - world's first customer controlled network;
  - made up of separate customer controlled IP networks rather than traditional IP routed network with central management and control
  - mostly provisioned at OC-192 (10 Gbps) speeds

CRC BADLAB Network Configuration

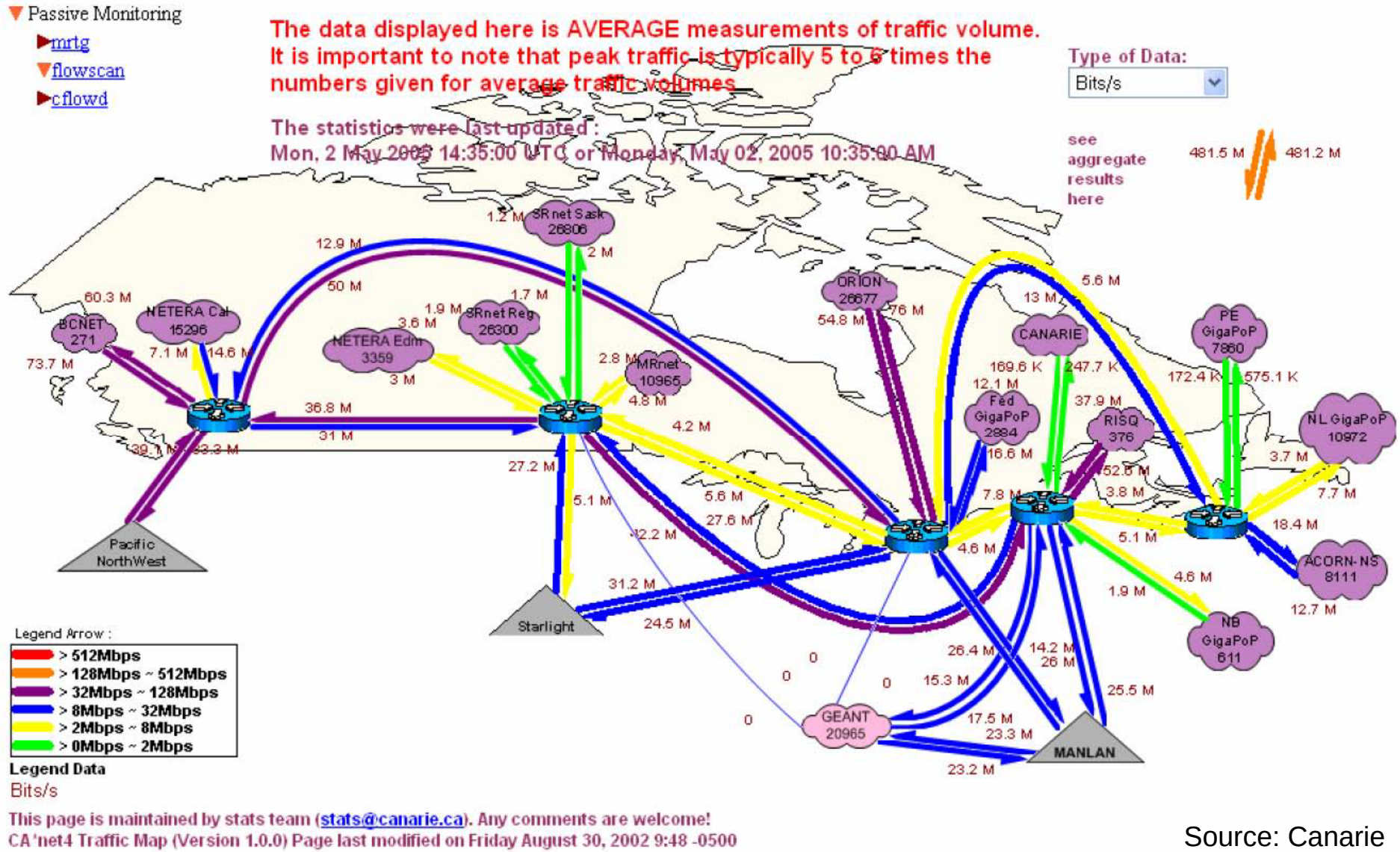


Source: Communications Research Centre Canada

CA*net 4 Architecture



Source: Canarie



Source: Canarie

Poles of Relevant Canadian Research Excellence (3)

AGILE ALL-PHOTONIC NETWORKS (AAPN) Research Network: http://www.aapn.mcgill.ca/

- Federally funded research network 2003-2007 (~$8M/5yrs)
- 5 universities (14 faculty members), 6 companies (including Nortel, JDS-Uniphase, and TELUS), 2 govt. labs (CRC, NRC)
- Canada's largest research initiative in optical networking, spanning networks & architectures and enabling technologies

Poles of Relevant Canadian Research Excellence (4)

Academic Research Centres:

- Centre for Advanced Systems and Technologies in Communications (SYTACom), McGill University (http://www.sytacom.mcgill.ca/)
- Nortel Networks Institute for Advanced Information Technology, University of Waterloo http://www.nortel-institute.uwaterloo.ca/nni_home.html
- Nortel Institute for Telecommunications, University of Toronto http://www.nit.utoronto.ca/

Government Labs:

- Communications Research Centre Canada http://www.crc.ca/
- National Research Council Institute for Information Technology (NRC-IIT) http://iit-iti.nrc-cnrc.gc.ca/index_e.html