Report on
Aboriginal Community Connectivity Infrastructure

A report on the level of connectivity in the Aboriginal communities of Canada

Indian and Northern Affairs Canada

2002-06-12

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I. Introduction

This report on the state of Internet connectivity in the Aboriginal communities of Canada must be viewed as a work in progress. Detailed community scans become outdated before they can be tabulated and written to. Also, the rapid expansion of Internet and telecommunication technologies makes any data collection effort challenging. Thus, it is important to track trends in the development of Internet services. To best serve this goal we have decided to take advantage of the Internet's power and develop a living report. Aboriginal connectivity statistics, and analysis there of, are updated in real-time on our Internet site http://www.aboriginalcanada.gc.ca/abdt/interface/cac_stats.nsf/engdoc/1.html

The technology revolution is upon us. Not unlike the Industrial Revolution of the late 1800's and early 1900's, the technology revolution will transform the way business is conducted. The technology revolution provides new opportunities for Aboriginal entrepreneurs, educators and healthcare providers. Connecting to the world via the Internet can provide many opportunities, especially for more remote communities.

This report is intended to address the need for information of two primary groups:

- Public sector decision makers: This report offers valuable insight into the state of Internet connectivity within Aboriginal communities. It is our hope that continuous tracking of connectivity will help policy makers distribute resources most accurately .
- Aboriginal Communities: Providing a source of reference for Aboriginal communities that are struggling to connect. Sharing of best practices, and keeping communities abreast of connectivity programs and initiatives will help them in developing their own connectivity plans.

Although not a goal of this report, it is interesting to compare and contrast the level of Internet connectivity available to Aboriginal communities with the overall Canadian population. Differences in survey methodologies make the direct comparison of statistics between studies both difficult to perform and of questionable accuracy. However, data supplied to the Broadband taskforce (BBTF) indicates that 72%[1] of Canadian municipalities have Internet access through a local or toll-free dial-up number. Our research, contained within this report, will show that 60% of Aboriginal community households have access to local or toll-free dial-up services, while only 30% of Inuit communities have access to equivalent services. Looking into broadband services, information supplied to the BBTF has identified 20%[2] of Canadian communities as having access to high-speed Internet services. Our analysis has identified 12% of Aboriginal communities with access to high-speed Internet services.

Overall, the existence of an Aboriginal/Non-Aboriginal digital divide seems to be a function of urban vs. rural infrastructure. With the average Aboriginal community having a population of less than 1000, it is not surprising that Internet connectivity rates are low. As demand for Internet services increase and costs for supplying these services decrease, we will continue to see smaller communities being connected. However, for some of the more remote and northern communities it is safe to assume that a viable business case may never be made for the extension of Internet services. For these communities the only hope for Internet connectivity lies in the aggregation of demand or cost subsidization. It is our hope that this report will help shape the development of a solution.

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[1] *The Final Report of Boardband Internet Service Available to Municipal Jurisdictions* - Federation of Canadian Municipalities
[2] *The New national Dream: Networking the Nation for Broadband Access* - Industry Canada, Page 65

Methodology:

The preparation of the report on Aboriginal community connectivity began several months ago. Indian and Northern Affairs Canada (INAC) has played a lead role through conducting connectivity research studies, assembling and analyzing data and statistics and developing the framework upon which the annual report was produced. However, much of the data was drawn from the previous data collection exercises.

The methodology supporting the annual report and data analysis has been collected from a variety sources including:

INAC - list of Indian Reserves and Indian Settlements from the Indian Land Registry System; survey of Aboriginal communities conducted by the Information Management Branch.

Statistics Canada - The 1996 Census provided us with the ethnic composition of the communities in Canada, population statistics, and census subdivision breakdowns.

Canadian Radio-television and Telecommunications Commission - The CRTC has provided us with insight into the High-Cost Serving Areas ruling and documentation on telephone company service improvement plans.

Industry Canada - Schoolnet and Community Access Point program information was shared with the authors of this report.

Private Sector Telecom - Indirectly through the submission of Service Improvement Plans (SIPS) and through direct contact, the telecom providers of Canada have provided us with information on community infrastructure and Internet Service Provider (ISP) locations.

Creation of an Inclusive Connectivity Database

Starting with the list of First Nation and Inuit communities from the department, and Métis communities identified through Census '96, INAC approached all of the 731 identified Aboriginal communities with a connectivity survey. Response to the survey was excellent but not inclusive. Added to this database of 731 communities was information on Industry Canada CAP Sites, Schoolnet sites, and data from telephone carriers on local dial-in access points. The result was a master database with 731 records that include various data sources relating to connectivity. The statistics provided within this report represent a synthesis of the data sources.

INAC Connectivity Survey

The 2001/2 connectivity study by Indian and Northern Affairs consisted of a telephone/ fax back survey. Our initial point of contact was the Band or community administration office. Usually engaging in dialog with the economic development officer we were able to gather information on connectivity at both the community administration office and the residences of the community. While the collection procedure is ongoing, we have successfully collected information from over 500 Aboriginal communities.

INAC Survey Summary

Group	Contracted Communities	Survey Respondents	No Participation	Limited Participation
First Nation	629	442 (70.3%)	158 (25.1%)	29 (4.6%)
Inuit	55	48 (87.3%)	4 (7.3%)	3 (5.4%)
Métis	50	37 (74.0%)	4 (8.0%)	9 (18.0%)
Total	**734**	**527 (71.8%)**	**166 (22.6%)**	**41 (5.6%)**

Industry Canada Connectivity Programs

The two primary Federal connectivity programs in Canada are the CAP and Schoolnet programs. A number of Aboriginal communities have benefited from these programs.

Aboriginal Community Participation in Federal Connectivity Initiatives

Program	Aboriginal Participation	
	Projects	Communities
Industry Canada Community Access Program	304	221
Industry Canada Schoolnet	429	309

Note: Removed were urban, closed, terminated, sites.

Assumptions:

As stated in the Canadian Constitution the Aboriginal peoples of Canada include the Indian, Inuit and Métis populations.

Among this population there are 634 First Nations, 55 Inuit communities and estimates ranging between 50 and 350 Métis communities.

There are also said to be approximately 2,000 reserve parcels of which the 634 First Nation communities or Bands are a part.

Nearly one quarter of Aboriginal population live in census metropolitan areas.

What is a Community?

This Report on Aboriginal Connectivity is a community-centric model and recognizes that the identification of the community is key for the purposes of defining service level and infrastructure gaps.

Due to the various sources of data contained within this report, and our desire to expand the report beyond status Indians, it is necessary to develop a definition of a community that is broad enough to capture all data sets but not too broad as to render the statistics insignificant.

We have chosen to use the following definition to guide our collection efforts and statistical analysis:

"A locality which is considered to be an Indian, Inuit or Métis community (Indian reserve, Indian settlement, Métis settlement, Inuit hamlet or census sub-division with 25 percent or more Aboriginal population) having the following attributes: a name, distinct physical location and territory, and Aboriginal governance structure, mandate and constituency."

Identifying vs. Defining an Aboriginal Community

On one hand the Aboriginal population, or Aboriginal community as it is often referred, is distributed throughout every Indian reserve, Indian settlement, Métis settlement and Inuit hamlet in every province, territory and region in Canada. According to Census '96, "About three in every 10 Aboriginal people lived on rural reserves, and another three in 10 lived in census metropolitan areas. One-quarter lived in urban areas other than census metropolitan areas, and one-fifth in rural areas other than reserves, often isolated northern communities."

Indeed, Aboriginal citizens, particularly in Prairie Provinces and the north constitute significant proportions of towns, villages, hamlets and rural communities other than Indian reserves and settlements.

It is unlikely that a definition of an Aboriginal community will be defined entirely through the terms of this project, as this is a matter for the Aboriginal community itself. However, and for the purpose of the project, using existing and available data is an important first step in a process that will identify which and where such Aboriginal communities are located.

Indian Reserve Community

The Indian Reserve is a physical locality that is defined by legislation and supported by legal surveys and recorded and managed by the Indian Land Registration System (ILRS) at Indian and Northern Affairs Canada. According to IRLS, there are 2720 Indian Reserves.

An Indian Settlement, also recorded but not maintained by the ILRS, does not have the same definition or legislative support as Indian Reserve under the Indian Act.

"An Indian Settlement is a place where a self-contained group of at least 10 Indian people reside more or less permanently. It is usually located on crown lands under federal or provincial jurisdiction. Indian settlements have no official limits (boundaries) and have not been set apart for the use and benefit of an Indian Band as is the case with Indian Reserves."

Only Status or Treaty Indians can have permanent residency or hold property without Band Council Resolution and Ministerial Authority.

Since there are more Indian reserve communities (and settlements) than there are Indian Bands (First Nations) - some Bands have joint ownership in Indian reserves - Indian reserves and settlements should be specified in relation to their First Nation. The Hub of the Indian reserve business activity and service delivery is usually the responsibility of the central band administration - the Band Office. Other common facilities and services for the affiliated reserve communities if not located within the administrative offices are situated on the "main" reserve lands where the administrative functions are housed to support band operations. It is this reason coupled with the difficulties in contacting reserve level representatives that we

have chosen to calculate connectivity statistics at the band level for the inaugural year of this report.

Métis Community

There is no federal legislation defining Métis lands, community or even people. The provinces of Alberta and Saskatchewan, so far are the only Provinces that formally define Métis. The Métis community hence is distributed throughout many different communities including villages, towns, hamlets, rural municipalities as well as Indian settlements throughout Canada.

The Métis community is perhaps the most difficult to define as there is no enrollment procedures similar the Inuit and Indian Registrar. The Métis National Council (MNC), only this past summer, has begun an exercise to define Métis. The MNC, however, does not share the definition of Métis that has generally been adopted by federal government policy.

We will continue to work with the MNC to further refine our list of Métis communities.

Inuit Community

Inuit are definite about their people, communities and homelands. In the events leading up to the Inuvialuit and Nunavut lands claims settlements, Inuit beneficiaries where enumerated through an enrolment exercise similar to the Indian Registration to support their claims. Inuit, though a majority live north of the tree line, live throughout the country.

So at the heart of the Aboriginal community issue are the Aboriginal people themselves - how they define themselves and where they perceive their communities to be.

II. Background - Basic Facts

It's important to provide some context before entering into a discussion on the telecommunication infrastructure of Aboriginal communities.

In 1998 the department of Indian and Northern Affairs reports that a total of 658,824 registered Indians were living both on and off reserve. By 2008, that number is projected to climb to 798,211; an increase of 21%.

Today's Aboriginal population is young and active. In 1999 almost half of the registered Indian population were less than 25 years of age. For Canada as a whole 33% of the population fell into this category. Having an Aboriginal youth population that are knowledgeable of today's emerging technologies will go a long way to assuring their success in tomorrow's world.

Population

In all and according to Census 1996 there are 799,010 people that identify themselves as North American Indian, Métis or Inuit (805,000 as more than 6000 reported themselves as members of more than one group). The Aboriginal population represents approximately 3 percent of the total Canadian population.

Aboriginal Population by Aboriginal Identity

Aboriginal Identity	Population	Percentage of Total Aboriginal Population
North American Indian	554,290	69%
Métis	210,190	26%
Inuit	41,080	5%

Source: 1996 Census

Geographic Distribution of Aboriginal Population

Province and Territory	Aboriginal Communities	
	Population	Percentage of total
British Columbia	130,655	17.5%
Alberta	122,840	15.4%
Saskatchewan	111,245	13.9%
Manitoba	128,684	16.1%
Ontario	141,525	17.7%
Quebec	71,415	8.9%
New Brunswick	10,250	1.3%
Prince Edward Island	950	0.1%
Nova Scotia	12,380	1.5%
Newfoundland	14,204	1.8%
Northwest Territories*	39,690	5.0%
Yukon	6,175	0.8%

Source: 1996 Census
* includes Nunavut which at the time of last census had not yet become a territory

Regional Distribution of Aboriginal Population by Aboriginal Identity

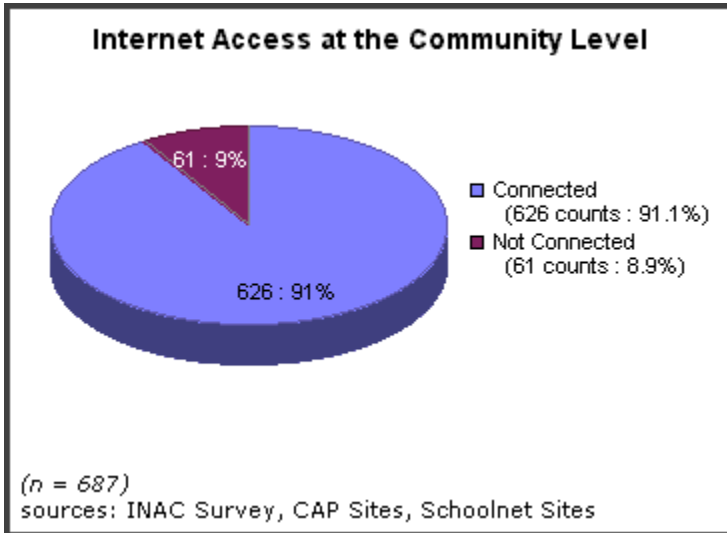| Province and Territory	Aboriginal Population		
	North American Indian	Métis	Inuit
British Columbia	113,315	26,750	815
Alberta	72,645	50,745	795
Saskatchewan	75,205	36,535	190
Manitoba	82,990	46,195	360
Ontario	118,830	22,790	1,300
Quebec	47,600	16,075	8,300
New Brunswick	9,180	975	120
Prince Edward Island	825	120	15
Nova Scotia	11,340	860	210
Newfoundland	5,430	4,685	4,265
Northwest Territories*	11,400	3,895	24,600
Yukon	5,530	565	110
Canada	**554,290**	**210,190**	**41,080**

Source: 1996 Census
* includes Nunavut at the time of Census 96.
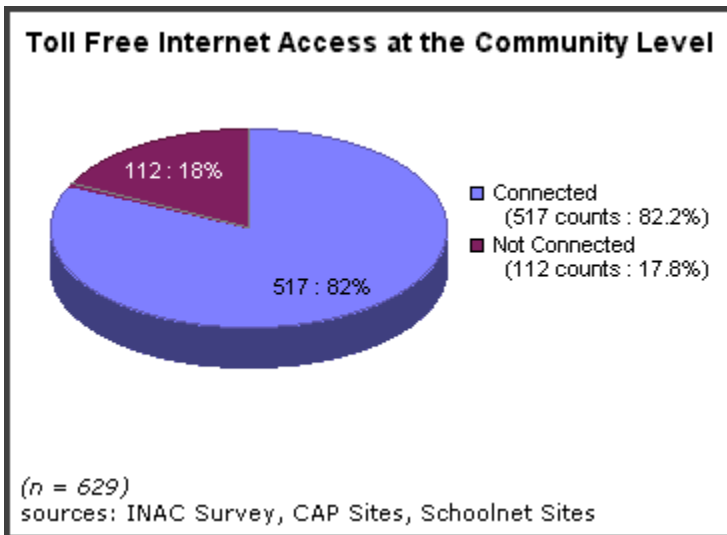
III Connectivity Data

The following information is a synthesis of the various data sources referenced within the above methodology.

Internet Access at the Community Level

Internet Access at the Community Level

Connected
(626 counts : 91.1%)

Not Connected
(61 counts : 8.9%)

61 : 9%

626 : 91%

(n = 687)
sources: INAC Survey, CAP Sites, Schoolnet Sites

At the community level **91.1%** of Aboriginal communities are connected to the Internet in some way. This includes access at the community administration office, Community Access Points or Schoolnet sites.

It should be noted that not all community administration offices or Schoolnet sites make their connections available to the general public.

Toll Free Internet Access at the Community Level

Connected
(517 counts : 82.2%)

Not Connected
(112 counts : 17.8%)

112 : 18%

517 : 82%

(n = 629)
sources: INAC Survey, CAP Sites, Schoolnet Sites

When we exclude the number of communities that incurr long distance change for the Internet services the picture changes.
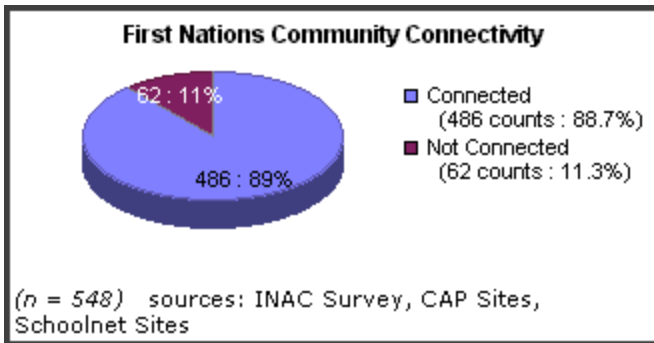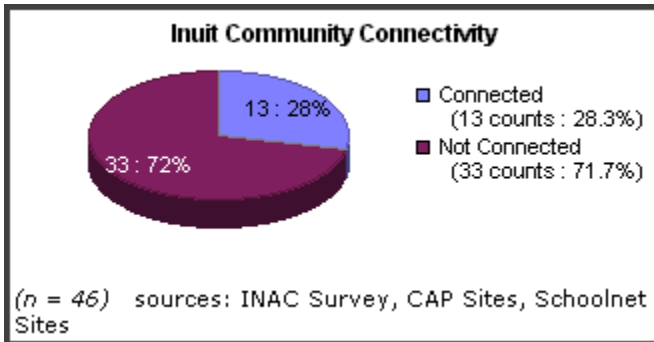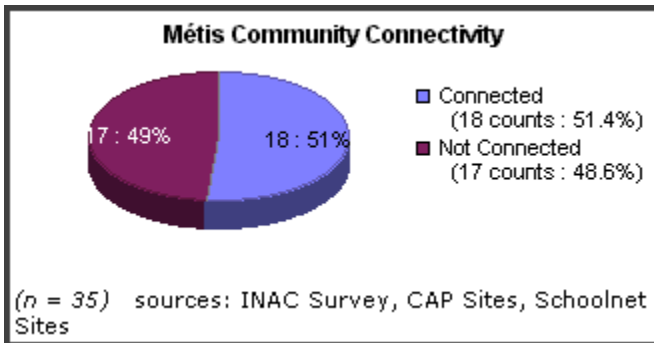
At the community level **82.2%** of Aboriginal communities are connected to the Internet in some way. This includes access at the community administration office, Community Access Points or Schoolnet sites.
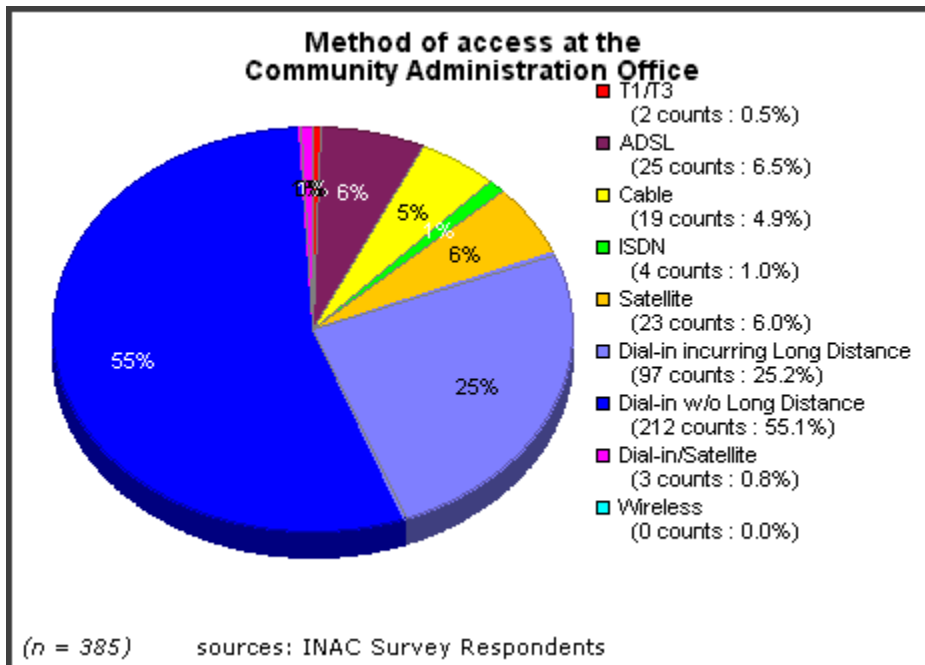
First Nations Community Connectivity

62 : 11%

486 : 89%

- Connected
  (486 counts : 88.7%)
- Not Connected
  (62 counts : 11.3%)

(n = 548) sources: INAC Survey, CAP Sites, Schoolnet Sites

88.7% of First Nation communities have toll free access to the Internet at the community level.

Inuit Community Connectivity

13 : 28%

33 : 72%

- Connected
  (13 counts : 28.3%)
- Not Connected
  (33 counts : 71.7%)

(n = 46) sources: INAC Survey, CAP Sites, Schoolnet Sites

Only **28.3%** of Inuit communities have toll free access to the Internet at the community level.

Métis Community Connectivity

17 : 49%   18 : 51%

- Connected
  (18 counts : 51.4%)
- Not Connected
  (17 counts : 48.6%)

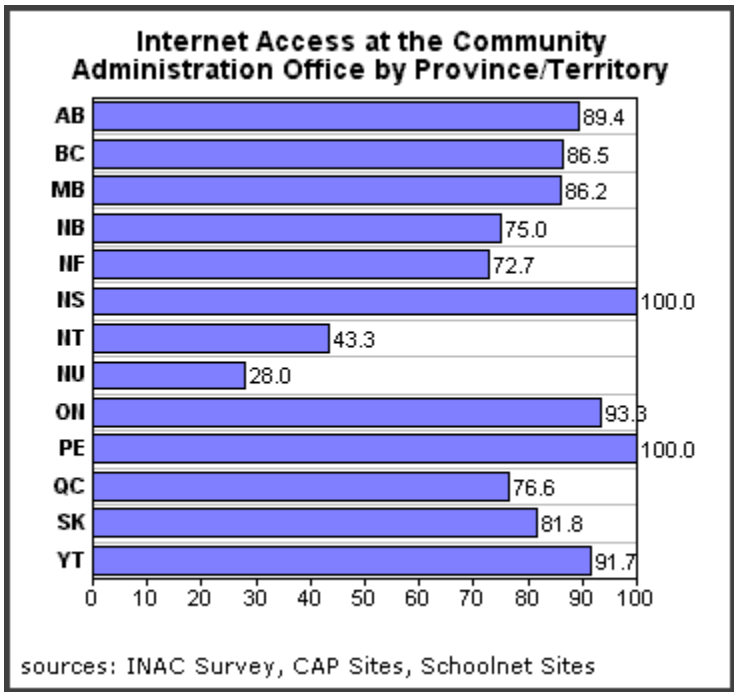*(n = 35)* sources: INAC Survey, CAP Sites, Schoolnet Sites

51.4% of surveyed Métis communities have toll free access to the Internet at the community level.

Method of access at the Community Administration Office

1% 6%
5%
1%
6%

55%

25%

- T1/T3
  (2 counts : 0.5%)
- ADSL
  (25 counts : 6.5%)
- Cable
  (19 counts : 4.9%)
- ISDN
  (4 counts : 1.0%)
- Satellite
  (23 counts : 6.0%)
- Dial-in incurring Long Distance
  (97 counts : 25.2%)
- Dial-in w/o Long Distance
  (212 counts : 55.1%)
- Dial-in/Satellite
  (3 counts : 0.8%)
- Wireless
  (0 counts : 0.0%)

(n = 385) sources: INAC Survey Respondents

The majority of community administration offices use low speed dial-in modems to connect to the Internet.

80.3% of community administration offices connect via low-speed modem. Of this **80.3%**, **31.4%** of these communities do so while incurring long distance charges.

Accessing the Internet via low speed modem while incurring long distance charges severely hinders the ability to use it for research and educational purposes.

Internet Access at the Community Administration Office by Province/Territory

Province/Territory	Value
AB	89.4
BC	86.5
MB	86.2
NB	75.0
NF	72.7
NS	100.0
NT	43.3
NU	28.0
ON	93.3
PE	100.0
QC	76.6
SK	81.8
YT	91.7

sources: INAC Survey, CAP Sites, Schoolnet Sites

The level of connectivity varies from province to province but averages at **78.8%**. It should be notes that we have identified only 2 Aboriginal communities in Prince Edward Island.

Community Administration Office High Speed Internet Access Rates by Province/Territory

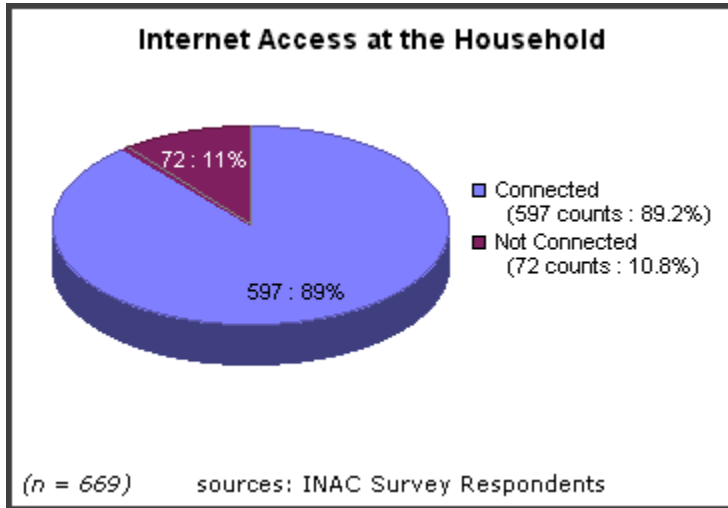| Province/Territory	Value
AB	3.4
BC	16.1
MB	2.7
NB	12.5
NF	0.0
NS	20.0
NT	18.8
NU	4.8
ON	11.7
PE	0.0
QC	12.1
SK	6.8
YT	60.0

sources: INAC Survey Respondents
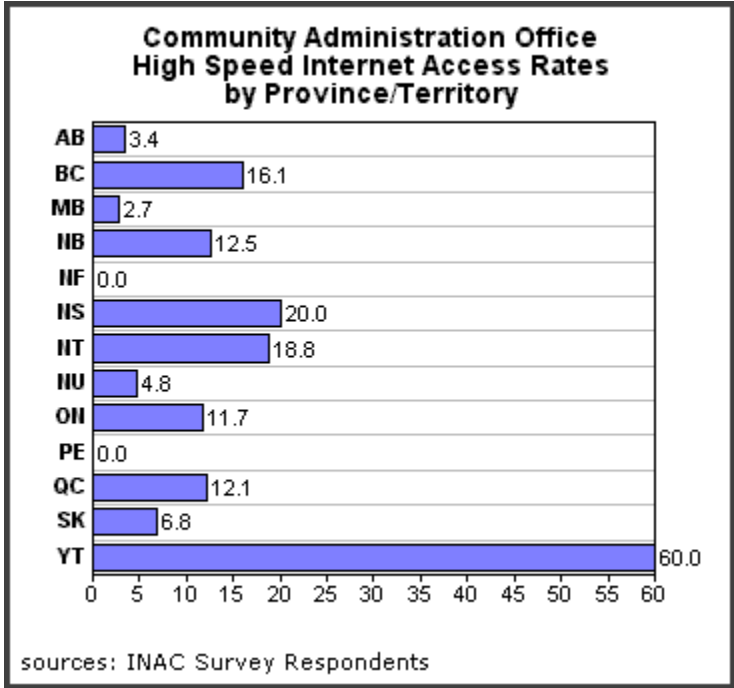
Yukon clearly leads the country with the number of Community Administration offices that are connected using high speed methods. This is in large part due to the Connect Yukon project. For more information on the Yukon Connect and other provincial initiatives, please see Appendix B.

In this data set methods of connectivity include xDSL, Cable, ISDN, and T1.

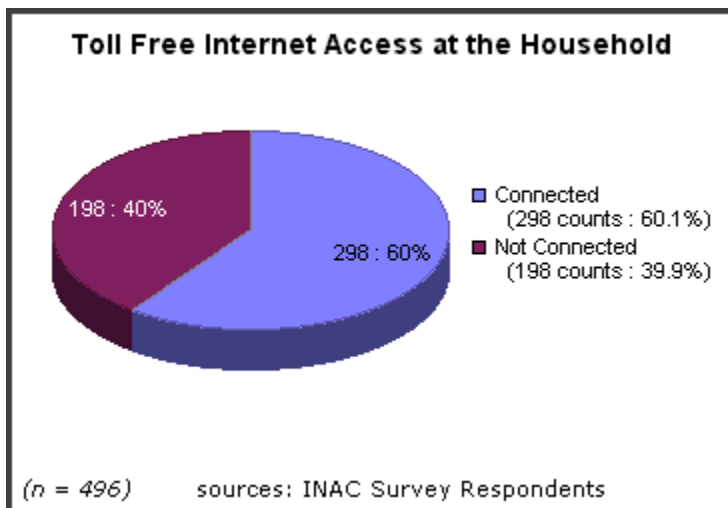## Community Internet Access Sites Breakdown

Access Point	Percentage of Communities	Counts
Community Admin Office	73.0%	459 / 629
Admin Office plus CAP or Schoolnet	82.2%	517 / 629
Only CAP or Schoolnet	11.1%	70 / 629

Internet Access at the Household Level

Internet Access at the Household

72 : 11%

597 : 89%

- Connected
  (597 counts : 89.2%)
- Not Connected
  (72 counts : 10.8%)

(n = 669)   sources: INAC Survey Respondents

At the household, **89.2%** of Aboriginal communities have the telephone infrastructure necessary to connect to the Internet.

It should be noted that our primary contact at the community was the Community Administration Office. Through this contact we attempted to ascertain what communication technologies were available to the general community.

Toll Free Internet Access at the Household

198 : 40%

298 : 60%

- Connected
  (298 counts : 60.1%)
- Not Connected
  (198 counts : 39.9%)

(n = 496)   sources: INAC Survey Respondents

When we exclude the number of communities that incurr long distance charges for the Internet services, the picture changes.

At the household level, **60.1%** of Aboriginal communities have the telephone infrastructure necessary to make a toll free connection to the Internet.
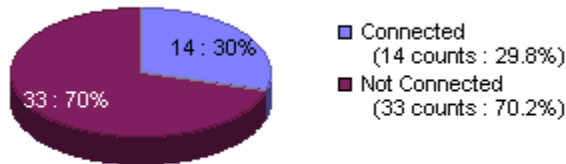
First Nations Community Connectivity at the Household

55 : 37%
260 : 63%

■ Connected
(260 counts : 62.7%)
■ Not Connected
(155 counts : 37.3%)
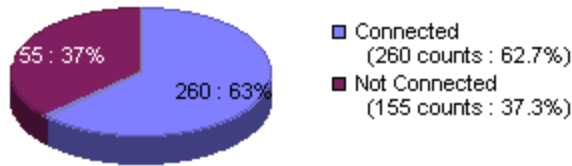
(n = 415)   sources: INAC Survey Respondents

**62.7%** of First Nation communities have access to the Internet at the household level.

Inuit Community Connectivity at the Household

14 : 30%
33 : 70%

■ Connected
(14 counts : 29.8%)
■ Not Connected
(33 counts : 70.2%)

(n = 47)   sources: INAC Survey Respondents

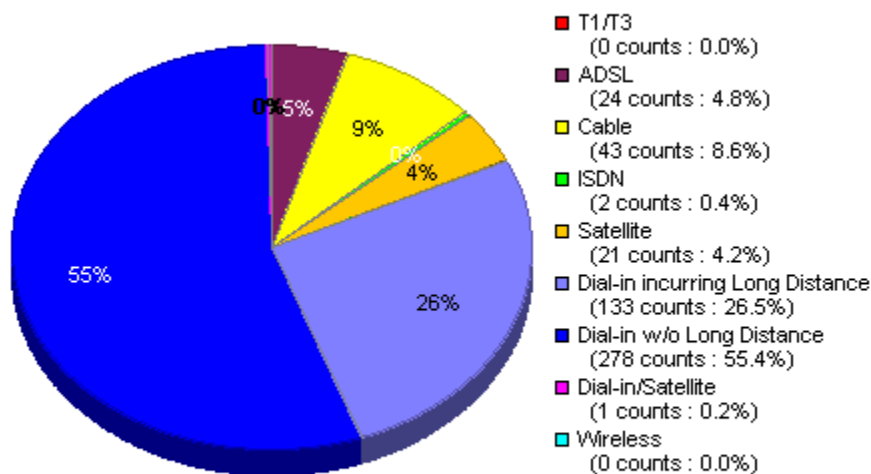Only **29.8%** of Inuit communities have access to the Internet at the household level.

Métis Community Connectivity at the Household

10 : 29%
24 : 71%

■ Connected
(24 counts : 70.6%)
■ Not Connected
(10 counts : 29.4%)
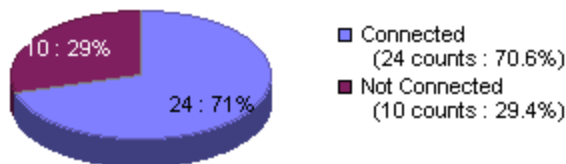
(n = 34)   sources: INAC Survey Respondents

70.6% of the surveyed Métis communities have access to the Internet at the household level.

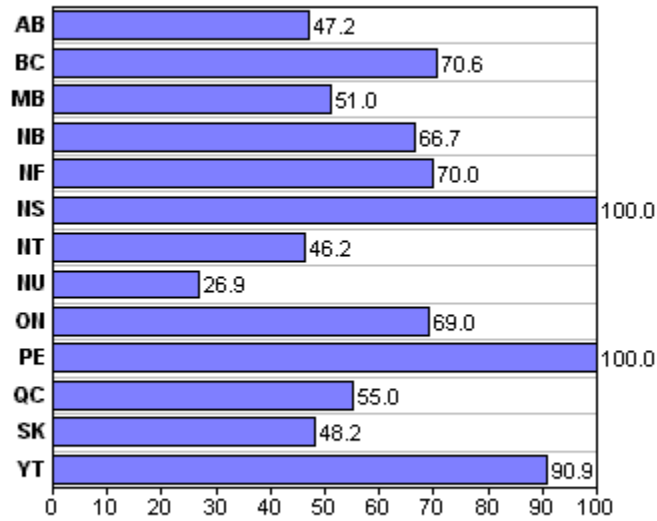## Method of access at the Household

0% 5%
9%
0%
4%
55%
26%

■ T1/T3
(0 counts : 0.0%)
■ ADSL
(24 counts : 4.8%)
■ Cable
(43 counts : 8.6%)
■ ISDN
(2 counts : 0.4%)
■ Satellite
(21 counts : 4.2%)
■ Dial-in incurring Long Distance
(133 counts : 26.5%)
■ Dial-in w/o Long Distance
(278 counts : 55.4%)
■ Dial-in/Satellite
(1 counts : 0.2%)
■ Wireless
(0 counts : 0.0%)

(n = 502)   sources: INAC Survey Respondents

Of the communities connected to the Internet **81.9%** of households use analog modems to connect. Of this **81.9%**, **32.4%** of those do so while incurring long distance telephone charges.

Internet Access at the Household by Province/Territory

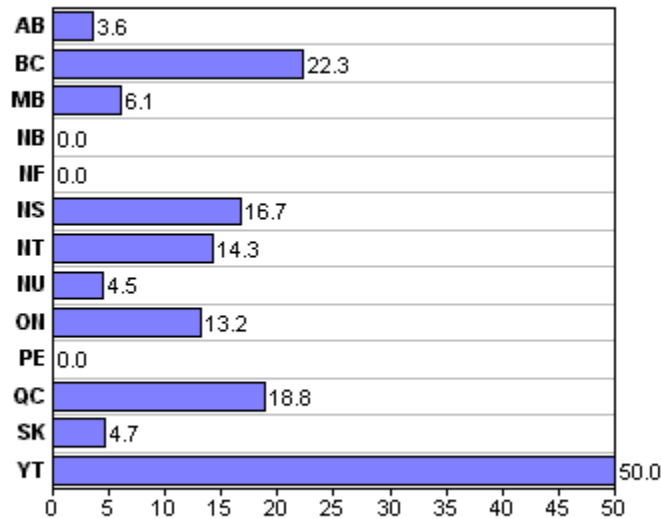| Province/Territory	Percentage
AB	47.2
BC	70.6
MB	51.0
NB	66.7
NF	70.0
NS	100.0
NT	46.2
NU	26.9
ON	69.0
PE	100.0
QC	55.0
SK	48.2
YT	90.9

sources: INAC Survey Respondents

Internet Access at the household level various greatly from province to province. Ranging from high of 100.0% in Prince Edward Island and Nova Scotia to 26.9% in Nunavut.

Once again this measures the ability to connect to the Internet if provided with the appropriate equipment at the household.
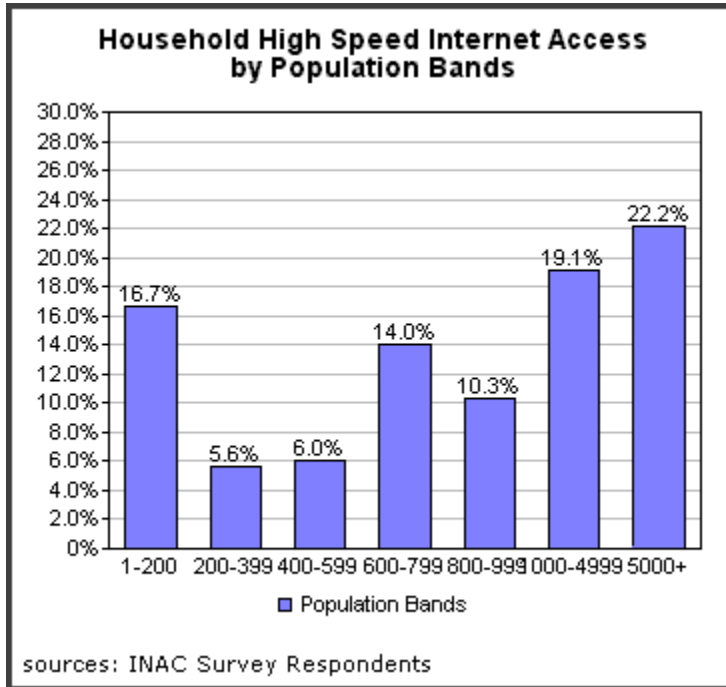
Household High Speed Internet Access Rates by Province/Territory

Province/Territory	Percentage
AB	3.6
BC	22.3
MB	6.1
NB	0.0
NF	0.0
NS	16.7
NT	14.3
NU	4.5
ON	13.2
PE	0.0
QC	18.8
SK	4.7
YT	50.0

sources: INAC Survey Respondents

When we look at high speed Internet access picture is quite different and variable. This chart tabulates the percentage of participating communities that said they have access to high speed Internet services at the household. For the purpose of this chart we have defined "High-speed" as Cable or xDSL access. Most satellite Internet systems currently in place are one way systems that still require a traditional analog modem for uploading. For that reason satellite systems have been excluded from the definition of high speed.

Access statistics by population bands

Household High Speed Internet Access by Population Bands

Population Band	Percentage
1-200	16.7%
200-399	5.6%
400-599	6.0%
600-799	14.0%
800-999	10.3%
000-4999	19.1%
5000+	22.2%

■ Population Bands

sources: INAC Survey Respondents

It was no surprise that we identified larger communities as being better connected to high-speed Internet services. As the cost of providing these services decrease and the number of customers who demand high-speed Internet services increase we should see smaller communities being offered high speed Internet services.

Existing Government Connectivity Programs

A number of government departments are involved in enhancing the level of connectivity across the country. Below are some summary statistics of their effect on Aboriginal communities. For a more detailed look at Federal Government connectivity initiatives please see Appendix A.

Aboriginal Community Participation in Federal Initiatives

Province and Territory	Community Access Program		SchoolNet	
	Projects	Communities	Projects	Communities
British Columbia	70	45	93	76
Alberta	17	8	61	33
Saskatchewan	2	2	76	52
Manitoba	26	14	50	43
Ontario	116	82	94	66
Quebec	38	32	31	21
New Brunswick	2	2	6	6
Prince Edward Island	1	1	2	2
Nova Scotia	4	4	15	10
Newfoundland	3	2	1	1
Nunavut	10	8	0	0
Northwest Territories	10	6	0	0
Yukon	5	5	0	0
Total Projects	**304**		**429**	
Total Communities		**211**		**309**

Notes: Removed were urban, closed, terminated, some Métis communities that were not part of the formal survey.

CRTC High Cost Service Area Ruling

Despite Canada's reputation as being one of the best-served countries in the world about 20 percent of Aboriginal communities face issues related to inadequate telecommunications service and infrastructure.

In Decision 99-16, <u>Telephone Service to High-Cost Serving Areas</u>, the Commission found evidence that the level of service is lower in high-cost areas.

The Commission established the following basic service objective for local carriers:

- "Individual line local service with touch-tone dialling, provided by a digital switch with capability to connect via low speed data transmission to the Internet at local rates;
- Enhanced calling features, including access to emergency services, Voice Message Relay service, and privacy protection features;
- Access to operator and directory assistance services;
- Access to the long distance network; and
- A copy of a current local telephone directory." [1]

[1] Decision 99-16, paragraph 24.

To meet the basic service objective (BSO) the Commission directed that all incumbent local carriers file Service improvement plans (SIPs), for its approval, demonstrating how they will improve service in served areas. The Commission also sought proposals for the extension of service to unserved areas.

To that end all carriers were required to identify un-served and underserved in relation to the basic service objective and to submit Service Improvement Plans (SIPs).

In conjunction with the SIPs the telephone companies were also directed to supply information on the availability of Internet Service providers in the exchanges of their subscriber areas. The following table summarizes the Internet Access shortcoming as they relate to Aboriginal communities.

Telephone Company	Communities without Internet Access	Served via Satellite	Other Reason
Northwestel	47	30	17
Bell Canada	41	24	17
Telus	25	0	25
MTS	19	6	13
Télébec	12	?	?
Telus Québec	1	?	?
Total	**145**	**61**	**71**

The Service Improvement Plans submitted by the telecom providers are just that, plans. SIPS also vary widely with respect to details on the locations and communities that will be impacted. The Commission has not yet approved these SIPs with the exception of Northwestel and MTS's initial two-year plan. We will continue to track any approvals, re-submissions and actions taken by the CRTC or telephone companies with respect to the high-cost serving area ruling and include them in subsequent reports.

Next Steps

Our analysis of connectivity was not completed with the publishing of this report. We continue to track trends in connectivity within the Aboriginal communities of Canada. As mentioned earlier, the online version of this report will capture the ongoing submissions of Aboriginal communities and resulting statistics. There are however, a number of enhancements that we would like to make to our survey for future publications. They include:

- Updating our background facts to reflect the 2001 Census.
- Working with the Métis National Council to better represent the Métis population in Canada within our analysis.
- Identify and document key sectors that have initiated connectivity programs at the provincial level (e.g. Health, Economic Development, Education).

Conclusion

Over the past few years great strides have been made to increase the level of connectivity in Aboriginal communities. Current service improvement plans, proposed government projects, and the trend analysis from our survey lead us to believe that this will continue for the foreseeable future. We will continue to track these trends via our Web site http://www.aboriginalcanada.gc.ca/abdt/interface/cac_stats.nsf/engdoc/1.html in an attempt to provide the clearest possible picture to government policy makers.

We invite your comments and suggestions for the final version of this and subsequent reports on Aboriginal connectivity. Please direct all comments to connectivity@inac.gc.ca.

IV Appendices

Appendix A – Federal Connectivity Initiatives

Community Access Program (CAP)

Industry Canada's Community Access Program (CAP) gives to the residents of rural, remote, and urban communities across Canada affordable access to the Internet. This provides Canadians with a new way to communicate, learn, and do business in today's knowledge-based economy.

The Community Access Program is pursuing the following objectives:

- To promote public awareness of the benefits and opportunities of using information technology and services;
- To help citizens become better informed through the exchange of ideas and information;
- To provide training for individuals in the use of information technologies;
- To support on-line delivery of government programs and services;
- To facilitate business activities such as electronic commerce; and
- To conduct on-line learning and researching.

The Community Access Program is a partnership between governments, the private sector, and community organizations designed to help accelerate public access to the Internet all across the country. At present, 8,800 affordable Internet access sites have been established or approved.

The program has a significant impact at the grassroots level and has become an important economic and social development tool in communities. Momentum has been building over the years, producing a national network of CAP communities/champions resulting in local Web sites, innovations and economic growth. In terms of overall impact, CAP has connected Canadians to the Internet and to each other from coast to coast.

To obtain more information, please contact CAP directly at:

Community Access Program
Industry Canada
Tel: 1-800-575-9200
TTY: 1-800-465-7735
Fax: (613) 952-8711
E-mail: comaccess@ic.gc.ca
Internet: http://cap.ic.gc.ca/

First Nations Schoolnet

First Nations SchoolNet (FNS) gives First Nations communities the opportunity to use exciting new technologies by providing schools with an affordable, high-speed connection to the Internet via DirecPC(tm) satellite terminals. To date, 80 percent of eligible schools are participating. Helping Canadians become connected to the Internet is part of Connecting Canadians, the Government of Canada's vision and plan to make Canada the most connected country in the world.

FNS is part of the broader SchoolNet initiative of Industry Canada's Information Highway Applications Branch. The work is being led by Industry Canada in partnership with the Assembly of First Nations, Canadian telecommunications companies through the former Stentor Alliance, and First Nations schools and communities.

The installation and use of FNS equipment is also supported by a network of help desks located in First Nations organizations or Aboriginal businesses across the country.

All eligible schools (i.e., schools under federal jurisdiction) receive information packages on FNS. They can then contact SchoolNet to make arrangements. Equipment is sent to the schools and contact is made with the closest help desk to help support installation. Funding is also put in place to support Internet access and long distance expenses (where applicable).

For more information, please contact:

Telephone: 1-800-575-9200
TTY: 1-800-465-7735
Web site: http://www.schoolnet.ca/aboriginal

VolNet

The Voluntary Sector Network Support Program (VolNet) is a new federal government program administered by Industry Canada. A part of the government's Connecting Canadians initiative to make Canada the most connected country in the world, VolNet's goal is to offer Internet connectivity, including computer equipment, new information technologies, network support and Internet skills development to voluntary organizations by March 31, 2002.

VolNet will improve the voluntary sector's access to information technology and to the skills and tools it needs to play a stronger role in Canadian society. VolNet's mission is to enable voluntary organizations to access and use Internet technologies to further their own mission.

VolNet is a joint undertaking of the federal government and the public, private and voluntary sectors. It is guided by the VolNet National Advisory Committee (VNAC), which comprises voluntary and private sector representatives, and federal government officials. The VolNet program design reflects key recommendations made by VNAC in its report, Building the Technological Capacity of the Voluntary Sector (January 1999).

Industry Canada is creating a network of VolNet delivery agencies, which will provide VolNet services to eligible charitable and not-for-profit organizations. Voluntary organizations wanting to take advantage of VolNet's services will apply through these delivery agencies, which will be responsible for identifying eligible VolNet Service Package recipients, assessing their needs, and purchasing goods and services on their behalf. Delivery agencies will also provide ongoing assistance in integrating new technologies into recipients' day-to-day work.

The VolNet Service Package includes three components:

- Internet access and support services - a basic Internet account for one year Computer equipment needed to connect to the Internet - 50 percent of the cost of the equipment is covered by Industry Canada (up to a maximum specified by VolNet), with the recipient paying the remainder
- Basic Internet skills development - basic Internet skills development to get on-line and start using the Internet.

In addition to the VolNet Service Package, VolNet also makes available applied learning opportunities and ongoing support, such as on-line discussion groups, workshops and a volunteer recruitment program to provide technological assistance to voluntary organizations in need.

Industry Canada is holding an ongoing competition inviting potential delivery agencies to submit proposals. Proposals are submitted to VNAC for review against specific eligibility and evaluation criteria. VNAC then makes recommendations to Industry Canada on which proposals to support.

Industry Canada is seeking organizations or consortiums with a mix of Internet and voluntary sector experience to take on the role of delivery agencies. Delivery agencies may be not-for-profit organizations working in the community Internet field, charities or not-for-profits with Internet project experience, or consortiums that include a not-for-profit organization and a for-profit Internet services company.

For more information, please contact:

Telephone: 1-800-575-9200
TTY: 1-800-465-7735
E-mail: volnet@ic.gc.ca
Web site: http://www.volnet.org/

Appendix B – Provincial Connectivity Initiatives

Alberta
Alberta Supernet
http://www.innovation.gov.ab.ca/supernet
Primary goals: Alberta SuperNet is an endeavor to provide affordable high-speed network connectivity and Internet access to all universities, school boards, libraries, hospitals, provincial government buildings and regional health authorities throughout the province. At the same time, SuperNet will ensure businesses and residences in 422 communities will have access to high-speed Internet at competitive rates.
Estimated date of completion: 2004

Saskatchewan
Saskatchewan Partnership for Prosperity
http://www.saskprosperity.sk.ca/
Primary goals: Increase access to high-speed Internet to at least 250 communities by 2005; increase the number of businesses and families connected to the Internet by 40%.
Estimated date of completion: 2005

Manitoba
Canada-Manitoba Infrastructure Program
http://www.infrastructure.mb.ca/e/proinfo.html
Primary goals: A multi focused program that for which projects related to Rural and Northern Telecommunications Infrastructure and High-Speed Internet Access for Public Institutions are included.
Estimated date of completion: March 31, 2007

Ontario
Connect Ontario
http://www.est.gov.on.ca/english/Connect/index.htm
Primary goals: Connect Ontario is an exciting new SuperBuild Growth Fund initiative to develop a network of 50 smart communities across Ontario by 2005. Through innovative partnerships among community institutions and organizations, governments, local business and other private sector interests, this initiative will enhance the competitiveness of our communities in the new digital economy and spur growth in jobs, new investment, and economic development opportunities.
Estimated date of completion: 2005

Data Service Improvement Program
http://www.torc.on.ca/torceng/memact/DSIP/Default.htm
Primary goals: The $13 million program - "DSIP: Connecting Rural Ontario" -- will provide 310 rural and small communities in Southern Ontario with access to new or improved high-speed data services.
Estimated date of completion: ?

Nova Scotia
Information Economy Initiative
http://www.gov.ns.ca/ecor/iei/index.html
Primary goals: 130 additional CAP sites.
Estimated date of completion: 2003

Yukon
Connect Yukon Project
Primary goals: High speed Internet service to 17 Yukon communities. Better telephone service to all Yukon communities. High-speed data services to most Yukon communities for business applications. New telephone services to many areas that presently don't have telephone service. Every community will benefit from a doubling of the telecommunications capacity available for voice telephone services. This will reduce the incidence of busy signals and poor FAX performance.
Estimated date of completion: End of 2001

Appendix C – Broadband Technology Primer

What is Broadband?

There is no university accepted definition of what constitutes broadband connectivity. It is however; important to recognize that in order to take advantage of the Internet's potential, connecting at a reliable, high transfer rate will be key. Advanced applications like distance education, tele-health, and e-business require broadband access.

Depending on the source, definitions of broadband vary between 200kpbs and 30Mbps with most centering around the T1 level of 1.544 bi-directional Mbps. The National Broadband Taskforce, defined broadband as "a minimum two-way, or symmetrical, transmission speed of 1.5Mbps per individual user" with the overall goal of providing "a high-capacity, two-way link between an end user and access network suppliers capable of supporting full-motion, interactive video applications."

When deciding on what constitutes broadband one must also take into account the services that are currently available in the geographic area of concern. In the eyes of many communities broadband may simply be defined as "anything faster than our dial-up modem".

Technologies

The use of broadband technologies across North America is growing rapidly. A survey conducted by Kinetic Strategies found there are 9.4 million residential customers of broadband Internet services in North America, which includes 8.2 percent household penetration. In addition, the study found that cable is outpacing digital subscriber line service, with 70 percent market share. Cable modem providers continue to dominate DSL providers, with an estimated 6.4 million cable modem customers in the United States and Canada, equal to 70 percent of the market.

In comparison, DSL providers served 2.9 million residential subscribers, according to the survey.

Cable vs. DSL Usage
Source: Kinetic Strategis
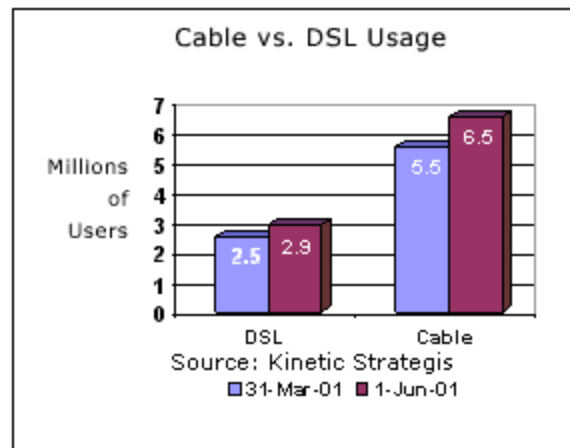
xDSL

A Digital subscriber line (DSL) is a very high-speed connection that uses the same wires as a regular telephone line.

ADSL is a distance-sensitive technology: As the connection's length increases, the signal quality decreases and so does the connection speed. The limit for ADSL service is 5,460 meters, although for speed and quality of service reasons many ADSL providers place a lower limit on the distances for the service. At the extremes of the distance limits, ADSL customers may see speeds far below the promised maximums, while customers nearer the central office have faster connections and may see extremely high speeds in the future. ADSL technology can provide maximum downstream (Internet to customer) speeds of up to 8 megabits per second (Mbps) at a distance of 1,820 meters, and upstream speeds of up to 640 kilobits per second (Kbps). In practice, the best speeds widely offered today are 1.5 Mbps downstream, with upstream speeds varying between 64 and 640 Kbps.

ADSL uses two pieces of equipment, one on the customer end and one at the Internet service provider. At the customer's location there is a DSL **transceiver**, and the DSL service provider has a **DSL Access Multiplexer** (DSLAM). Most residential customers call their DSL transceiver a "DSL modem. It is simply a piece of equipment that connects the customers equipment to the to the DSL line. The DSLAM at the access provider is the equipment that really allows DSL to happen. A DSLAM takes connections from many customers and aggregates them onto a single, high-capacity connection to the Internet. The DSLAM provides one of the main differences between user service through ADSL and through cable modems. Because cable-modem users generally share a network loop that runs through a neighborhood, adding users means lowering performance in many instances. ADSL provides a dedicated connection from each user back to the DSLAM, meaning that users won't see a performance decrease as new users are added.

Types of DSL

Asymmetric DSL (ADSL) - Most homes and small business users are connected to an ADSL line. ADSL divides up the available frequencies in a line on the assumption that most Internet users look at, or download, much more information than they send, or upload. Under this assumption, the connection speed from the Internet to the user is three to four times faster than the connection from the user back to the Internet.
Very high bit-rate DSL (VDSL) - This is a fast connection, but works only over a short distance.
Symmetric DSL (SDSL) - This connection, used mainly by small businesses, doesn't allow you to use the phone at the same time, but the speed of receiving and sending data is the same.
Rate-adaptive DSL (RADSL) - This is a variation of ADSL, but the modem can adjust the speed of the connection depending on the length and quality of the line.

Current technology can provide a theoretical maximum of up to 7 megabits per second, and research promises even greater performance in the future with protocols VDSL.

Cable Modems

When a cable company offers Internet access over the cable information is sent from the Internet to an individual computer -- into a 6 MHz channel. On the cable, the data looks just like a TV channel. Internet downstream data takes up the same amount of cable space as any single channel of programming. Upstream data -- information sent from an individual back to the Internet -- requires even less of the cable's bandwidth, just 2 MHz.

Putting both upstream and downstream data on the cable television system requires two types of equipment: a cable modem on the customer end and a Cable-Modem Termination System (CMTS) at the cable provider's end.

A CMTS will enable as many as 1,000 users to connect to the Internet through a single 6 MHz channel. Since a single channel is capable of 30-40 megabits per second of total throughput, this means that users may see far better performance than is available with standard dial-up modems.

The single channel aspect, though, can also lead to one of the issues some users experience with cable modems. If you are one of the first users to connect to the Internet through a particular cable channel, then you may have nearly the entire bandwidth of the channel available for your use. As new users, especially heavy-access users, are connected to the channel, you will have to share that bandwidth, and may see your performance degrade as a result. It is possible that, in times of heavy usage with many connected users, performance will be far below the theoretical maximums. The good news is that the cable company adding a new channel, and splitting the base of users can resolve this particular performance issue.

Another benefit of the cable modem for Internet access is that, unlike ADSL, its performance doesn't depend on distance from the central cable office. A digital DATV system is designed to provide digital signals at a particular quality to customer households.

Appendix D – Technology Solutions

Satellite Systems

C-COM Satellite and Infinity Heritage
C-Com and Infinity have partnered to provide Aboriginal communities with access to the 2-Way DiRECWAY satellite Internet service. This allows users to download Internet content at speeds of up to 400 Kbps and provides a satellite return channel with upload speeds peaking at 128 Kbps.
http://www.c-comsat.com/

LinCsat and Donna Cona
LinCsat™ Communications Inc. and Donna Cona have partnered to deliver a 2-way high-speed Internet access services by satellite to homes, offices, and institutions. LinCsat uses the DirecWay™ system manufactured by Hughes Network Services as the core technology for the system. This allows users to download Internet content at speeds of up to 400 Kbps and provides a satellite return channel with upload speeds peaking at 128 Kbps.
http://www.lincsat.com/

Bell Canada (DirecPC SE)
The DirecPC SE service transmits data from your personal computer over a modem via your ISP to the DirecPC SE Network Operation Centre, which gathers your digital content and transmits the responses over the high-speed satellite space link via Bell ExpressVu's high-powered DVB satellite. Maximum download are 400 Kbps and upload speeds are dependent upon your local ISP (usually 56 Kbps)
http://www.bell.ca

Gilat Satellite Networks
Gilat Satellite Network through it's subsidiary provides two-way, always on, high-speed satellite Internet service. StarBand downloads at speeds that will often reach 500 Kbps with targeted peak-time speeds in excess of 150 Kbps. Current upload speeds range between 40 and 60 Kbps.
http://www.gilat.com/

Wildblue
WildBlue is a company that plans to deliver high-speed Internet access services via satellite to homes and small offices, virtually regardless of their locations in the U.S. and Canada by 2002. The first WildBlue satellite is expected to launch in 2002, and will provide service to the U.S. and Canada. WildBlue also has the license to 90% of the commercial Ka-band capacity on the TeleSat ANIK F2, scheduled for launch in late 2002. Wildblue is 20% owned by Telesat Canada. WildBlue will typically give you speeds of up to 3.0 Megabits per second (or 3,000k) and up to 0.5 Mbps upstream.
http://www.wildblue.com/

Wireless Networks

Wi-LAN
The Canadian company Wi-LAN specializes in high-speed Internet access, LAN/WAN extension, and broadband wireless access. The Wi-LAN wireless Ethernet bridges have wireless data rates currently ranging from 2.2 to 12 Mbps, and operate using MC-DSSS and Direct Sequence Spread Spectrum technology. They create a solution for building multiple-site information networks or extend communication infrastructures. For building-to-building, LAN-to-LAN connectivity within a given metropolitan, suburban or rural area, broadband wireless access is an easy and cost-effective way to create a high-speed network.

Broadband wireless links can be deployed faster than wire line links. As well, your broadband wireless network can be quickly, easily, and inexpensively modified to meet your changing connectivity needs. A broadband wireless network gives you flexibility to painlessly add or eliminate locations, or secure additional bandwidth.

A wireless building-to-building link provides throughput rates several times faster than those offered by wire line alternatives. And unlike wire line high-speed circuits that are typically available only in urban centres, broadband wireless links can be deployed virtually anywhere, urban, suburban, and rural locations.

Wireless building-to-building networks are as reliable as traditional wire line ones and provide consistent throughput over distance. Like wire line circuits, wireless links are secure, making unwanted eavesdropping virtually impossible.
http://www.wi-lan.com/

WaveRider
WaveRider has developed a full suite of fixed wireless Internet access products that enable telecommunications service providers to deliver high-speed Internet access to commercial and residential subscribers.

WaveRider's products operate in the license-exempt 2.4 GHz and 900 MHz ISM spectrums, and offer the speed and features network operators require to satisfy their customers' broadband needs.
http://www.waverider.com

Any technology solution providers that would like their company profile included within this report can submit, in French and English, a company description similar to those above to connectivity@inac.gc.ca

Appendix F – Community best practices

Pukatawagon, Manitoba

This Northern Cree community of 2800 people successfully deployed a wireless local loop and satellite uplink station to provide Internet access to it's residents. 50 Local families have signed up for unlimited Internet service for $30 per month. For more Information see this story from the National Post.
http://www.qlccom.com/news/NPOct2201.pdf

Ojibways of the Pic River First Nation, Ontario

The project, with support from FedNor, Aboriginal Business Canada, and the Ontario Aboriginal Economic Development Program delivers high speed - high bandwidth Internet service to the Pic River First Nation administration and residential customers.

The project makes use of an already existing cable television plant. Access to the Internet is accomplished through a newly constructed fibre optic link, installed by Bell Canada. The result is high-speed access similar to large urban centers.

Improved community service in the elementary schools, the youth center, the highschool, the health center and the administration offices is immediate. Programs are working to take advantage of the new service. Improved connectivity has the capacity to change education programs for the school and brings to the forefront opportunities such as telehealth.

The Pic River Development Corporation continues to look at opportunities to expand its cable/Internet division in other communities along the north shore of Lake Superior. Many communities already have the cable infrastructure and access to the Bell fibre network to make similarly constructed projects possible.
http://www.picriver.com/

Industy Canada Smart Communities

Kuh-ke-nah Network (K-Net)

A successful applicant to the Government of Canada's Smart communities program, K-Net is setting up five Smart Services:

- Community Information Technology Centres in each of the five First Nations, which will house a seven station community computer access and training site, a videoconference suite, as well as workstations for disabled users and for multi-media production.
- K-Net Portal, a high-speed, interactive gateway to community information and services. The portal will provide a variety of services, including personalized Web access and e-mail; community development tools such as support for small business; and access to local and regional records such as Band Council minutes.
- Data Warehouses, which will enable each of the five First Nations to store and retrieve information. This is expected to promote better decision making and improve accountability.
- A telehealth initiative in partnership with the NORTH Network, which will improve the level and quality of health services through broadband technologies and various applications. It will include telediagnostic procedures such as cardiology and radiology.
- Keewaytinook On-line Secondary School, which will allow students to attend Grade Nine in their community rather than leaving for urban centres such as Thunder Bay. Pending a successful evaluation and the desires of the communities, Grade Ten will be offered in 2002-03.

http://knet.on.ca

Smart Yellowknife Communities Project

Another sucessful applicant to the Government of Canada's Smart communities program, the Smart Yellowknife Communities Project has developed four Smart Services linked by a "Smart City Centre". The services include:

- CityLink will enable residents to gain access to city services and information through cable television, telephone (IVR) and eventually Smart TV. Through the CityLink individuals will be able to register their business, book a facility, secure permits and licenses, or pay utility bills and parking tickets.
- WellnetLink provides information and services of interest to the public, other NGOs and health practitioners.
- BusinessLink offers members and non-members a listing on the city's electronic directory, as well as options such as e-commerce applications. More advanced features will include a "virtual incubator mall," which will allow order, delivery and payment services.
- Knowledgelink projects bring the classroom into the home connecting parents and teachers. The site will also offer

open labs for computer awareness training. On a broader scale, KnowledgeLINK brings information on the North to the community and the world. Comprehensive demographic and geographic information will be available. Virtual tours of traditional aboriginal travel routes and customs are being constructed for the enjoyment of visitors.

http://www.looknorth.ca

SmartLabrador

The SmartLabrador Network is providing highspeed Internet access and videoconferencing capabilities to 41 public-access and health sites in the region. SmartLabrador has developed an innovative hybrid network, which utilizes satellite, frame relay and wireless technologies. Geographically, the SmartLabrador Network is one of the largest networks in Canada. It is also one of the first integrated telephone and satellite IP networks, and as such enables access to a broad range of applications including:

- Telehealth
- Virtual Courtroom
- Government information availible via kiosks
- Technology eduation programs
- Labrador Heritage Mall
- Labrador News Network
- Labrador Heritage Website

http://www.smartlabrador.ca

Any communities that wish to share their connectivity story with the authors of this report my do so via e-mail at connectivity@inac.gc.ca