

The Bell Telephone Historical Collection and Late Nineteenth-Century Canadian Urban History: A Preliminary Report

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[See table of contents](#)

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Article abstract

In 1878, the first telephone exchange in the British Empire was put into service at Hamilton, Ontario. By 1891, the Bell Telephone Company of Canada had completed a long-distance network exceeding 6400 kilometres, including an unbroken link along Central Canada's "Main Street," between Quebec City and Windsor. The company's operations in 1891 embraced 22,000 subscribers and more than 200 exchanges.

The spread of the long-distance network was halting at first, owing to the meagre capital resources of the company and the relatively poor return on investment given just a few thousand subscribers in the entire system. Also, much of the initial capital investment was quickly rendered obsolete, because of technical improvements in voice transmission over copper metallic circuits, which by the mid-1880s had begun to replace and augment existing long-distance links by iron wire.

This research note discusses the development of the long-distance telephone network in Central Canada, its evolving pattern of telephone exchanges, the spread of telephone adoption, and the intensity with which the long-distance system was used in its formative phase. The research was completed under the auspices of the *Historical Atlas of Canada/Atlas Historique du Canada*.

Research Notes/Notes de recherche

The Bell Telephone Historical Collection and Late Nineteenth-Century Canadian Urban History: A Preliminary Report*

Darrell A. Norris

Résumé/Abstract

En 1878, le premier central téléphonique de l'Empire britannique était inauguré à Hamilton (Ontario). Dès 1891, la compagnie de téléphone Bell du Canada avait mis sur pied un réseau interurbain de plus de 6000 km, y compris une ligne continue le long de l'axe principal du centre du pays, entre Québec et Windsor. La société desservait en 1891 au-delà de 22,000 abonnés par l'intermédiaire de plus de 200 centraux.

L'expansion du réseau interurbain fut entravée au début par les maigres ressources financières de la société et le rendement plutôt faible des investissements, imputable au fait que l'ensemble du réseau comptait seulement quelques milliers d'abonnés. En outre, une grande partie des premières immobilisations tomba vite en désuétude par suite des progrès techniques réalisés dans le domaine de la transmission de la voix. Les circuits métalliques en cuivre, vers le milieu des années 1880, commençaient déjà remplacer les câbles de fer des lignes interurbaines.

La présente note de recherche décrit la croissance du réseau téléphonique interurbain dans le centre du Canada, ainsi que le modèle d'évolution des centraux téléphoniques, l'adoption du téléphone et la fréquence d'utilisation du système interurbain à l'époque de son implantation. La recherche a été menée sous les auspices de l'Atlas historique du Canada/Atlas of Canada.

In 1878, the first telephone exchange in the British Empire was put into service at Hamilton, Ontario. By 1891, the Bell Telephone Company of Canada had completed a long-distance network exceeding 6400 kilometres, including an unbroken link along Central Canada's "Main Street," between Quebec City and Windsor. The company's operations in 1891 embraced 22,000 subscribers and more than 200 exchanges.

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This research note discusses the development of the long-distance telephone network in Central Canada, its evolving pattern of telephone exchanges, the spread of telephone adoption, and the intensity with which the long-distance system was used in its formative phase. The research was completed under the auspices of the Historical Atlas of Canada/Atlas Historique du Canada.

Introduction

Between 1878 and 1891, Canadian communications were revolutionized by the development of long-distance telephony and by the adoption of the telephone. In 1878, the British Empire's first telephone exchange went into

service, at Hamilton, Ontario. Thirteen years later, the Bell Telephone Company of Canada had completed a long-distance system of over 6400 kilometres, including an unbroken connection between Quebec City and Windsor, Ontario. The company's operations by 1891 embraced 22,000 telephone subscribers and over 200 exchanges in Quebec and Ontario. Like many technological innovations, telephony faced numerous problems in its early commercial application. The first of these was that the limited number of early adopters of the innovation was, in itself, a barrier to widespread adoption. In Canada, telephone adoption was gradual until 1902, when the number of subscribers served by Bell mushroomed from 50,000 to almost 200,000 within a decade.¹ The second problem was that the commercial viability of the industry was threatened by the capital investment required to in-

* This report is based on research at the Telephone Historical Collection of Bell Canada, 1050 Beaver Hall Hill, Montreal. I am indebted to Miss E. M. L. Geraghty (Historian) and to the staff of the collection, for their advice and assistance. I particularly wish to thank Mrs. N. Raquer and Miss B. Primeau for their help. This preliminary research was completed with the support of the Social Sciences and Humanities Research Council, through its funding of the *Historical Atlas of Canada/Atlas Historique du Canada*. Further analysis may yield an effective mapping of nineteenth-century communications and their urban context in Volume Two of the Atlas.

stall an urban and interurban infrastructure in anticipation of future revenue. The fledgling Bell Telephone Company of Canada, with initial capital resources of \$500,000 in 1880, poured over \$2 million into new construction in its first decade.² Another problem was that early telephone equipment was quickly superseded by technical refinements or was simply incapable of accommodating the increased volume of telephone messages. For example, iron wire was employed on the Bell network in Canada until 1885 when hard-drawn copper wire, which furnished better transmission, was first installed on the Hamilton-St. Catharines line.³ Later, twin-wire copper metallic circuits were substituted, yielding a further improvement in the quality and range of sound transmission. However, by 1891, much of the existing wire mileage was obsolete. Also, by the end of the 1880s, the Bell company had begun to replace an urban chaos of overhead wires with underground conduits in downtown areas. Moreover, the telephone had no monopoly of urban air-space. In 1891, the Board of Directors of the company reported that:

The introduction of electricity for street railways, motors, etcetera, as well as electric lighting, has made it necessary to provide for a great deal of reconstruction, of which, in the large cities, a large percentage must be underground. This work is being carried on as rapidly as its nature will permit.⁴

A fourth problem was that the annual rental cost of a telephone placed it well beyond the means of the general public. In the first seven full years of the Bell company's operations, average rental paid per subscriber ranged between 30 and 35 dollars per annum,⁵ equivalent to about a tenth of a manufacturing worker's annual income.⁶ At that price, the telephone had a limited market to penetrate. In some small towns, for example, telephone adoption appears to have been a very slow process. In Dundas, Ontario, one of the earliest centres served, there were twenty subscribers in 1881, and only thirty-six a decade later.⁷ In contrast, during the same period Montreal experienced almost a ninefold growth in the number of Bell telephones in service.⁸

Historical Context

The early years of the telephone in Canada were decisive in the sense that the innovation was well-entrenched within a decade of its introduction, yet these years were inconclusive in terms of the role the telephone would eventually play in Canadian society. Two close parallels spring to mind: the automobile and television. Among nineteenth-century innovations, early railway development in Canada is not a good parallel to the formative years of the telephone industry because railway technology had been refined in Britain and the United States before it was applied in Canada in the 1850s.

Canada can lay claim to hosting the concept of the telephone, albeit on the basis of a summer visit by Alexander Graham Bell to the family home in Brantford in 1874.⁹ Bell's early telephone experiments, however, were completed in his Boston laboratory and subsequently demonstrated publicly at the Philadelphia Centennial Exhibition in 1876. In July of that year, Bell successfully achieved the first long-distance telephone contact, between Brantford and nearby Mount Pleasant, Ontario, using the line of the Dominion Telegraph Company.¹⁰ This success was repeated shortly after between Brantford and Paris, Ontario. The Canadian patent on Bell's system, issued in 1877, was subsequently assigned by Bell to his father,¹¹ who sold these rights to the National Bell Telephone Company of Boston, having failed to find a Canadian buyer. The Boston company in turn assigned an agent to Canada to merge competing telephone interests into a single company. This, the Bell Telephone Company of Canada, was given exclusive rights by authority of Parliament in April 1880. By December of that year the company had bought out the telephone interests of four Canadian telegraph companies and three city telephone companies (Hamilton, London and Windsor). The company's monopoly was short-lived. Its Prince Edward Island interests were sold in 1885. Services in Nova Scotia and New Brunswick were transferred to provincial control by 1888, and in the following year Bell sold its British Columbia interests to the Victoria and Esquimalt Telephone Company.¹² The company was active in Western Canada (Winnipeg was the third largest earner in the network in 1885, after Montreal and Toronto);¹³ Bell interests in the Prairie Provinces were sold during 1908-09.¹⁴ Although Saint John, New Brunswick, and Halifax, Nova Scotia, were among the first thirteen telephone exchanges operated by Bell in 1880, early telephone adoption was slow outside of Ontario, Quebec and Manitoba. By 1888, when Bell was divested of its interests in the Maritimes, there were just 1,200 subscribers in New Brunswick and Nova Scotia,¹⁵ 8.2 per cent of the total served by Bell. The financial ledgers for the company reveal its business activities in eighteen Maritimes centres between 1880 and 1885,¹⁶ but seven of these agencies had lapsed by 1885, and three-quarters of the company's Maritimes business was done in Halifax or Saint John. In its first decade of service, the principal concern and success of the Bell Company was to create a system focused on what Maurice Yeates has termed Central Canada's 'main street,' the Quebec-Windsor axis, and to accommodate the traffic demands of two key metropolitan nodes, Toronto and Montreal.

The Telephone Historical Collection

The data concerning the early activities of the Bell Telephone Company of Canada are very comprehensive; they have been brought together and very thoroughly catalogued at the Bell Canada Telephone Historical Collection, Room 820, 1050 Beaver Hall Hill, Montreal, P.Q.,

H3C 3G4. Correspondence should be addressed to Miss E.M.L. Geraghty (Historian). The data I examined fall into three general categories of urban-historical interest. These are the chronology of aggregate growth, the development of the long-distance telephone network, and the pattern of telephone adoption and usage.

Aggregate Growth

The *Annual Reports* and year-end Financial Statements of the company provide several aggregate measures of the system's development between 1880 and 1891 (Table 1). The reports also document, albeit briefly, the company's acquisition and sale of telephone interests, issues of share capital and equipment manufacturing. Bell's manufacturing department began in 1882; a new factory on Aqueduct Street opened in 1891 with a pay-roll of 200 men.¹⁷

The Long-Distance Network

Three sources of evidence in the Telephone Historical Collection can be used to trace the early development of Bell's long-distance services:

- a) The Long Distance Line Statistics Book.
- b) Agency and Long Distance Network Maps.
- c) "Long Distance Rates," Reference 30681.

The Long Distance Line Statistics Book is a chronologi-

cal record, beginning in 1881, of each link in the system and of subsequent improvements, if any. Each entry records:

- (i) the origin and destination of the line worked on.
- (ii) the mileage of poles constructed, if any.
- (iii) the mileage of wire erected.
- (iv) the type of wire; by material and grade.
- (v) the year.
- (vi) the expenditure incurred.

Underground, metallic circuit, or purchased links are also indicated by supplementary notes in the ledger. Some lines were up-graded several times during the decade 1881-91. The Hamilton-Toronto link is a case in point:

(i) 1881	45.5 pole miles; 147 miles of iron wire	\$8,000
(ii) 1883	49 miles of iron wire	\$2,192
(iii) 1885	6 pole miles (Burlington loop); 98 miles copper wire	\$2,500
(iv) 1887	43 miles copper wire	\$2,186
(v) 1887	(via Burlington) 33 pole miles; 91 miles copper wire	\$4,327
(vi) 1887	93 miles copper metallic circuit	\$2,659
(vii) 1888	(to Clappison's Cor.) 11 miles copper wire	\$ 378
(viii) 1889	(Lorne Park Loop) 1.75 pole miles, 3.5 wire miles	\$ 233
(ix) 1891	(to Burlington) 13 miles copper wire	\$ 897

TABLE 1

Growth of the Bell Telephone Company of Canada, 1880-1891

YEAR	SUBSCRIBERS (th.)	EXCHANGES	AGENCIES	SYSTEM MILEAGE ^b		REVENUE (DOLLARS)			EXPENDITURE	
				POLE	WIRE	EXCHANGE	PRIVATE	TRUNK	NON- CAP.	CONSTR.
				(th.)	(th.)	(th.)	(th.)	(th.)		
1880	2.1	13	45	-	-	23.8	5.0	-	18.6	
1881	3.1	40	21	.084	.196	83.8	10.6	-	68.2	20.5
1882	4.4	41	23	.233	.439	135.7	13.3	-	92.2	93.4
1883	6.0	44	28	.507	1.105	189.8	15.1	-	105.4	80.4
1884	7.4	74	19	.855	1.5	245.1	14.9	-	204.1	126.3
1885	9.6	126	49	2.0	3.0	287.1	12.7	-	204.8	130.4
1886	11.6	157	79	2.6	4.0	337.8	12.6	59.0	253.3	217.7
1887	14.0	184	106	3.1	5.1	411.5	11.7	76.8	295.1	176.9
1888	14.6 ^a	184 ^a	115	3.6	6.3	440.7	10.0	89.4	325.8	185.0
1889	16.6 ^a	201	124	3.7	6.6	450.7	10.6	102.5	364.3	184.4
1890	19.4	212	151	4.1	8.2	451.8	10.8	109.2	451.2	168.7
1891	22.2	229	185	4.4	9.2	584.0	10.7	121.1	554.6	309.9

NOTES: a) Divestiture of Nova Scotia and New Brunswick operations occurred in 1888, comprising 1200 subscribers. 300 were transferred to the Victoria and Esquimalt telephone company in 1889.
b) 1 mile equals 1.61 kilometres.

SOURCE: The Bell Telephone Company of Canada, *Annual Reports, Agencies Ledgers*

The long-distance network maps confirm the exact line of each link constructed. The five thematic maps show the expansion of this network in Ontario and Quebec between 1881 and 1890. Note the widespread introduction of copper metallic circuits on new links constructed after 1884, and the replacement of the iron wire strung between Toronto and Sarnia via Hamilton and London. Outside of the Montreal region and the Eastern Townships, the extension of the exchange and long-distance network in Quebec was largely limited to the north shore of the St. Lawrence as far as Quebec City.

The structure of long-distance rates between 1880 and 1919 is summarized in a report (reference 30681) which extracts the toll information given on network maps, in advertisements and in the company's instructions to its agents. The company adopted a stepped distance-cost rate profile.

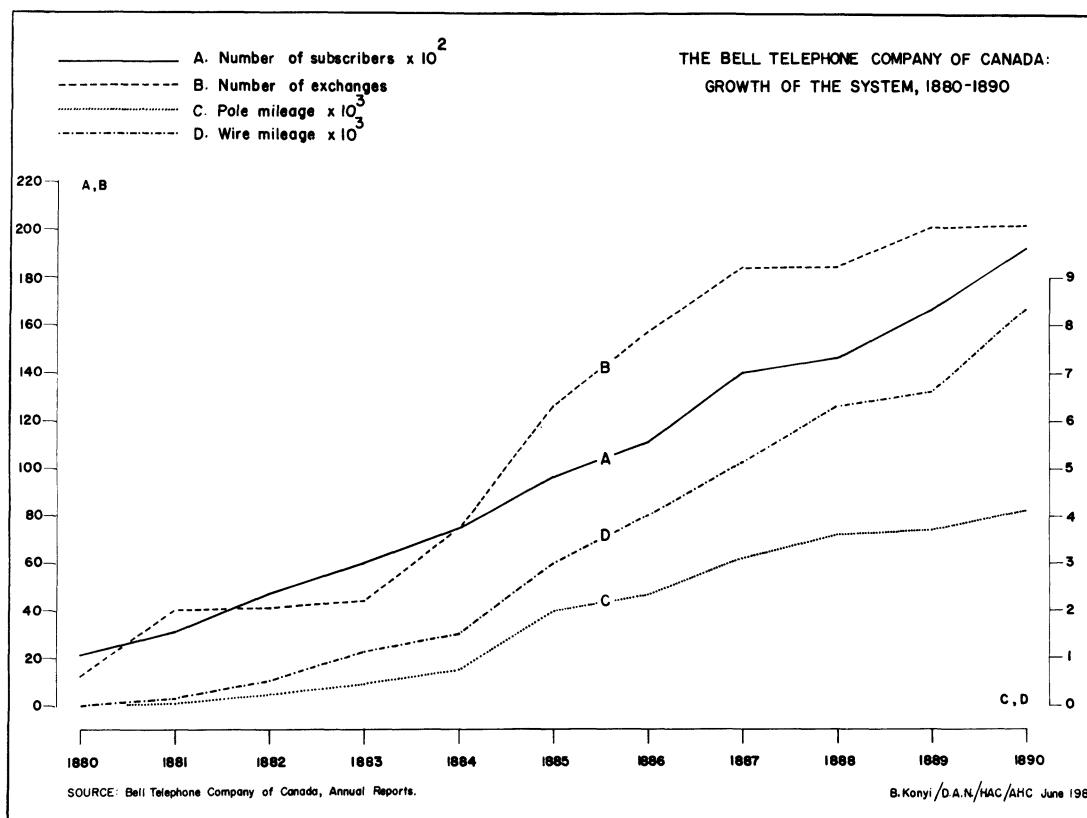
Telephone Adoption and Usage

THE URBAN SYSTEM. Reference 24085 in the Telephone Historical Collection contains a table showing the number of telephones in service, by year, in 125 centres in Ontario and Quebec between 1879 and 1958. Many places served are missing from the list (and no data exist for some years) but the record nonetheless provides a useful

picture of early telephone adoption (Table 2). The list appears to have been compiled from early telephone directories. The Agencies Ledgers of the company provide income summaries for over 200 exchanges and agencies in the Maritimes, Central Canada and the Prairies, for the period 1880-1885. These ledgers have, it seems, three key applications:

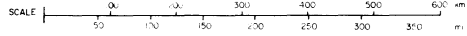
- 1) They can be used to corroborate the evidence in reference 24085, discussed above. Exchange rental income should generally mirror the number of telephone subscribers attributed to an exchange in a given year.
- 2) They can be used to supplement the same evidence; i.e. where the number of telephones is unknown, it can be estimated from rental income.
- 3) They provide a picture of each centre's long-distance telephone contact (from the trunk revenue of the exchange).

Some preliminary results are given in Table 3. As column 4 of the table indicates, average rental income per subscriber was relatively high in Toronto and Montreal, presumably because many subscribers in these two cities rented additional lines. Otherwise, \$20 to \$30 per annum seems to have been the prevailing standard.

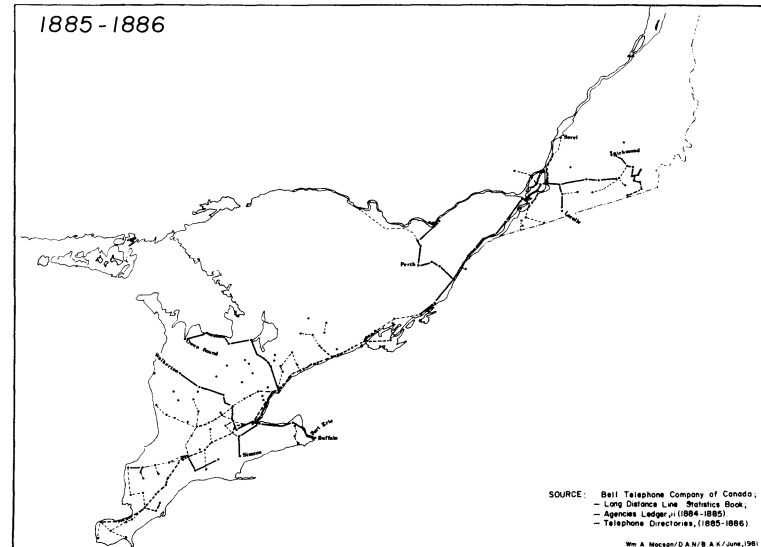
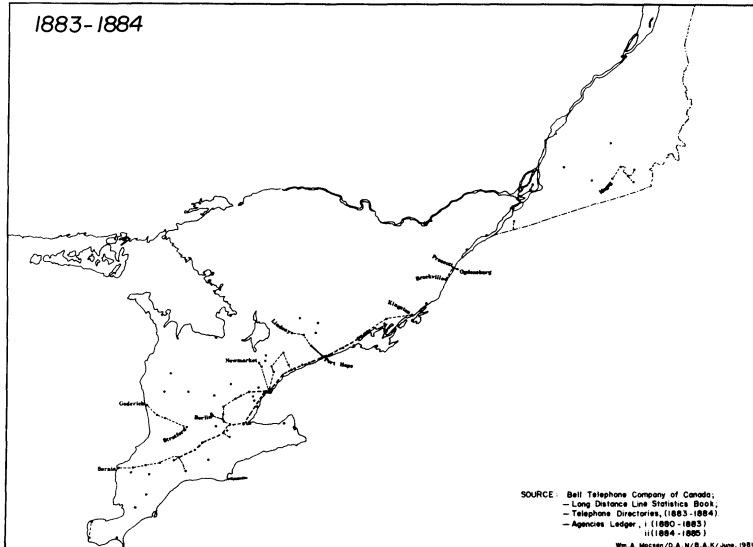
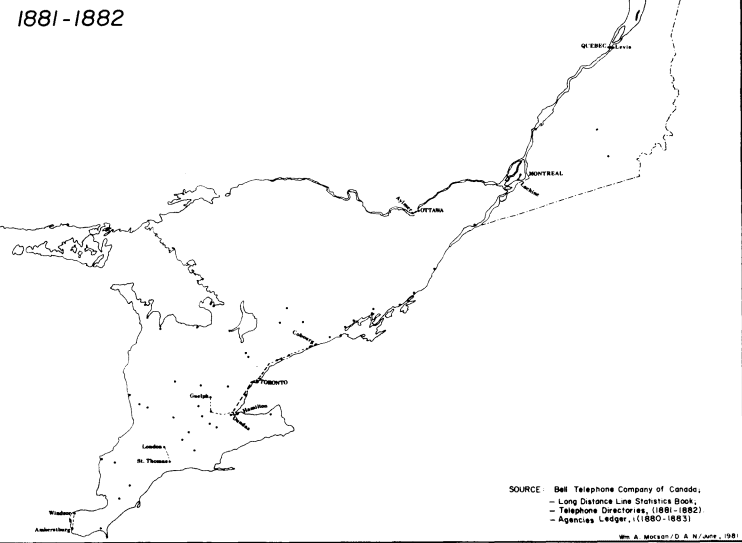


THE BELL TELEPHONE NETWORK IN CENTRAL CANADA, 1881-1890

- Place with telephones installed
- Long-distance connection, single strand iron wire
- - Long-distance connection, iron wire, two or more strands
- / Long-distance connection, copper metallic circuit



HISTORICAL ATLAS OF CANADA/ATLAS HISTORIQUE DU CANADA, McMASTER UNIVERSITY JUNE 1980
BASE: Department of Energy, Mines and Resources, Surveys and Mapping Branch (1971)



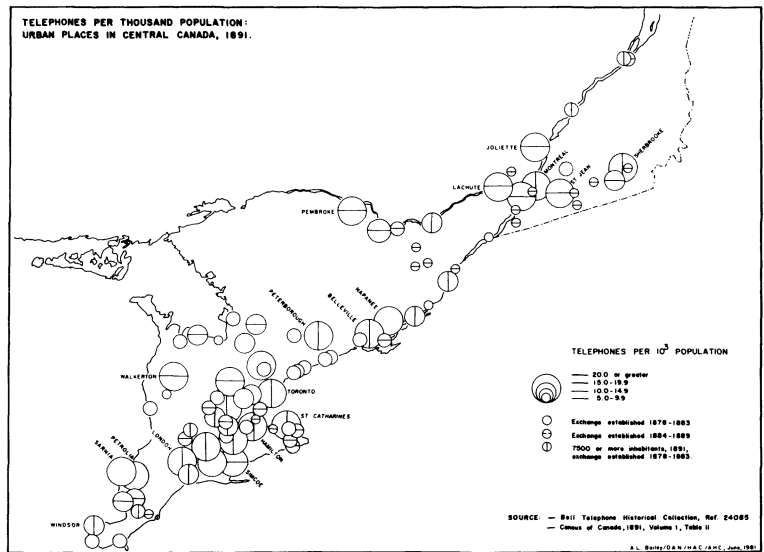
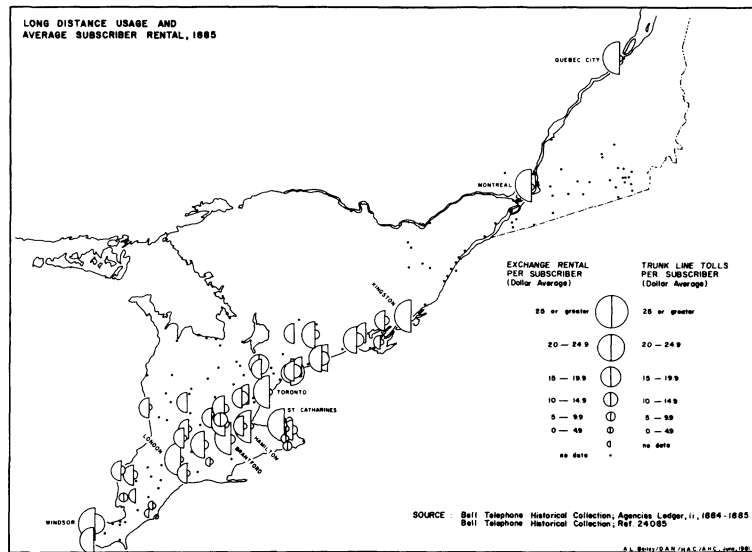
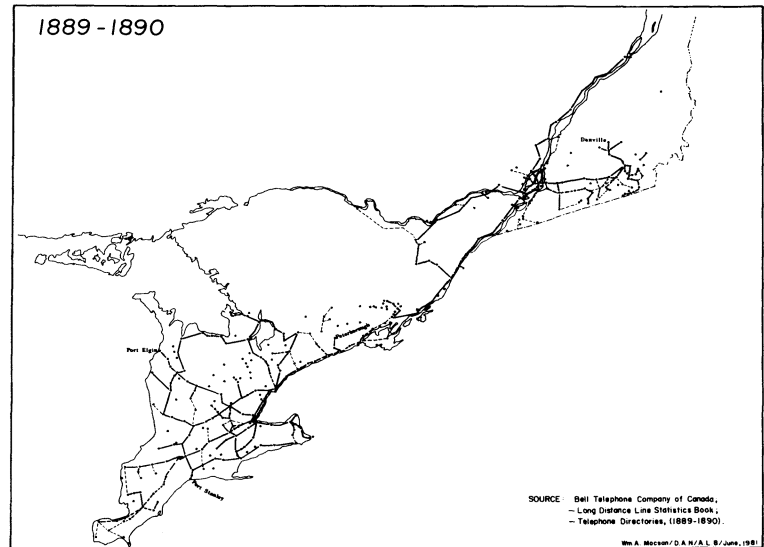
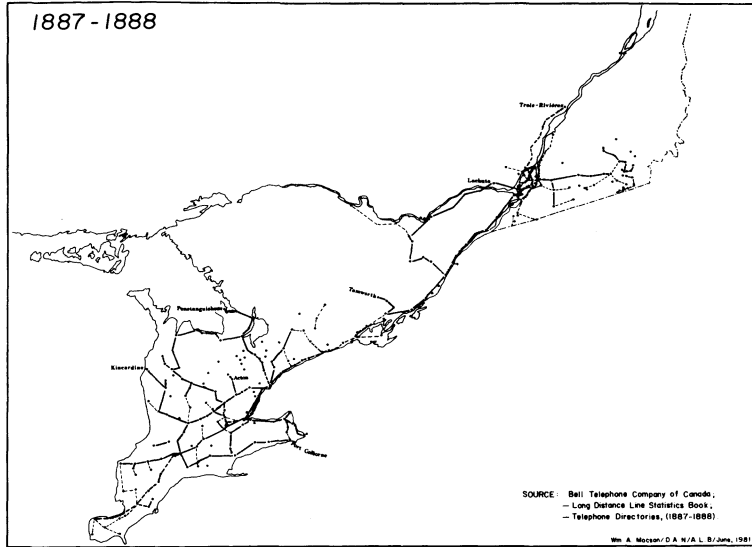


TABLE 2

Bell Telephone Subscribers: Selected Urban Centres in Ontario and Quebec, 1880-1891^a

YEAR	1880	1883	1885	1887	1889	1891
PLACE						
Belleville	-	29	98	180	221	238
Bowmanville	-	45	62	59	46	50
Brantford	33	75	131	198	265	299
Cobourg	-	39	49	52	53	60
Dundas	-	26	31	30	n.a.	36
Galt	-	55	86	110	116	139
Guelph	11	50	99	167	175	212
Hamilton	181	389	573	747	857	1004
Kingston	-	107	157	328	272	371
Lindsay	-	27	46	57	60	86
London	104	283	407	530	n.a.	760
Montreal	546	1000	1300	2082	3622	5689
Napanee	-	11	42	104	102	105
Oshawa	-	32	40	46	39	48
Ottawa	230	n.a.	388 ^b	464	n.a.	968
Peterborough	-	60	109	154	184	317
Port Hope	-	55	70	74	64	73
Quebec	79	n.a.	293	n.a.	625	838
St. Thomas	28	64	85	113	129	170
Toronto	353	796	1329	2007	2892	3818
Whitby	-	18	30	32	27	34
Windsor	22	n.a.	73	105	151	188
Woodstock	-	49	89	114	152	181
Cornwall	10	n.a.	n.a.	43	60	67
Paris	-	20	35	39	40	43

NOTES: a) Urban centres listed by 1883 included in the above list.
b) Figure is for 1886.

SOURCE: Telephone Historical Collection No. 24085.

Long-distance calls were made from the exchange (non-subscribers paid extra for this service but could use it) and it is, therefore, somewhat misleading to express trunk-line tolls (i.e., long-distance revenue) on a per-subscriber basis (Table 3, Column 5). Nonetheless, the figures suggest that use of the long-distance network in 1885 was greater in Central and Western Ontario than in Eastern Ontario or Quebec.¹⁸ Within Ontario, long-distance calls were apparently less common in the major cities than in their tributary urban centres (see map). The final map, which shows telephone adoption rates attained by 1891, corroborates the importance of the telephone in the medium-sized centres of Southern Ontario's urban pattern, particularly if their exchanges were among those established during the first six years of telephone-network growth.

URBAN CASE STUDIES. The Telephone Historical Collection has account books for early exchanges. One ex-

ample, for Petrolia, Ontario, suggested that telephone adoption was anything but irreversible. Many subscribers' accounts lapsed; some remained in arrears. The most promising source, however, for tracing the pattern of telephone adoption is the city telephone directory. For example, the collection holds an excellent directory series for Hamilton, the first Canadian exchange, starting in 1878. These directories can be linked to contemporary city street directories and assessment rolls to provide a detailed socio-economic profile of early adopters of the innovation.

TABLE 3

Exchange Revenue, Nine Selected Centres, 1885

EXCHANGE	1	2	3	4	5
	SUB- SCRIBERS ^A (1885)	EXCHANGELINE RENTAL ^B (1885)	TRUNK- LINE TOLLS ^C (1885)	B/A (\$)	C/A (\$)
Toronto	1329	53,548	4997	40.29	3.76
Montreal	1300	66,976	948	51.52	0.73
Hamilton	573	15,540	2413	27.12	4.21
London	407	10,189	1331	25.03	3.27
Ottawa	388	11,248	179	28.99	0.46
Quebec	293	11,035	141	37.66	0.48
Kingston	157	4,884	360	31.11	2.29
Brantford	131	3,341	849	25.50	6.48
Peterborough	109	2,249	758	20.63	6.95

NOTE: Values in columns b and c were obtained from the *Agencies Ledger* (Reference 23126-1).

Conclusions

From this preliminary survey of Canada's first telephone decade (and of the evidence available to trace the spread of the innovation), it appears that the scope of developments before 1891 commands much urban-historical interest. At least three treatments of early telephony are plausible:

1) Telephony as simply an aspect of nineteenth-century communications technology imposed on the urban fabric.

2) Telephony as an element of the increasing integration of the urban system in the late-nineteenth century and of the growing dominance of metropolitan centres. The evolving long-distance telephone network clearly echoes the developing urban system.

3) Telephony as a social phenomenon in the late-nineteenth-century city.

NOTES

1. Bell Canada, Telephone Historical Collection (Henceforth B.C.T.H.C.), Reference 24085, "Telephones in service as of December 31."
2. B.C.T.H.C. J.H. Brace, The Bell Telephone Company of Canada: *Annual Reports*, 1880 to 1946 (Bound volume, Gazette Printing, Montreal.)
3. B.C.T.H.C., "Long distance line statistics book, 1881-."
4. B.C.T.H.C., The Bell Telephone Company of Canada, *Annual Report*, 1891.
5. B.C.T.H.C., The figure is based on total rental income from exchange and private lines, given in the Annual Reports of the company. Some lines (e.g. government offices) were rent-free.
6. *Census of Canada*.
7. B.C.T.H.C., "Number of Telephones in Service as of December 31," (1879-1958) Reference 24085.
8. *Ibid.*, Toronto's growth was almost identical: 400 telephones in 1881, 3,818 a decade later.
9. Robert V. Bruce, *Alexander Graham Bell and the Conquest of Solitude* (Boston, 1973), pp. 120-124.
10. *Ibid.*, p.201.
11. *Ibid.*, p.247. Bell assigned three-quarters of the Canadian patent rights to his father.
12. These transactions are described in the *Annual Reports* of the company.
13. B.C.T.H.C., "Agencies Ledger, Bell Telephone Company of Canada, 1884-85." Reference 23126-1, folio 170.
14. H.G. Owen, *The First Century of Service* (Bell Canada, 1980), p.2.
15. B.C.T.H.C., *Annual Report*, 1888.
16. B.C.T.H.C., "Agencies Ledger, Bell Telephone Company of Canada, 1880-1883, 1884-1885." References 23126, 23126-1. The 18 centres were as follows:
 - a) Amherst, N.S. Private line(s) rented in 1880, lapsed by 1881. Exchange by 1885, with rental income of \$692.
 - b) Bridgewater, N.S. Private lines 1881-1885, \$218 income in 1885. Trunk connection 1884-1885, income \$8.
 - c) Campbellton, N.B. Private line(s) rented in 1880, lapsed by 1881.
 - d) Charlottetown, P.E.I. Exchange, 1884-1885, income \$254.
 - e) Bathurst, N.B. Private lines rental income in 1883 only.
 - f) Chatham, N.B. Private line(s) 1880, lapsed thereafter. Exchange 1884-1885, income \$1,345. Trunk connection 1885, income \$458.
 - g) Cumberland, N.S. Private line rented in 1880, lapsed by 1881.
 - h) Fredericton, N.B. Private lines 1881-1885, income \$260 in 1885. Exchange installed by 1885, income \$700.
 - i) Halifax, N.S. Private lines and exchange, 1880-1885. Income \$904 and \$8,930 respectively. Trunk connection 1884-1885, income \$11.
 - j) Moncton, N.B. Private lines and exchange, 1881 only. Income \$503, \$711.
 - k) New Glasgow, N.S. Private lines 1884-1885, income \$290.
 - l) Pictou, N.S. Private lines 1880-1883. Income \$356 in 1883.
 - m) Saint John, N.B. Private lines and exchange, 1880-1885. Income in 1885, \$172 and \$10,457 respectively. Trunk income 1885, \$30.
 - n) Sydney, N.S. Private lines rented 1881-1885, income \$594 in 1885.
 - o) Windsor, N.S. Exchange 1885, income \$437.
 - p) Truro, N.S. Private lines 1881-82, income \$160.
 - q) Woodstock, N.B. Exchange 1885, income \$650.
 - r) Yarmouth, N.S. Exchange 1881-1885, income \$1,528. Trunk connection 1884-1885, income \$232.
17. B.C.T.H.C., *Annual Reports*, 1890, 1891.
18. Kingston's link with Toronto was completed by 1883, but the Montreal-Kingston connection was not opened until 1885, and the Quebec-Montreal line was finally opened in 1890.

Editor's Note: In 1978 the Bell Historical Collection placed duplicate copies of certain documents in the Public Archives of Canada to facilitate research. The material included annual reports from 1880, an extensive series of telephone directories and several series of house publications. To gain the perspective of a small telephone operation, researchers may consult the papers of the Aylmer and Malahide Telephone Company, also held at the Public Archives of Canada. Most large telephone companies in Canada have archival programmes and in some cases have prepared company histories.