

University of London

**IDEOLOGY AND THE TELEPHONE: THE
SOCIAL RECEPTION OF A TECHNOLOGY, LONDON 1876-1920**

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Abstract

This thesis explores the social reception of the telephone mainly in late-Victorian and Edwardian London. My objective is to understand how urban populations are educated to a new technology, and how technology is socially appraised and embedded. "The social reception of technology" is defined as the development and promotion of a new technology, the political reactions and social comment it stimulates, and the nature of its social and geographic diffusion. This approach, I argue, reveals important connections between technology, ideology and social power in the city.

The telephone was one of several new space-binding technologies introduced into Britain between 1870 and 1920. The telephone contributed to the creation of a "networked city", and to the extension of the "public sphere". Because of the telephone's basic characteristics -- its speed and immediacy of communication -- commentators have regarded it as essentially modern and democratic. This view is considered deterministic and an exaggeration of the telephone's early significance.

The telephone system developed gradually. Initially an élite technology, the telephone was first used and introduced in traditional ways. Developed in Britain largely by private interests, the telephone was commoditised by its promoters and marketed as a business machine. The long distance network was prioritised over local networks, business over social uses, and the extension of the price system over other possible social objectives. As the telephone system developed, this "entrepreneurialism" clashed with other ideological agents in the city: the individualism of private land ownership, professionalism of engineers and public servants, and with diverse state and non-state institutions claiming to represent the public interest. If not modern in function or consequence, the telephone I suggest was institutionally modern; in the attempts of its promoters and their opponents to use the "public sphere" in their own interest, yet always subject to it; to generate through the press and through material and symbolic practices talk about the telephone, yet always subject to public scrutiny in the form of press comment and criticism.

The thesis illustrates these arguments through a survey of how the telephone was reported in the press; through a study of policy as revealed in the archives of the Post Office and the National Telephone Company; and through a case study of the telephone's diffusion in the middle class suburb of Hampstead.

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Table of Contents

<i>Abstract</i>	2
<i>Acknowledgements</i>	3
<i>Table of Contents</i>	5
<i>List of Figures</i>	7
<i>List of Tables</i>	9
Chapter	
1. Ideology, the social reception of technology and the telephone	10
Introduction	
Ideology	
The social reception of technology	
The telephone	
The telephone's institutional development in Britain: a summary	
Thesis structure	
2. Methodology and sources	44
Research methods	
Sources consulted	
Problems of interpretation	
3. The telephone's social reception and diffusion, 1876-1920	56
Introducing and demonstrating the telephone	
The telephone's military significance	
A superior telegraph	
A developing network	
Demonstration, description, and the telephone's social diffusion	
The telephone's social uses	
How reliable was the telephone?	
Conclusions	
Notes	

4. Competing ideologies and the "telephone question", 1876-1912	123
Alternative development paths	
The National Telephone Company and its critics	
Other voices?	
The telephone question	
Local social geography	
A modern debate?	
Conclusions	
Notes	
5. Educating the public: selling telephones	161
The National Telephone Company: origins, size and structure	
What did the telephone cost?	
The ideal telephone	
Contract agents	
Making space work: the case of call offices	
Conclusions	
Notes	
6. Hampstead on the telephone c.1890-1921	206
Hampstead's social and spatial structure	
Hampstead receives the telephone	
Who had the telephone? When, where and why, c.1901-21?	
Conclusions	
Notes	
7. Conclusions and suggestions for further research	237
Appendix	
1. Methods of analysis and sampling strategies for the selection of Hampstead telephone subscribers, c.1901-21	248
2. Hampstead's pioneering telephone subscribers: occupational information	252
Bibliography	253

List of Figures

Figure		Page
3.1	Demonstrating a new invention: New Year's greetings by telephone, 1882	63
3.2	The telephone and the social hierarchy: early institutional subscribers, 1879	65
3.3	The Electrophone service c.1905	72
3.4	The telephone trunk-line network, 1892	75
3.5	London's telephone exchanges, 1896	79
3.6	Early NTC advertisement describing and explaining use of the telephone, Kingston-on-Thames, 1893	80
3.7	Telephone wires, City of London c.1900	88
3.8	NTC advertising c.1900: telephone as economiser	93
3.9	NTC advertising c.1900: the modern telephone	94
3.10	NTC advertising c.1900: "annihilating" time	95
3.11	NTC advertising c.1900: "annihilating" space	96
3.12	NTC advertising c.1900: telephone in emergencies	97
3.13	NTC advertising c.1900: telephone in emergencies	98
3.14	NTC advertising c.1900: telephone as labour-saver	99
3.15	NTC advertising c.1900: household management	100
3.16	Police signal box, 1906	103
4.1	The networked city: constructing an underground subway for the Post Office's London Telephone Service, 1901	146
5.1	Explanatory diagram of a telephone exchange, 1880	170
5.2	NTC advertising: telephone shop window, Halifax c.1905	176
5.3	A private branch exchange c.1910	188

Figure		Page
5.4	Hotels on the telephone	190
5.5	Telephone kiosks as symbols	192
5.6	Telephone call office sign as symbol	194
6.1	Orientation map of the Metropolitan Borough of Hampstead . .	207
6.2	Base map of Hampstead showing principal streets and institutions	209
6.3	Advertisement for Taylor & Lown's livery stables, 1911	216
6.4	Map of Hampstead's pioneering telephone subscribers, 1902-03 .	224
6.5	Map of sample Hampstead telephone subscribers, 1912	225
6.6	Map of sample Hampstead telephone subscribers, 1921	226

List of Tables

Table		Page
6.1	Telephone location: residence or place of employment, 1902-1921	220
6.2	Telephone usage: numbers and patterns of telephone ownership	221
6.3	Pioneering subscribers (1902-03) by institutional/ functional area	222
6.4	Diffusion of telephones among selected occupational and industrial categories, 1902-03	223
6.5	Residential subscribers by social class, 1902-1921	227
6.6	Residential subscribers by occupational class, 1902-1921	228

Chapter 1: Ideology, the social reception of technology, and the telephone

Introduction

"It is useless to fight against the inevitable. The day will come when we shall all be on the telephone."

Hampstead resident, October 1899

In the late twentieth century the social diffusion of innovations has become a common experience of everyday life. One need only consider the recent world-wide spread of computers, mobile phones, or compact disc technology to witness the routineness of the process. In the late nineteenth century however, to believe in the inevitability of an innovation's diffusion was exceptional. Then it was common to believe that telephones, and innovations like it, if possibly generally useful, would not, or ought not to become widely available. We have in short learnt to accept the social diffusion of innovations as a routine process. How did this important historical transformation occur? What mental shifts did it involve, and what were the institutions, and means of education and communication necessary for it to take place? In this thesis I wish to highlight these broader questions for scholarly research, by taking the telephone as my example to examine the historical processes by which technology is socially received and embedded.

This thesis considers the telephone's institutional development and social diffusion through the lens of "ideology". My discussion focuses on the telephone's introduction and development in urban Britain, but mainly in London, between 1876 and 1920. This was an early stage in the telephone's diffusion. The telephone's social reception, social construction, and social management are each examined. My aim is to explore several connections between "ideology" and the "telephone". The concept of "ideology" is relevant here because of its function as a means of communication for the dissemination of information and arguments about technology.

The telephone is an obvious candidate for research. Invented and first patented in America in 1876, and exhibited in that year at the Centennial Exhibition in Philadelphia, the telephone symbolised the growing significance in America of the electrical industry, of the technologies associated with it, of corporate business, of professional associations and of collaborative scientific research.¹ The telephone was also an international

invention. Most authors agree that Bell and Edison should be seen in the context of a fairly large group of electrical men, mostly working in the telegraph business.² As Platt observes, "A general awareness of demands for better urban services among this fraternity helps explain why several inventors here [in America] and abroad would lay claim almost simultaneously to being first to perfect a telephone in the mid-1870s and a commercially practical lighting device by the end of the decade".³ Thus the telephone contributed to, and symbolised a period of unprecedented change in international technical and scientific research, in business, and in transport and communications.⁴ Yet we know surprisingly little about how we became accustomed to it. Scholars have not been shy to speculate on the telephone's consequences. Considered important because of its combined social, economic and psychological consequences, the telephone is seen to have contributed to on-going processes of modernization. One scholar speculated that the telephone's consequences were manifold: in the economy, leading to reduced transaction times, improved business efficiency, and the rise of large modern corporations; politically, creating the conditions for instantaneous dissemination of news and entertainment to the masses; and socially, leading to new forms of social interaction, for example social networks no longer confined to their physical area of residence.⁵ The telephone's capacity for instantaneous electrical communication is seen also to have extended an on-going process of "time-space convergence".⁶ Furthermore, because of its capacity to bind space, and to break down social as well as spatial barriers, the telephone has been seen as an essentially democratic technology.⁷ Despite a range of speculations about the telephone's importance and historical consequences, little sustained empirical research exists to substantiate these claims. Similar remarks are made by Graham and Marvin, the authors of a recent compendium of writings on telecommunications and the city.⁸ There is, they suggest, a relative neglect of this subject by urban scholars, and an absence of empirical studies into how telecommunications have in the past transformed, and how they are currently transforming, the management and provision of city services.⁹ Given the degree of contemporary and historical significance attributed to the telephone, this gap in our understanding of such an important modern technology seems glaring.

Ideology

Ideology has two conventional meanings. The first considers it to be a coherent "system of ideas" which generally seeks to change the world and to explain it. The second treats ideology as a form of "false consciousness"; essentially a set of ideas which potentially may deceive those who possess them. Ideology is also loosely defined as "any kind of action-orientated theory or any attempt to approach problems in the light of ideas".¹⁰ Thus Baker identifies three definitions of ideology: "programmatic understanding", "value-laden theory" and "unexamined discourse". The best definitions treat ideology historically. Thus Thompson sees ideology as "a system of signification which facilitates the pursuit of particular interests" and sustains specific "relations of domination".¹¹ For Althusser, ideology is "a system (possessing its own logic and structure) of representations (images, myths, ideas or concepts) existing and playing a historical role within a given society".¹² Gouldner goes further to consider ideology important not only for its role as a historical set of ideas but as an historically emergent phenomenon and part of a modern rational culture. Gouldner argues that the emergence of ideology coincided with the decline of traditional structures and authority figures and with the emergence of the "public sphere".¹³ Gouldner refers here to the concept of a "public" and to Habermas' notion of the "public sphere". A "public" refers "to a number of people exposed to the same social stimuli" and who have something in common without there being persisting interaction between them.¹⁴ The concept of a "public", as applied to the city, Peter Goheen recently reminds us, is as old as urban social science itself, and the focus on communication by scholars who first developed the concept also shows its connection to the process of social learning about the confusing new urban environment.¹⁵ Habermas' notion of the "public sphere" implies that region of private social life where people meet as a "public", "to engage in a debate over the general rules governing relations in the basically privatized but publicly relevant sphere of commodity exchange and social labor".¹⁶ Habermas, in his early writings, applied the concept to the bourgeois intellectual culture of the eighteenth century, and implied that the medium of political confrontation was historically new and unprecedented: "people's public use of their reason".¹⁷ The concept has now wider applicability.¹⁸ In a similar vein, Gouldner argues that with the decline of old aristocratic and clerical élites, and with the new bourgeoisie far from established, there was a need for a new public discourse, no longer justified on the grounds of authority.¹⁹

Ideologies or "secularized and rational belief-systems", according to Gouldner, emerged to fill this void.²⁰

The concept of "ideology" has a long and convoluted history. This history need not directly concern us but there are two points connected to the view previously outlined, of ideology's historical emergence with the "public sphere", that we do need consider. First, as Thompson insists, the concept of ideology is inseparable from the development of mass communications, and inseparable from the growth and expansion of institutions over time and space. This is because historically the institutional production of cultural symbols was a powerful means of binding people and places together. The second point is to rescue the concept of ideology from élite usage; as a term applicable mainly to the traditional sphere of politics, and to clearly discernible systems of ideas or political dogmas. Instead we should recognise ideology's relevance and its operation in discourses of everyday life.²¹

Until recently, geographers have been prone to dismissing the value of ideology as an explanatory tool. Baker's latest comments on ideology were stimulated by a sense that geographers had not considered fully the role of ideas in landscape change.²² Yet there have been significant attempts by geographers to consider the importance of ideology for understanding various aspects of modern society. Gregory's work on the mails in early nineteenth-century England was concerned in part with the ideological significance of state control of information circulation, and of the importance of communication for integration of the market economy and for those who opposed it.²³ Roger Miller shows how in America between 1880 and 1920 an ideology of home-making shaped and intersected with new domestic technologies, demographic change and suburbanization to transform social relationships in American middle-class households. The result was that middle-class women, formerly managers of full-time live-in domestic servants, became the users of technology and employers of part-time, hourly-paid, charwomen.²⁴ George Revill explores for a nineteenth-century British railway company the role of "corporate culture" and of modern bureaucratic control for the production of narrative and for producing particular experiences of work and of self-identity.²⁵ As productive as these attempts have been, they tell little of the specific institutional ideologies involved or how these ideologies functioned, operated and competed spatially.

Geographers' reticence to consider the full significance of ideology rests in part

on the legacy of Marxist analysis which tended to treat ideology as "superstructural". Yet even some Marxist critics maintain that to consider ideology as a separate system of ideas or as superstructural is mistaken, and distorts Marx's own conceptualization of the role of ideas. These authors instead insist that ideology ought to be considered as an important process of signification, located at the heart of the production process and of social life itself.²⁶

What are the characteristics of an ideology? Gouldner and others offer us some clues which will be useful in identifying the use of ideology in subsequent chapters. Authors stress ideology's holistic quality; that ideologies are complete symbolic systems with a "globalizing function" that compel its advocates to a "total transformation of society".²⁷ Baker sees in ideologies a "quest for order" for he sees them essentially as simplified visions of the world whose function is to offer reassurance.²⁸ Duby, for this reason, suggests that ideologies have a deforming function, for they highlight certain facts and relations but obscure others.²⁹ Baker suggests that ideologies also involve the assertion of authority for they concern the struggle for power between conflicting interest groups.³⁰ Thus for these authors a society may consist of different competing systems of representation. Duby also recognises in ideology a stabilizing role, for ideologies are designed either to protect the privileges of an élite or to replace them with something else intended to become permanent.³¹ Ideologies also, according to Duby, present particular visions of history, with the future projected as more perfect than the present, based on memory and on selective or mythical readings of the past.³²

Commentators focus on ideology's specific language and grammar. Gouldner interprets ideology as a "new mode of political discourse" seeking action not by invoking authority or tradition but predicated on the idea of grounding political action in secular and rational theory. Thus Gouldner defines ideologies narrowly as "symbol systems serving to justify and to mobilise public projects of social reconstruction" and identifies a fundamental rule of the grammar of modern ideology as "the principle of the unity of theory and practice mediated by rational discourse".³³ But Gouldner explains that this discourse of rational persuasion premises a society of equals, free from coercion and available to be convinced. For this reason Gouldner associates the origins of ideology with the emergence of the mass media, with revolutions in communications and with the proliferation of "news", and of "news"-reading and "news"-informed "publics".³⁴ The

condition for the birth of ideology was thus a society in transition, where traditional social structures had declined in importance, where revolutions in communications had effected a great increase in the volume of "news", and where there was great social demand for this news to be interpreted. Ideologies were important for their "mobilizing appeal". Their grammar was characterised by systematic statements of objectives to be achieved with constant reference to what was. This was a grammar rooted in logic and facts, and presented in terms of us and them, and rights and wrongs.

I argue in this thesis that the social appraisal of technology ought not to be considered independently of ideology. Maxine Berg, makes a similar case for understanding social reactions to "the machinery question" in early nineteenth-century Britain.³⁵ Berg argues that "the machine", referring to a set of eighteenth-century technical innovations, was seen by contemporaries as symbolic of industrialization and its consequences, in particular of the new economic relations of production, and of the consciousness of the new bourgeoisie and working classes. Contemporaries' reactions to the machinery question, Berg suggests, helped shape, and in turn were shaped by, the early political economists, whose social and intellectual role was to interpret these changes for the middle classes. Thus social theories invented to interpret the unprecedented mechanization and social changes Britain was experiencing were drawn upon by the new industrial élites to help embed and to legitimate their new social role and position. Berg's point is that social theories and attitudes to mechanization and its consequences were historically inseparable from class ideology.

Harold Perkin's interpretation of nineteenth-century English society as partly a struggle between conflicting class ideals lends further support to examining technology through the lens of ideology.³⁶ Perkin's interpretation rests on a set of competing ideals: entrepreneurial, aristocratic, working class and professional.³⁷ For Perkin, the nineteenth century as a whole witnessed a critical transition in the make-up of English society, with a society structured around vertical interests, governed by paternalism and deference, giving way to a society based upon horizontal and antagonistic classes. This transformation was itself made possible by the successful imposition by the business or capitalist middle class upon the other classes of their ideal, even though they failed at first to wrest from the aristocracy the visible trappings of power. This, the entrepreneurial ideal, was based upon the values of laissez-faire capitalism, on middle class moral

superiority, and on the superiority of active over passive capital.³⁸ The success of entrepreneurial capitalism and of the entrepreneurial ideal reached its zenith in the mid-Victorian period, only to turn sour in late-Victorian times. Entrepreneurialism was undermined from without and from within, so Perkin suggests.³⁹ The external factors were the growth of the professions, and of professional government which sought to tackle social problems, and recognition of the inability of laissez-faire capitalist principles to address them. The internal factors were the growth of a cadre of corporate capitalists and thus the influence of professional values, and the intermarriage of entrepreneurs and aristocrats. Together these undermined the moral superiority of the business class. By 1886, Perkin argues, mid-Victorian entrepreneurialism had given way to late-Victorian professionalism.⁴⁰

Perkin's conceptualization of class ideals, and his argument about a transition from entrepreneurialism to professionalism, is directly relevant to my interpretation of the telephone in later chapters of this thesis.⁴¹ In general I interpret the telephone's development as an urban conflict between different ideals concerning technology's social role. I consider the telephone company as an example of entrepreneurialism, espousing a laissez-faire approach to the control and uses of urban space, and entrepreneurial principles with regard to the telephone's function and social uses. I also chart in the last few years of the nineteenth century a subtle ideological shift in the telephone company's social management, from entrepreneurialism to professionalism.

Unlike Berg and Perkin, this thesis emphasises the urban rather than the national appraisal of technology, and conceptualises it as a negotiation between conflicting city "publics". This process was not new to the twentieth century. Nor was the process of negotiation restricted to the issue of technology. Peter Goheen shows how such a conceptualization can be applied to the changing uses and control over urban public space in nineteenth-century Canadian cities.⁴² Similarly, Goheen refers to the work of Asa Briggs on nineteenth-century British cities, and to the work of more recent scholars such as Philip Ethington on the urban political process in San Francisco, to argue that the urbanization process can be understood as the social adjustment by urban "publics" to, and their negotiation over, a set of new issues presented by the novel and constantly changing environment of the nineteenth- and twentieth-century city.⁴³ The "telephone question" and the issue of improved urban communication, discussed in Chapter 4, ought therefore

to be seen in the light of similar public discussions over issues ranging from the style of urban government, sanitation and health, to the municipal provision of utilities.⁴⁴ Following Goheen and other urban scholars, some already mentioned, I argue that although these urban issues and the specific arguments which surrounded them are in themselves interesting and significant historically, so too is the political process and the means by which these urban problems were raised for public discussion, publicly negotiated and resolved, however temporary or unsatisfactory the solution.

I argue in this thesis that the concept of "ideology" has both general and specific relevance to the telephone's development in late nineteenth- and early twentieth-century Britain. In general terms, ideology was an important means of communicating knowledge of, and ideas associated with a new innovation. Moreover, in the process of debate over issues concerning the telephone's development the parties involved typically employed ideology as a means of persuasion, and sometimes as a means of defence when challenged. In both the selling of telephones, and in public debates over the telephone's development, appeal was consistently made through rational argument to the public's reason. Thus ideology framed processes of learning about, and social responses to the telephone.

The concept of "ideology" is also relevant to the telephone's development in three specific ways. First, it was clear that the telephone had potential economic and political significance. If initially the British Post Office, a Government department, had little sense of the telephone's practical utility, and vacillated for many years in its telephone policy, the telephone's potential strategic significance was clearly understood.⁴⁵ The Post Office was swift to ensure that the Government's monopoly over telecommunications was extended to include the telephone. The Attorney-General, on the Government's behalf, initiated legal proceedings against the Edison Telephone Company in November 1879 and against the Telephone Company (Bell's patents) one month later.⁴⁶ In December 1880 the High Court ruled in the Government's favour, legally declaring the telephone to be a telegraph, meaning the telephone and Britain's private telephone companies were subject to the provisions of the Telegraph Acts and to Government control.⁴⁷ This accorded with the Government's attempts earlier in the century, in periods of greater social unrest, to retain control of sensitive means of communication such as the telegraph and the postal service.⁴⁸ Political and economic considerations also intersected, as Government officials,

the telephone's promoters and a wider public became increasingly aware of the telephone's commercial importance.⁴⁹ The telephone's potential as a space-binding technology had considerable economic and ideological significance. Comments made by Carey and Goheen about the developing telegraph network in America and Canada apply equally to the telephone in Britain.⁵⁰ Carey argues that a major consequence of the telegraph, whose initial use was mainly for the transmission of business information, was to broaden market integration and to further extend the price mechanism over space.⁵¹ The decisions by Britain's private telephone companies initially to favour long-distance inter-urban trunk lines over local lines, and later by the Post Office first to establish a backbone system connecting Britain's major urban centres, shows how national political and economic integration took priority over other possible social objectives.⁵²

Secondly, different ideological views shaped the telephone's development both in a national and in an urban context.⁵³ Nationally, the public debate on "the telephone question" exposed differences in view about how a new and important system of communication ought to be managed, how its efficiency could be improved, and the extent to which it ought to be made socially available. This ideological struggle was also played out in an urban context. Different urban interests had different ideological views about the telephone's development, about the relative rights of private property holders, public bodies and private companies over the use and control of urban space. This was a struggle that had much to do with an on-going negotiation over the control of urban public space.⁵⁴

Thirdly, these different ideologies framed the telephone's social management.⁵⁵ They were an important determinant of the telephone's cost and pricing structure, its internal systems of operation and its geographical development. Concern for the telephone's social management avoids the common mistake of reducing the telephone to the instrument itself, or of considering the telephone in abstract instead of in institutional terms. Ideology was also important for selling telephones. Ideology, in the form of rational arguments, was the principal method used for selling telephones. Of equal significance were the specific arguments used, designed primarily to foster business use of the telephone by various commercial groups.

The social reception of technology

How urban populations adapt to a new technology, and their reactions to it, helps us understand the social embedding of technology. By technology, I imply more than simply machines, but also the systematic and continuous application of social and technical knowledge to the solution of practical problems.⁵⁶ This systematic conceptualization of technology draws on Bruno Latour's notion of "networks", regarding social processes as interconnected evolutionary chains of events, neither purely "natural" nor purely "social".⁵⁷ As Latour explains, seen as networks:

the modern world, like revolutions, permits scarcely anything more than small extensions of practices, slight accelerations in the circulation of knowledge, a tiny extension of societies, minuscule increases in the number of actors, small modifications of old beliefs. When we see them as networks, Western innovations remain recognizable and important, but they no longer suffice as the stuff of saga, a vast saga of radical rupture, fatal destiny, irreversible good or bad fortune.⁵⁸

This consideration of technology influences my methodology, which is essentially to follow the telephone, conceived as a network of individuals, institutions, and socio-technical material and symbolic forms and practices, on its route through urban society (see Chapter 2). I describe this general process of the social diffusion, adaptation and embedding of technology as the "social reception of technology". This is defined as the development and promotion of a new technology, its pattern of social and geographic diffusion, and the political reactions and social comment it stimulates. There are three principal reasons for employing this method of research.

First, the social reception of technology reveals how we learn about and learn to accept new technologies. Secondly, in the case of an urban technology its social reception reveals important connections between ideology and social power in the city. A focus on the urban scale shows how individuals and communal groups socially appraise technology. Detailed examination of these discussions reveals the changing historical meanings and role of technology in an increasingly urbanised and industrialised society. It exposes the city's social hierarchy and institutional geography, showing how a common process of technological appraisal and diffusion is experienced in different cities.

Thirdly, the method seeks to place emphasis on the uses of technology, and on who uses it. This is an attempt to avoid technological determinism. Here, Fischer's recent

comments on approaches to the study of technology are important.⁵⁹ Fischer accuses scholars of two common kinds of technological determinism.⁶⁰ The first treats technology as an external exogenous force that "impacts" on social life and alters history. The second treats technology as a symptom of a deeper cultural "logic", transmitting the cultural ethos that determines history. Both, for Fischer, are problematic. Impact analysis is obviously deterministic but so is a similar approach, what Fischer terms "impact-imprint" analysis, an interpretation that assumes a technology imprints its characteristics onto its users. Thus Fischer is critical of authors such as Stephen Kern who argue that the qualities of a technology -- the speed of the bicycle and the automobile, or the immediacy of the telegraph and the telephone -- transfer to their users.⁶¹ The second or "symptomatic approach", recognisable in the writings of Lewis Mumford and Schumacher, assumes technologies form a coherent, consistent whole. The use of evolutionary or mechanical metaphors to give systematic meaning to periods of history dominated by particular kinds of technology is also common to this approach. As examples of this one thinks here of Harold Perkin's "The age of the railway" or Mumford's division of human history into its "eotechnic", "neotechnic" and "paleotechnic" phases.⁶² Fischer's point is that technologies do not necessarily act with uniformity or coherence. The same technology may have different effects in different places. What matters is how technology is used.⁶³ Fischer also cautions us against an over-reliance on élitist and intellectual appraisals of technology, and on literary and artistic sources, which although suggestive and significant, ought not to be taken at face value.⁶⁴

Fischer's criticisms are very relevant to writings in geography about technology. Many authors could be singled out for criticism but I shall take the recent writings of a prominent and influential geographer to illustrate the general problem. David Harvey, in his Marxist interpretation of the urban process under capitalism, makes much of the historical role of new communications technologies, and their consequences for increasing the speed of movement of people, goods, and information.⁶⁵ He argues that underlying processes within capitalism produce developments in technology whose effect is to speed up the circulation time of capital and information. The result is intense phases of "time-space compression", a notion that captures the human sense of shock and disorientation that results from such dramatic change, feelings that are reflected in cultural forms.⁶⁶ Harvey's meta-narrative aside, his argument is also deterministic. The superiority of new

technologies over earlier ones is rarely questioned. Furthermore human emotional responses are read off as a direct by-product of technology and its consequences. Harvey relies much on élite reflections of the experience of new technologies, and on similar treatments by authors such as Kern and Schivelbusch.⁶⁷ The danger here is to assume and to exaggerate the consequences of technology. Are new technologies always faster and more efficient than previous ones? Do technologies always imprint their characteristics on the user? Similarly, should we assume that the experiences and reflections on new technologies by privileged travellers and social observers are the same for the general mass of the population?

Fischer's influence on this study is considerable. So too is the social constructivist approach to technology, an interpretation that explores how different factors, agents and institutions shape the development of technology.⁶⁸ This approach to technology rejects determinism and coherency in favour of contingency; that technology is continually shaped and reshaped, and in the process is subject to conflict, difference and resistance. The approach highlights technology's heterogeneous quality: the multiple influences on its development, and the constraints and the possibilities these present. The approach also emphasises that technology may always have developed differently.⁶⁹ An advantage of this approach is that it shows technology, something we often take as a given, to be a construction. Yet to regard technology as a construction does not mean it is not real, or that we cannot delineate and explain its constructions in particular times and places.⁷⁰ Fischer, himself, is broadly sympathetic to this approach, but feels that research efforts have concentrated on the production end of technological development at the expense of studies that explore the interface of technology and its consumers.⁷¹ His remedy to the criticisms outlined above is to conclude that:

If we can neither deduce a technology's social role from its manifest properties nor easily extrapolate it from a cultural *Geist*, if it matters more what individual users choose to do with a device and how these choices aggregate, then we must look closely at the histories of specific technologies.⁷²

Fischer's criticisms and conclusion, and the broad objectives of the social constructivist approach to technology, all stand as major influences on the subsequent development of this thesis.

Hägerstrand, and diffusion studies in general, provide a further influence.

Hägerstrand teaches us that diffusion is a *social* as well as a spatial process.⁷³ His work on diffusion in Sweden posed the question as to how the adoption of an innovation becomes widespread once it has entered a settlement. Hägerstrand's interest was to explain the process of diffusion, not the innovations themselves. His method, to follow a set of innovation diffusions within a single, relatively small area, was designed to understand the distributional changes over time. Although Hägerstrand's focus was on the locational point-to-point process that led to the individual adoption and spread of innovations, he admitted the importance of social networks, of communal decisions regarding innovations, and the role of communications and institutions in disseminating knowledge about them. Hägerstrand thus teaches us that to study diffusion requires that we consider both its institutions and its means. By the latter I imply the processes of education and communication by which people gain knowledge of a new innovation. Ideology is important in this context. Understood as systematic rational arguments with potential "to sustain relations of domination", ideology is an important means of educating urban publics to the existence of a new technology, and of communicating to them its social values.

The role of institutions in bringing innovations to public attention is widely understood. The importance of scientific societies and mechanics' institutes during Britain's first industrial revolution is well known.⁷⁴ Other more enduring institutions had similar significance. Mumford, in *Technics and Civilization* for example, alluded to the historical importance of the royal court, the battlefield and coal mines as sites of consumption providing continual demand for new inventions.⁷⁵ How important these institutions were, their relative significance, and their changing historical roles into the late-nineteenth and twentieth century is uncertain, and is an important area for further research. This thesis highlights the question's importance. In the case of the telephone we see the continuing significance of royal patronage, of the urban court, and of traditional sites of consumption and display, such as scientific societies, coal mines, hospitals and the military battlefield. There is also evidence of reliance on new institutional forms: on "public" as opposed to "private" exhibitions, although private elite soirées remained important; on newspaper publicity; and on large private corporations whose primary purpose was to sell the invention and all its accoutrements to an expanding public.

I argue in this thesis that the means of learning about a new invention were

equally significant. The acts of exhibition and demonstration were an important means of alleviating fears of a new invention.⁷⁶ Showing, describing and explaining an innovation's functions and capabilities made it seem less threatening, especially when it was performed in an entertaining way, or explained in principles, or in terms of existing technologies, which were already largely understood. Practical demonstrations presented important occasions for making audiences aware of an invention's existence and utility. These occasions were also used by the telephone's promoters to generate news-worthy publicity. Lecture tours such as Bell's to Europe in the winter of 1877-78, staged telephone concerts, exhibitions, and public displays were important and increasingly necessary attempts, designed as much to capture public attention as they were to secure financial backing. With the emergence by 1892 of a private company, The National Telephone Company (NTC), supplying the telephone service throughout most of the UK, reliance was placed on canvassers, and on advertising to convince potential subscribers of the telephone's value. Contemporaneous with the emergence in Britain of large national commercial and retailing organizations, the NTC is an example of Giddens' concept of "time-space distancing", the notion of modernity as the growth of institutions, and of institutional practices, over time and space.⁷⁷ Significantly, NTC canvassers were armed with a variety of standard arguments. The company also relied on various forms of advertising, considered as "a set of purposive procedures for producing consumption", in an age when the process of selling was professionalised, and when efforts to sell commodities reached new heights.⁷⁸ The object of canvassing and advertising was to generate talk about the telephone, and to keep the telephone in the public's mind. Various literal and symbolic spaces were used for this purpose. These included the strategic positioning of public telephones and company emblems, and of billboards paraded through the city's streets. As such the NTC sought to use the "public sphere" in its own interest. The telephone's physical presence in the city had similar intended and unintended consequences. The visible web of overhead wires, poles and derricks, and the physical act of digging up the streets for underground cables did not go unnoticed by city-dwellers.

As I demonstrate in later chapters of the thesis, newspaper publicity was of continual and growing importance. Telephone companies sought to befriend newspaper editors and to "plant" news stories. Newspapers themselves continually brought the telephone to public attention through the publication of comparative national telephone

statistics, by describing novel developments in telephony, and by raising for public debate important questions about the telephone service. Description and explanation were as important as demonstration in making the public aware and knowledgeable on the subject of a new invention. This was an on-going process for newspapers had constantly to keep the public up to date with new developments in the technology. Newspapers also performed the important role of providing a voice for the public to debate a range of issues on how the telephone service was developing. These included the rights of individual property holders against the powers of the Post Office, or of private telephone companies, on the aesthetics and danger of telephone wires, on the issue of telephone charges and telephone inefficiency, and on the "telephone question", the issue of whether the telephone service ought to be managed by the state, private enterprise or by municipalities. What counted was not only that these issues were publicly debated, with the public granted a genuine voice in the discussions, but that both private and state institutions were increasingly subject to criticism and to public scrutiny through the press. When criticised these organizations, and their representatives, had little choice but to respond.

The telephone

The telephone was one of several technologies introduced to European and North American cities between 1870 and 1920. It was closely associated with the "second industrial revolution".⁷⁹ This is a collective term widely used to denote the period beginning in 1870 and ending around 1920, although some authors extend it until 1950, during which there emerged a set of new industries based on advances in electrical and chemical science, and the development of an entirely new power source, the internal combustion engine.⁸⁰ The phrase has also associations with a set of changes in the organization and structure of industry, and with revolutions in management and in consumption, with the rise of large-scale corporations, and associated business practices such as the advent of mass advertising.⁸¹ In Britain the period was significant for the increased role of science in technological development, especially in production. The rise of scientifically managed production and especially the expansion of capital goods industries, developments that resulted from the extension of factory methods to areas of industry formerly untouched by it, had the consequence of spreading the availability of

mechanical goods to the majority of the population. Many of these goods such as the typewriter (invented 1843) or the sewing machine (invented 1846) were developed first for business or commercial use but inevitably found their way into the home.⁸² How much the telephone itself contributed to and resulted from these changes is uncertain. Yet it is difficult to imagine their occurring without the telephone's influence. The telephone was one of several new space-binding technologies whose collective effect was to alter dramatically external relations of time and space between places.⁸³ Cities also experienced considerable internal changes. Networks of wires, pipes and cables provided a new range of urban services distributing water, power and information.⁸⁴ Urban dwellers witnessed the construction of these "networked cities" and experienced the results.⁸⁵ Yet we know little of the process of social adaptation, or of its speed or ease.

Compared with other nineteenth- and twentieth-century technologies the telephone's history has been relatively ignored by historians of science and technology, and by social scientists more generally.⁸⁶ General studies do exist of the social response to the telephone but they are mostly élite and intellectual appraisals.⁸⁷ Few studies describe the telephone's introduction at the urban scale; its use and assessment by urban institutions and urban publics.⁸⁸ In North America where the telephone was first invented and swiftly adopted the history of the device is better known. The most recent studies have focused on the invention process, on the shift to sociability and on the gender relations involved in telephone systems.⁸⁹ Of these, the most significant is Claude Fischer's *America Calling: A Social History of the Telephone to 1940*, published in 1992, a study of the consequences of the telephone and the automobile for "community" and American urban social life.⁹⁰ Its significance lies in its sustained attempt to assess the telephone's social consequences, and to identify the nature and speed of social adaptation to the telephone during a mature period in the technology's diffusion. No British study yet matches its scope or empirical rigour. British telephone history is more patchy. One or two volumes covering the telephone's early years do exist. Written by engineers, these books focus mainly on the technical and scientific side of telephone development, not on the social adaptation to the telephone or on its consequences.⁹¹ There is also a growing number of local area telephone histories published by British Telecom.⁹² Post Office histories have generally neglected the institution's telecommunications function. British general economic and social histories, and historical geographies, often ignore the

telephone, but one or two do provide a basic national summary of the telephone's development.⁹³ Occasionally, historians make speculative remarks about the telephone's economic and social significance. Leonore Davidoff, for example, suggested that the telephone may have helped break down the tight etiquette surrounding aristocratic social circles.⁹⁴ Except for Robson's study of telephone exchange diffusion, and the more recent work by Nigel Thrift on the broader historical geography of electrical technologies, there exists no systematic scholarly urban study of the telephone's social diffusion and reception.⁹⁵ So all we are left with is a basic chronology of the telephone's development in Britain.⁹⁶

Ithiel de Sola Pool offers a possible explanation for the comparative lack of scholarly interest in the telephone. For Pool, the dearth of writings on the telephone is related to the origins of the sociology of science. Pool argues that the dominant nineteenth-century paradigm for understanding the industrial revolution was provided by Marx. The wide acceptance of Marx's writings, and the prominence these gave to productive technologies and to a unidirectional view of causality -- reading off from society's material base the principles of social organization and its ideological structures -- shifted attention away from the possibility that technologies might themselves be shaped by social relations and ideas. Pool argues that this was partly rectified by the writings of Max Weber. The most influential twentieth-century school of sociology developed in Germany which became the source of inspiration for a young generation of American sociologists, many of whom studied for a time in that country. Pool argues that this branch of sociology stimulated a generation of American sociologists to explore the history of technology and its impact on society. But with the telephone no longer a novelty in American society of the 1930s "no sociologist of science in that first wave of technology assessment seriously examined the ways in which the telephone had changed society".⁹⁷

Such an explanation does not explain the telephone's absence in British writings where the history of technology has a long tradition. In the British case a more plausible explanation is that telephone history is subsumed within the history of the British Post Office. Post Office histories are inward-looking, focusing on the institution's complex political and administrative history, and on its role as a modern state bureaucracy.⁹⁸ Although Perry provides a comprehensive account of the history of the telephone within

the British Post Office these studies neglect the Post Office's wider social significance and its telecommunications function.⁹⁹ It is tempting also to speculate that a tendency to mythologise invention as an individual heroic act, and to associate invention with national importance, in the telephone's case, may have mitigated against its serious study by British intellectuals. I wish to suggest three reasons for this.

First, to claim the telephone as a success story of British invention would have been an embarrassment, for the person largely credited with the telephone's invention, Alexander Graham Bell, although a native of Scotland, in fact emigrated from Britain to find fame and fortune in North America. Secondly, the telephone's invention in the late nineteenth century, coincided with significant changes in the invention process, with the rise of the research laboratory and greater international collaboration in scientific research. Thus for any inventor or country to claim an invention solely as their own was becoming more of a distortion of the invention process. A third reason was the perception of British relative economic decline from the 1870s onwards, which may have acted against serious contemplation of the telephone's significance.¹⁰⁰ Simply put, for at least fifty years following its invention, British progress in telephony was considered by contemporaries to be poor relative to other industrial nations, and not a story of success. Such thinking persists, as in Perry's recent characterization of the Post Office's early involvement in telephone development as the "years of delay".¹⁰¹ Given that the National Telephone Company, a private company, controlled 90% of the British telephone market until its nationalization in 1912, and that Post Office histories ignore it, one can only wonder at the accuracy of describing early British telephone experience as one of delay. Delay relative to what?

Such thoughts remain speculative. A more probable general reason for the relative neglect by scholars of the telephone is Pool's second explanation. This relates to the telephone's distinctive qualities, which makes it difficult to apply a simple model of causality to explaining its effects. The telephone, according to Pool, behaves in diametrically opposed ways. It invades our privacy in the home but makes it possible for us to conduct private communication at our convenience. It makes information available to us but reduces the need for written documentation. In short: "Its impacts are puzzling, evasive, and hard to pin down. No matter what hypothesis one begins with, reverse tendencies also appear". It is the idiosyncratic quality of the telephone which for Pool is

the real reason for the paucity of writings on its history. Added to this is the need to employ a sophisticated logic of causality where "purposive behaviour" must be seriously considered in analysis.¹⁰²

Again such thoughts are speculative. But this last interpretation, emphasising the "polymorphous" character of the telephone, hints at the possible utility of examining the telephone's development from a geographical perspective. If it is not possible to state definitively the telephone's impact on society, because "rather than constraining action in any one direction, the telephone is an agent of effective action in many directions", then the social space in which one encounters the telephone seems of critical importance.¹⁰³ The telephone might well be an ambiguous technology, but with specific social conditions pertaining to the different social spaces where it is experienced, the ambiguities may appear more social in origin than inherent to the technology itself. This is an argument not only against determinism. It is also to suggest that space may be a more dominant metaphor for understanding the social diffusion and appraisal of technology. This argument has broader relevance. In an article on recent spatial economic change the economic geographer, Meric Gertler, suggests that scholars have considered the spatial consequences of technology, and appreciate how the same technology may have different effects in different places which we may explain "culturally", but have been less alert to how technology itself is spatially constituted.¹⁰⁴

This thesis suggests several ways in which space may be a productive metaphor for understanding the social diffusion and appraisal of technology.¹⁰⁵ First, as Chapter 3 will show, the telephone was introduced to specific social spaces, settings such as scientific societies or coal mines, which historically had performed this function of demonstrating new inventions. If the invention was new the settings and means of its introduction were not. Secondly, the telephone diffused through urban society in a way that exposed the prevailing social hierarchy. This theme recurs throughout the thesis but a brief synopsis here of events detailed in later chapters will highlight the point and its significance. The telephone, was first introduced to the country's leading scientific community, it was demonstrated before Queen Victoria and thus quickly given royal patronage. It was also demonstrated before leading politicians, journalists, and businessmen. The country's principal economic and political institutions were some of the first organizations to be connected to the telephone. Telephone exchanges were established

first in the financial districts of the country's leading cities, and the telephone spread out from there to the city's leading business houses, to Government departments, to the medical and professional community, and to the expanding urban middle classes.¹⁰⁶ Certainly, there were countervailing tendencies, such as lone inventors or individuals who advertised how to construct cheap home-made telephones, but the pattern of social diffusion was not unpredictable for a luxury invention filtering down the social hierarchy.

The thesis describes how traditional social hierarchies and land ownership structured the telephone's development as well as its social diffusion.¹⁰⁷ The difficulties the Post Office and private telephone companies had in obtaining wayleaves to construct networks of telephone wires exposed the importance and complexity of existing urban land ownership. As well as the unpredictability of individual and institutional private landowners telephone companies faced the political prejudice of numerous public bodies. The telephone in other words ought not to be conceived as if it appeared God-like, as in the famous phrase *deus ex machina*, or upon a *tabula rasa*. Such notions of technology appearing suddenly out of nowhere causing pandemonium are more symptomatic of elite and intellectual appraisals of technology, or of imperial contexts, where cultural differences in technological achievement may be considerable, but less so in everyday urban life.¹⁰⁸ The suggestion, for example, in the writings of Stephen Kern, David Harvey and Wolfgang Schivelbusch, among others, that the telephone and similar technologies, such as the telegraph, the railway or electric lighting, led to the "annihilation of space and time", was and still is an important reaction to new technology.¹⁰⁹ Karl Marx, writing in the 1850s, made similar comments about the role of transport and communications in reducing spatial barriers to the circulation of capital and information.¹¹⁰ These, however, were generally elite responses, and exaggerated responses to technology's potential, not to its actual capabilities. Throughout the thirty or forty years covered by this thesis the majority of calls were local calls, international telephony was just in its infancy, and the press spent as much time criticising the telephone's poor service and inefficiency as it did in praising its achievements.¹¹¹

While there is no doubt that the telephone and technologies like it generated considerable anxiety and fear, there is little evidence to suggest that these emotions were generally felt. Carolyn Marvin, shows for example how electrical technologies at the end of the last century generated a mixture of concerns, including worries over military

annihilation, and fears of otherness in social exchanges across class, gender and racial lines, made possible by immediate electronic communication.¹¹² Marvin draws mainly on the electrical and trade press but other than in this kind of literature public disquiet about the telephone's potential social consequences was remarkably subdued. This thesis shows that in many instances the telephone entered sections of British society and its institutions silently. The telephone blended into existing social spaces, whether it be the City of London, the House of Commons, the Law Courts or middle-class Hampstead.¹¹³ Some of the reasons for this are apparent. There is evidence to show that British experience matched that in North America where the leading telephone promoters established their careers in the telegraph industry and adopted similar attitudes to the telephone.¹¹⁴ The telephone, as with the telegraph, was considered essentially as a business device, and not for sociability. For many years in Britain the telephone was described and conceived by its promoters as a "superior telegraph".¹¹⁵ The telephone was also declared to be a "telegraph" by the British courts. Social uses reflected this for the telephone was marketed and used principally as a business machine. By the time of the telephone's invention the principle of electrical communication was also well established so that its function and common uses were in no way new. This silent reception of technology recurs with Eric Hobsbawm's recent remarks on the consequences of similar unprecedented developments in twentieth-century transport and communications:

Perhaps the most striking characteristic of the end of the twentieth century is the tension between this accelerating process of globalization and the inability of both public institutions and the collective behaviour of human beings to come to terms with it. Curiously enough, private human behaviour has had less trouble in adjusting to the world of satellite television, E-mail, holidays in the Seychelles and trans-oceanic commuting.¹¹⁶

This is not to say that the telephone was avoided. Although initially a curiosity once it was shown to be practically useful subscribers were not shy to use it. There is little evidence to suggest that the telephone was avoided because of associations with "industrialism", because of cultural prejudice, or for more private reasons such as that it was socially threatening and invasive. The examples that exist of such behaviour are of "freak" or quirky intellectuals. It is significant that middle-class Hampstead, with no shortage of intellectuals, took up the telephone with remarkable ease and with little public

angst.¹¹⁷ Throughout my investigations a combination of evidence suggests that Britain's urban bourgeoisie, growing in significance during the nineteenth century, took up the telephone with considerable alacrity because it was widely understood that it would aid the flow of trade and commerce. Consistently the argument was made that Britain or that particular British cities were lacking in telephones and somehow materially deficient compared to other cities and countries, feeding into discourses of national decline.¹¹⁸ It was a rare comment indeed to declare that British cities or London in particular had no need of a telephone system.

At the national and urban scales there was considerable public debate on the subject of the "telephone question".¹¹⁹ The issues were relatively straightforward: about competition and efficiency, about the management and regulation of the telephone service, and about whether these objectives were best achieved by the Post Office, municipalities or private interests operating telephones, or through a combination of all three. The debate however was as much about who should have telephones as it was about who should control and best manage them. This was essentially a national debate but it was also an urban and local one. The debate was an ideological struggle fought out by several parties over the control of the telephone and over urban space, at a time when public space was increasingly becoming subject to market forces. The parties involved were the Post Office, private telephone companies, local authorities, politicians, engineers and civil servants, lone commentators, and the public through press criticism and through private and institutional land ownership.

As well as a public debate some of these issues intersected with a process of popularization as these parties with intended and unintended consequences brought the telephone to the public's attention.¹²⁰ Press discussion of the telephone service prompted talk about it. I have already referred to other means by which this occurred: the acts of demonstration and description, the physical presence of telephone poles and wires, press coverage in response to complaints and inefficiencies, and to technical progress in telephony. There were in addition many references to the telephone in popular culture, such as in music hall songs. Claude Fischer, for example, cites the fact that over 650 telephone songs were published in various countries between 1877 and 1937, with titles such as "Hello, Central, Give me Heaven", "Hello, Is this Heaven; Is Grandpa There?", "Love by Telephone", and "The Bell Went Ting-a-ling".¹²¹ This aspect of popularization,

although important, has been left for future research, partly due to time constraints and partly for the theoretical reasons previously outlined. The National Telephone Company also contributed to the process of popularization through its use of doorstep canvassing and advertising, and through its continual attempts to repudiate press criticism. How effective these methods were does not alter the fact that they were decidedly modern; deliberately using the "public sphere" in its own interest to generate talk about the telephone and to encourage its selective use. The telephone, as a system of communication, was not in principle new, and it is uncertain if the telephone was at all modern in its consequences. This thesis makes reference to such questions but they are not my main concern. What is, is to understand how ordinary urban citizens learn about a new technology, and learn to accept its social diffusion as routine. In answer to this question, I want in conclusion to suggest that if the institutions involved were not always historically different, the means by which the telephone was increasingly brought to the public's attention, and how its development was publicly debated, were signs of an increasingly modern society.

The telephone's institutional development in Britain: a summary

For future reference I will provide here a brief summary of important events in British telephone history. The telephone was developed in Britain initially by private interests. Groups of financiers and merchants, based in the City of London, purchased from agents of the telephone's inventors rights to operate the telephone in Britain, and established two rival telephone companies, one in possession of Bell's, the other Edison's patents.¹²² These companies merged in 1880 to form the United Telephone Company (the UTC).¹²³ The UTC set up subsidiary companies throughout the United Kingdom.¹²⁴ These later amalgamated under the name of the National Telephone Company (the NTC), a process that was largely completed by the end of 1894.¹²⁵ In December 1880 a High Court ruling declared the telephone to be a telegraph under the provisions of the Telegraph Acts.¹²⁶ Henceforth the private companies were forced to take licences from the British Post Office. These initially were very restrictive, forcing the companies to pay to the Post Office a 10% royalty on gross receipts, prescribing tight areas of operation and precluding the private companies from operating inter-urban services.¹²⁷ A new laissez-faire policy, introduced in 1884, led to many of these early restrictions being lifted.¹²⁸ The Post

Office continued to licence and to regulate the activities of the private telephone companies, changing its policy frequently along with changes of Government, in Post Office personnel, and with shifts in political ideology.¹²⁹ The history of the telephone service up until the end of the First World War was one of continual complaints and repeated calls for nationalization. In 1896 the Government went half way towards this goal by nationalizing the trunk lines.¹³⁰ The nationalization process was completed with the transfer of the NTC's local plant, staff and exchanges to the Post Office on 31st December 1911.¹³¹

Thesis structure

After a methodology chapter the thesis is organised chronologically and thematically. Initial chapters consider the telephone's early social diffusion and reception in Britain. Later chapters focus on how the telephone was sold, and on its local social diffusion and reception. Each chapter proceeds chronologically, side-stepping where necessary to develop important themes. Chapter 3 focuses on the processes that led to the telephone's social diffusion, and on the social comment that surrounded its introduction to Britain. Attention is given to how urban populations learnt about the new technology; to the significance of specific institutions and means of education; and to the telephone's early social uses. Chapter 4 concentrates on the political aspects of the telephone's development in Britain, and on the ideological conflicts that accompanied its urban development. Chapter 5 explores how the telephone was sold through an analysis of the National Telephone Company's marketing strategies in the years preceding the First World War. The final empirical chapter, Chapter 6, provides a detailed case study of the telephone's local social diffusion and reception in the middle class London suburb of Hampstead (c.1890-1921).

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Chapter 2: Methodology and sources

To repeat, this thesis has two principal research questions: to understand the processes by which urban populations learnt about and learnt to accept the telephone; and second, to investigate the telephone's social reception, diffusion and use. The purpose of this chapter is to explain the reasons for my chosen research methods, the sources consulted, and to raise problems of interpretation.

Research methods

My first question is designed to understand how the telephone was socially embedded. My basic method is to follow the telephone's path through society, and to highlight important events and processes as this unfolded. The social diffusion of technology is seen as an important clue to social structure. From this I hope to be able to comment on the significance of particular institutions, and the means by which the telephone was steered through society. My second question is designed to investigate how the telephone was socially shaped, both by institutions and social groups. The main issues I am concerned with here are the telephone's social management, social responses to the telephone, and the telephone's local social diffusion and use. I had also the original intention of exploring the telephone's social and economic consequences. This proved extremely difficult for the pre-1920 period. My research efforts focused on large City of London companies, where telephone adoption rates were known to be relatively high, and where I expected to find in the board papers or company correspondence discussions of the telephone's adoption. These searches proved largely unproductive. This was because companies tended not to record their deliberations over the purchase and introduction of telephones, and because telephonic communication leaves usually no record. Similarly to undertake new oral history for the pre-1920 period, or to mine existing oral history archives for references to the telephone, would be a major effort relative to the amount of information likely to be forthcoming in this early phase of the telephone's diffusion. For these reasons the question of the telephone's consequences has been postponed for the future, and to an extension of this research to include a later period in the telephone's diffusion.

My original intention was to examine in a set of different social spaces, such as the home, the office and the streets, what the telephone meant and how it was used. This was with the joint wish to avoid technological determinism, and to emphasise the

importance of space in the social appraisal and use of technology. I assumed that technology's meanings and consequences are not independent of its users, or of the spaces in which it is used. Instead technology has different meanings and consequences in different places. In the manner first envisaged this proved difficult to achieve. This was due in part to the lack of adequate business sources giving detailed archival information on the telephone's application in business, and due to the elusiveness of the telephone as a technology. Searches at the Guildhall Library and at the National Register of Archives proved unproductive. When the telephone is mentioned in pre-1920 business papers it usually warrants only casual reference, and is not something that elicits sustained discussion. One has instead to look for more subtle clues such as the appearance of a telephone number on letter heads. One can infer from this that commercial environments found the principle of telephonic communication relatively uncontentious, and its cost more bearable than in say a Government department, a local Town Hall or a Board of Guardians, where expenditure from the public purse was more accountable. This is the most obvious explanation for the relative lack in business sources of social comment on the telephone. The telephone is also an elusive technology. There is usually in this period no record of telephone conversations and unless the communication is significant in some way it is usually unrecorded in other sources, in for example diaries, company correspondence and novels. There are of course exceptions and Chapter 3 includes evidence from each of these sources. It is possible, as I discuss later on, to trace the telephone's development in individual organizations from company diaries. Office plans occasionally show the inclusion of a telegraph or telephone room, as does a 1906 plan for a set of new shipping offices in Cockspur Street, London.¹ Similarly from about 1910 onwards, there are enough sporadic references to the telephone in British contemporary fiction to make inferences about social uses of the telephone.

Other sources such as electrical and trade journals were deliberately avoided although, as Carolyn Marvin has shown, these are potentially rich sources of information.² My reason for avoiding these kind of sources was to escape from one kind of technological determinism, what Claude Fischer terms the "impact-imprint" assumption, the notion that a technology because of its basic characteristics imprints these characteristics on human users of the technology.³ Thus the telephone, because of its incessant ring, its immediacy and invasive qualities, is assumed to make people nervous

and to destroy privacy.⁴ The electrical trade literature, appealing mainly to an emerging professional public of engineers and electricians, for this reason must be treated with caution. It had an obvious interest to promote the advantages of new electrical technologies, and to advance its members for their special skills as interpreters of these new developments and to bring these technologies to a wider public. Another reason for avoiding this literature was so not to prioritise élite and intellectual appraisals of technology. Fischer makes a strong case for the need for empirical studies to show how technologies are used and to measure their consequences. In other words, we cannot rely solely on élite uses or appraisals of technology or assume them to be general responses.

To study the telephone seriously requires methodological imagination. For this reason it is worth mentioning methodological approaches and sources, which although not generally adopted in this study, may prove useful for other scholars or for my own future research. Certainly one is able to find references to the telephone in literary sources or in personal papers and biographies. Evidence from these sources, however, poses serious problems of interpretation. Take the example of Hilaire Belloc. We learn from his biographers that Belloc had a passion for the telephone.⁵ He made a habit of using the instrument for long periods as soon as he arrived at anyone's house. When the Bellocs moved to Chelsea in 1900 they promptly installed a telephone, and were the first house in their street to have the amenity.⁶ Belloc however refused to have a telephone installed at King's Land, his country cottage, where he did not wish to have his privacy disturbed.⁷ How common a predilection was this? Are we to interpret this behaviour as individual idiosyncrasy or hypocrisy, or as something more meaningful of English attitudes to the appropriateness of technology in country and urban settings.⁸ The answer I would suggest is not to discount such sources but to be more systematic in our methodological approach. Claude Fischer's work on the telephone's social history in America up to 1940 shows how knowledge can be gleaned systematically from unlikely sources, or from sources which one may at first want to reject on grounds of partiality or élitism.⁹ Fischer, for example, uses etiquette books to infer social uses of the telephone.¹⁰ The assumption here is that etiquette books follow, rather than lead, popular social trends. If by a certain date telephone use for a particular social activity was prescribed by the etiquette manual as acceptable, this kind of use is then assumed to have been generally a routine activity for the wider population. Similarly, Fischer uses content analysis to trace references to the

telephone in local newspapers, professional cards and classified advertisements.¹¹ From this he infers how long it takes to adapt to a technology, with a decline in direct press comment about the telephone a sign that the technology is no longer a novelty. From these and similar sources, from social surveys, and especially from oral history, Fischer gleans significant evidence about the telephone's social uses, and is able to assess the telephone's consequences for the maintenance of "community" and American urban social life. These approaches have considerable potential in a British context. However, given the telephone's delayed adoption in Britain, relative to the United States, and the relative absence in Britain of useful information on domestic technology in social survey and census material before World War 1, these approaches would be more productive in a study of the telephone's post-1920 diffusion.

The problems of locating adequate business sources, added to the wish to avoid technological determinism and élitism, led me to undertake a detailed case study of the telephone's local reception, diffusion and use. This resulted in the Hampstead study reported in Chapter 6. I sought in addition to complement this with archival material at the urban (mainly London) and national scales. This was to provide a wider context for the telephone's development, and to explain aspects of the telephone's social shaping, to include elements of its production and consumption. The wish to give the telephone an urban focus rested on the belief that the telephone was essentially an urban technology, in that it was principally developed for, and consumed by, an urban market. The focus on one city (London and Hampstead) was designed to emphasise that although a general urban process, the social appraisal and embedding of technology occurs differently in different cities.

London was an obvious choice for study. Long described as a "world city", its central position at the heart of international trade and finance, and in this period at the heart of Empire, suggested it as a productive site for examination.¹² My choice of Hampstead rested on several factors. In particular I wanted a London suburb where telephone exchanges opened at the turn of the century, where there were reliable local newspapers, good local histories and for practical purposes a dependable local studies centre. Hampstead, a suburb of North-west London, proved the most productive location. Telephone exchanges opened in Hampstead in the first decade of the twentieth century. Hampstead has a well-organised local studies library with an extensive collection of local

newspapers and trade directories, and a comprehensive set of vestry and borough papers. Hampstead is also noteworthy for having a particularly good local history.¹³ Hampstead's reputation as a middle-class borough for the "well-to-do" led me also to expect to find some social comment in personal diaries or in local newspapers on the nature of the telephone's social diffusion and use.

Sources consulted

The thesis relies on a wide range of sources which are not easily grouped to correspond directly with my different research questions. At different stages of the thesis I rely on similar sources to answer different questions.

To answer my first question about how urban populations learnt about the telephone I have followed several research paths. Much of the information on this question comes from a close reading of *The Times* for the years 1876-1912. *The Times*, then under the editorship (1884-1912) of George E. Buckle, maintained a tradition of political independence.¹⁴ This non-aligned political role is adequately summarised in the official "in-house" history of *The Times*:

If *The Times* supported a party it was because it believed its policy accorded with the nation's best interests. The duty of the journal remained what it had always been: to obtain authentic information of political, social and economic affairs and to comment upon them without regard to private ambitions or interests.¹⁵

Despite this claim to independence, one must still regard *The Times* as an establishment newspaper. It was the model for many of the leading penny dailies of the late nineteenth century, which catered distinctively for the upper and middle classes and for the male reader. The contents of *The Times* was overwhelmingly political, with some space given to business and religion, and to human interest stories and sport. The staple, however, was politics, especially speeches, and proceedings in parliament were reported at full length. A distinctive quality of *The Times* and the penny dailies was that they provided the facts so that readers could form their own political judgement. Editorial comment was confined to leading articles. Thus, as one historian describes it, "propaganda was made by open argument; not, as in the twentieth century, by the doctoring of news".¹⁶ For this reason, *The Times* is treated in this study as a reliable source of information for the major developments in telephone history, and for tracing general social comment on the

telephone. This material forms the basis for my arguments in Chapter 3, on the telephone's general social reception and diffusion, and in Chapter 4, for debates about how the telephone service was developing. In Chapter 3 newspaper material is supplemented with samples of pre-1912 telephone advertising (from British Telecom's Archives), with a small case study of the telephone's adoption by a security company (from Chubb archives) and with literary sources. In Chapter 4 newspaper material is supplemented with official evidence mainly from Select Committee inquiries.

Chapter 5 focuses on how the telephone was sold. The chapter relies mainly on the papers of the National Telephone Company (contained mostly in Post 84, a collection of documents held in British Telecom's archives, and relating to the activities of the private telephone companies), a company which by 1892 controlled about 90% of the British telephone market.¹⁷ The NTC board papers unfortunately were destroyed during the Second World War. Rich intermediate level sources however survive. Most notable are a set of papers relating to meetings of contract agents. Contract departments were established c.1902 to formalise and to co-ordinate company policy on telephone sales. The discussions are rich and frank. Post 84 also includes detailed telephone statistics for the period 1893-1912. To compensate for the absence of board papers, and thus senior level company discussions, I consulted the NTC's six monthly company reports held at the Guildhall Library. These also assisted in attempts to reconstruct the biographies of Britain's early telephone promoters.

The Hampstead case study, Chapter 6, represents the most sustained empirical attempt in the thesis to examine, and to measure the telephone's local social reception, diffusion and use. The first part of the Hampstead study relies on official vestry and borough records, and on local newspaper coverage, especially on letters and editorial comment published in the *Hampstead and Highgate Express* (hereafter the *Ham and High*). The *Ham and High*, founded in 1860 by George Samuel Jealous, a liberal idealist, philanthropist and distinguished writer, was, and still is, a high-brow quality local newspaper, providing news and information on the local area, and catering in addition to Hampstead's significant intellectual, artistic and literary community.¹⁸ It was thought that in such a social setting as Hampstead this refined newspaper would contain adequate social comment on the telephone. These sources combined are used to ascertain for the period prior to the opening of telephone exchanges which institutions used the telephone,

for what purposes, and to uncover general social responses to the telephone. Wishing for more personal responses to the telephone, attempts were made to examine local diaries and personal papers for references to the telephone but these proved unproductive. Hoping to find discussions on wayleave difficulties attempts were made to consult papers of local estates, such as land belonging to the Church Commissioners, but inquiries did not uncover material of any significance.

The second half of the Hampstead study reconstructs the telephone's social diffusion after exchanges opened in the borough in the first decade of the twentieth century. The object was to ascertain who had the telephone and when, and in a limited sense, given the limitations of source material, to assess how the telephone was used. Full details of my methodology may be found in Appendix 1. A short summary will here suffice. No study has systematically examined in a British context the telephone's local urban social diffusion. Similar work on the United States by Claude Fischer, and on Canada by Robert Pike, provided methodological models for this but the exact methods and kinds of sources used in those studies were not always appropriate or practical in a British context.¹⁹ The earlier up-take of the telephone in the United States and Canada, and the existence there of more comprehensive city directories, allows for a general analysis of local telephone subscribers' occupational and household characteristics in the pre-1910 period.²⁰ In Britain, similar analysis for this period is seriously impeded by the slower relative up-take of the telephone. To adopt Fischer's method of sampling householders from the census, and then cross-referencing these with the telephone and city directory, would reveal few telephone subscribers in a period when no more than 1 or 2% of the British population on average subscribed to the telephone. This method is also impeded by the fact that the last available manuscript census in Britain is that for 1891. This severely restricts the amount of occupational information available on telephone subscribers, and makes it necessary to construct alternative means of determining occupational status and social class. Similarly, early British telephone directories, unlike their North American counterparts, provide no clear distinction between residential and business telephone subscribers. This had to be inferred. For methodological purposes therefore it was necessary to decide upon appropriate sampling strategies, and to construct suitable means of analysis for the available British sources. For information on Hampstead's early telephone subscribers, on their social class, gender and location,

evidence was collected from telephone directories and cross-tabulated with local trade and street directories. This was completed for the years 1902-3, 1912 and 1921, dates chosen to coincide as closely as possible with census years, so that published aggregate census data could be used.

Problems of interpretation

The thesis draws heavily on *The Times* as a source of evidence. *The Times* is an élite source but provides a reliable and comprehensive account of British telephone developments. It also raises for debate issues which were, or which soon became, general ones, for example the issue of the telephone's cost, and issues concerning the location, visibility, aesthetics and danger of telephone poles and wires. It was always my wish not to rely entirely on *The Times*, to avoid the charge of élitism. It was for this reason that I undertook the Hampstead study, and avoided other élite sources. Ultimately there is a need to complement material in *The Times* with similar coverage in London newspapers. In general, one must also be aware that published newspaper material may have been planted by the telephone companies. Certainly some letters to *The Times* were published to give the telephone promoters' viewpoint. At times I use material contained in letters as evidence of the telephone's social use, or as evidence of the public's on-going involvement in negotiations over the telephone's development. Sometimes there are noticeable trends, in social uses, or where the issues correspondents raise recur over the years, for example on the dangers, aesthetics or property rights involved in the location of telephone poles and wires. At other times one has to assume that the quantity of letters received on an issue is not always important. One published letter may be one of hundreds discarded by the editor.

Much of the above applies equally to the records of the National Telephone Company (Post 84). Because this company's purpose was to promote the telephone, and the telephone's advantages as a business machine, one must stress at the outset the implicit bias of this material. One has certainly to treat with caution the company's published statistics. Chapter 5, however, depends on internal discussions between company officials, evidence that was not intended for public consumption. The ideological bias of sources however is a general problem raised by this thesis. How is one reasonably to assess if the early telephone service was efficient or not, or if individual British cities

were deficient in telephones? These are fair questions but my purpose, especially in Chapters 4 and 5, is to expose the existence and ideological positions of the various parties involved in the negotiation over the telephone's development, not to present this evidence as fact.

The thesis at times side-steps issues of ideology to measure the telephone's social diffusion and use. The examples of NTC company advertising and the Chubb case study, both in Chapter 3, and of the Hampstead case study in Chapter 6, raise some important problems of source interpretation. I will discuss each in turn. Only a little early telephone company advertising survives. It is not possible, as Claude Fischer does in America, to trace definitively through content analysis ideological shifts in early company advertising, for example from business use to sociability.²¹ Even dating early advertising is sometimes difficult although the design of the lettering sometimes provides a useful clue, for example the use of Art Nouveau in NTC turn-of-the-century advertising (see Figures 3.8-3.15). In the case of Chubb, it is possible to show through the use of company diaries how the telephone network spread and developed internally to that organization. But such sources have limitations. If Chubb had offices with telephones in London and Manchester one cannot assume that London and Manchester were in telephonic communication. Similar problems are raised by the Hampstead study. One is able to show the telephone's social diffusion with some degree of accuracy. For example, early telephone directories, when supplemented with information in local street and trade directories, provide information on subscribers' occupation, or on their economic function, in about 30 or 40% of cases. One should be aware, however, that there is some occupational bias in the use of street directories, and that they are an unreliable source for lower ends of the occupational scale. Traders are more commonly included than craftsmen, labourers and domestic servants are typically excluded, and a higher proportion of names in the directory tend to list occupations if they are on the main streets or side streets of central districts. Furthermore, because directories typically list the names of householders, they only give an occupational profile of householders, not of all individuals, and thus emphasise the relatively better off people in nineteenth- and early twentieth-century society.²² Despite their partiality, directories provide useful and accurate occupational information on telephone subscribers, which, given that the manuscript census is currently available only up to 1891, would otherwise be generally unobtainable. It is much harder

to know for the pre-1920 period how the telephone was being used, who was using it, and whether calls were being made mainly to sustain local social networks or for long-distance communication. Elsewhere in the thesis I provide some evidence to answer these questions but for this period these are difficult questions to answer.

To conclude, I want to highlight two practical areas of research which if time had allowed, would have usefully improved the thesis. These are the use of iconic representations of the telephone and the provision of public telephones. The public telephone, as opposed to the residential and business telephone, usually receives limited treatment in social studies of the telephone. Yet the public telephone had an important symbolic role, educating urban populations about the telephone. Both the public telephone and the inclusion of symbolic reference to the telephone in business advertisements, for example, to imply a company was up-to-date and modern, show how knowledge of the telephone was not restricted to its instrumental use. Both topics are mentioned in passing. The thesis, however, probably understates their importance, and would have benefited from further elaboration. These must remain topics for future research.

Notes

1. Rosemary Ind, The Edwardian office, in Jane Beckett and Deborah Cherry (eds.), The Edwardian era (London, 1987) 133
2. Carolyn Marvin, When old technologies were new: thinking about electrical communication in the late nineteenth century (New York, 1988)
3. Claude S. Fischer, Studying technology and social life, in Manuel Castells (ed.), High technology, space and society (Beverly Hills, California, 1985) 284-300; Claude S. Fischer, America calling: a social history of the telephone to 1940 (Berkeley, 1992) Chapter 1
4. Stephen Kern, The culture of time and space 1880-1918 (Cambridge, Mass, 1983)
5. Robert Spreaigt, The life of Hilaire Belloc (London, 1957); A.N. Wilson, Hilaire Belloc (London, 1984)
6. Spreaigt, The life of, 146-47; Wilson, Hilaire Belloc, 92
7. Wilson, Hilaire Belloc, 308
8. On this theme of English anti-industrial or anti-technological sentiment see Raymond Williams, Culture and society 1780-1950 (London, 1967) and Martin J. Wiener, English culture and the decline of the industrial spirit 1850-1980 (Harmondsworth, Middx, 1981)
9. Fischer, America calling, op. cit.
10. Ibid., 183-87
11. Ibid., Chapters 5-7
12. Asa Briggs, Victorian cities (Harmondsworth, 1968) Chapter 8
13. F.M.L. Thompson, Hampstead: building a borough, 1650-1964 (London, 1974)
14. The history of The Times: the twentieth century test, Vol. 3., (London, 1947)
15. Ibid., 13
16. Robert Ensor, England 1870-1914 (Oxford, 1936) 144, 533-34. Ensor suggests that *The Times* did later on lose some of its political independence. This was after 1908, when *The Times* was purchased by Lord Northcliffe (Alfred Harmsworth), founder of the *Daily Mail*. Northcliffe sought to give *The Times* a more popular appearance, lowering its price steadily to 1d, and using it to put forward his own opinions on public issues. (The price of *The Times* was reduced to 3d in 1861; Northcliffe reduced it further to 2d in February 1911 and to 1d in March 1914)

17. British Telecom Archives, Post 84, Telecommunications: telephones, private companies 1879-1915
18. Reginald Pound and Geoffrey Harmsworth, Northcliffe (London, 1959) 26
19. Fischer, America calling, op. cit.; Robert M. Pike, Kingston adopts the telephone: the social diffusion and use of the telephone in urban central Canada, 1876 to 1914 Urban History Review 24 1 (June 1989) 32-47
20. Fischer, America calling, Appendix F, 299-308
21. Claude S. Fischer, "Touch someone": the telephone industry discovers sociability Technology and Culture 29 1 (Jan 1988) 32-61
22. Gareth Shaw, British directories as sources in historical geography, Historical Geography Research Series, No. 8. (Exeter, 1982) 29-43; see also P.J. Atkins, The compilation and reliability of London directories The London Journal 14 1 (1989) 17-28, and by the same author, The directories of London, 1677-1977 (London, 1990)

Chapter 3: The telephone's social reception and diffusion, 1876-1920

This chapter focuses on the process by which sections of the British public learned about and learned to accept the telephone, reactions to it, and the specific pattern that this adoption process took, mainly but not exclusively in London. The chapter traces the telephone's introduction and development largely through accounts in contemporary newspapers, periodicals, biographies and fiction. The chapter has three main themes. First, the telephone's "social reception" is used as a general measure of how traditional or modern the process was that introduced a new urban technology. Secondly, the telephone's social reception reveals the set of social spaces significant to the process. This in turn illuminates metropolitan history and its unique social and historical geography of technological diffusion and development. Thirdly, the social reception of technology reveals contemporary attitudes to new technology. The chapter concentrates on the social geography of an innovation's diffusion through London. The political side of the telephone's development in London is told in Chapter 4. The chapter proceeds chronologically, following the telephone as contemporaries would have experienced it. At times I side-step to develop important themes, either for the sake of collecting together scattered material, or to give coherence to events that otherwise would seem disconnected. For example, the telephone network in London, and in Britain generally, developed slowly. If presented as it appeared to contemporaries in journals and newspaper accounts the reader would be perplexed as to how the telephone network and its structure developed over time.

Introducing and demonstrating the telephone

First news in Britain of the telephone was contained in newspaper reports of telephone developments taking place elsewhere. *The Times*, reporting in November 1877 on recent telephonic experiments in Germany, described how "perfectly distinct oral communication" had proved possible between the German Central Telegraph Office in Berlin and Brandenburg, 61 kilometres distant.¹ For many years this newspaper continued to report on telephone developments worldwide, although mainly in Europe and North America, and to provide detailed comparative statistics of national progress in telephony. Contained in these news items was the sub-text that if Britain was to maintain its

industrial supremacy and military superiority it had to keep up with its rivals in matters of new technology.

The telephone was formally introduced into Britain by Lord Kelvin, a judge at the Centennial Exhibition at Philadelphia. Kelvin was so impressed by Bell's speaking telephone that Bell gave him duplicates of his membrane transmitter and iron-box receiver to carry back to England.² From this moment on the telephone received wide publicity in Britain. In September 1876, in his Presidential address to the mathematical and physical section of the British Association for the Advancement of Science in Glasgow, Kelvin made reference to and exhibited Bell's telephone. The telephones presented to Kelvin and exhibited at the Glasgow meeting of the British Association could not be got to work because they had been damaged during transport.³ Nevertheless, Kelvin, in reporting the scientific exhibits he witnessed in America, explained the telephone's significance and simplicity of conception. Kelvin's address, reported in the British scientific journal *Nature*, described Bell's invention as "the greatest by far of all the marvels of the electric telegraph". He also admired the inventive spirit that devised the slight means necessary to realise "the mathematical conception that, if electricity is to convey all the delicacies of quality which distinguish articulate speech, the strength of its current must vary continuously and as nearly as may be in simple proportion to the velocity of a particle of air engaged in constituting the sound".⁴

Kelvin rightly stressed the conceptual significance of Bell's speaking telephone for it was the conception at the heart of Bell's telephone, more than its physical apparatus or capacity to transmit sound, which made it so significant an invention. Bell was not the first to invent an instrument which reproduced sound. But he was the first person to successfully patent an invention whose simplicity of conception allowed for the practical reproduction and transmission of sound by electro-magnetic means. Reminiscing in 1916, Bell explained the critical thinking necessary for the telephone's invention which took shape in his mind in the summer of 1874. This was that "it would be possible to transmit sounds of any sort if we could only occasion a variation in the intensity of the current exactly like that occurring in the density of the air while a given sound is made".⁵ As such, Bell's electric speaking telephone differed significantly from earlier telephones, such as the "telephone" invented in 1821 by Charles Wheatstone, which transmitted music by means of wooden rods, or even those primitive "string telephones" that were sold on the

streets of London in the 1860s and 1870s.⁶ These telephones relied on the principle of conductance, not on electro-magnetic induction, the principle critical to Bell's telephone.⁷

By the summer of 1877 Bell had considerably improved his telephone and in July 1877 William Preece, chief engineer at the British Post Office, brought to the United Kingdom the first pair of practical telephones.⁸ When Preece lectured on the telephone to the British Association for the Advancement of Science, meeting in Plymouth later that year, he demonstrated these telephones. Bell was also present at the meeting. Recently married, and on honeymoon in Britain at the time, he was telegraphed an invitation to attend the meeting. Bell accepted the invitation and assisted Preece in demonstrating his invention. The announcement of Preece's paper on the telephone created a sensation at the Association.⁹ The *Popular Science Review* was undoubted in its view that the lion's share of attention at the meeting went to the telephone: "Wherever the instrument was to be exhibited, whether in the physical or mathematical sections, or at Mr. Preece's popular lectures, there were always crowded audiences, eager to learn something about so novel an apparatus ... the interest in this subject culminated on the arrival of Professor Graham Bell, the inventor of the talking telegraph".¹⁰

The telephone received considerable publicity following this meeting of the British Association. Bell, although on honeymoon, delayed his return to America and continued to give lectures on the telephone, receiving between fifteen and twenty-five pounds for each talk. As well as his lecture to the British Association at Plymouth, he demonstrated the telephone before leading citizens of Glasgow. He gave at least ten telephone lectures in England and Scotland over the next four months, mostly sponsored by scientific and technical societies, but these also drew crowds of the general public. In two cases the crowd numbered as many as two thousand.¹¹ Thus it was that when at the end of October Bell addressed the Society of Telegraph Engineers in London, at a meeting specially convened to welcome him to England, he did so in a "hall crowded to overflowing".¹² Bell also gave private demonstrations. For example, he demonstrated his invention in a Newcastle coal mine and in a separate experiment on the Thames tested communication between submerged divers and the surface. His most famous private demonstration however was before Queen Victoria.¹³ This was in January 1878 when Bell and Col. Reynolds, Bell's British agent, were presented to the Queen at Osborne House, on the Isle of Wight. Bell lectured for fifteen minutes on the mechanism of his invention, after which

several telephonic communications were arranged between Osborne House and Osborne cottage, and then with Cowes, Southampton and London. From Cowes a quartet of tonic-sol-fa singers were heard to sing several songs. Mr. Preece in Southampton spoke for several minutes with Prof. Bell and Col. Reynolds and "talked as fluently ... as though he were in the next room". Also from Southampton, a bugle sounded the retreat and was heard with "startling distinctness". Finally the distinct tones of an organ were heard from London.¹⁴

Following the meetings of the British Association, Bell gave a lecture to the Royal Society of Arts in London. *The Times* reported that "if any proof were wanting of the universal interest this remarkable instrument is now exciting, it was shown by an assembly of the members which not only filled the hall and staircases of the building, but overflowed into the street outside". In the course of his lecture Bell described the types of electric current which he claimed to be the first to recognise, the process of experimentation by which he came to invent the telephone, how the instrument worked and in conclusion provided some practical illustrations of its application. Telephones in the meeting room were connected to instruments in different parts of the building, in a hotel across the street, and to the existing telegraph wire connecting the Society of Arts with its printing office off Fleet St. At about ten o'clock in the evening it was found possible for conversation to be carried on between the Adelphi and Fleet St, a distance of about a mile. Earlier in the day there had been too much interference on the lines to allow for uninterrupted communication.¹⁵ Bell's lecture was so successful that the Society invited him to give a second. Because of the large audience expected the lecture was held in the hall of the Freemason's tavern. On this occasion Bell concentrated on the various stages by which the telephone was invented, and gave prominence to an explanation of the principle of the telephone.¹⁶

Bell's lecture series set the pattern for the next few years. In lectures to scientific societies, and in a range of public and private demonstrations, all reported in the press, the telephone was made known to increasingly wide audiences. William Preece, the Post Office's chief engineer lectured on the telephone in December 1877 to the Royal United Service Institution, and in January 1878 to the Physical Society in London.¹⁷ Also that winter Prof. Barrett, of the Royal College of Science for Ireland, lectured on the telephone to the London Institution. The aim of his lecture was to explain and exhibit the various

attempts to transmit music and speech electrically that had culminated in Bell's electric telephone. Prof. Barrett was clear in explaining the significance of Bell's telephone. Whereas earlier devices and instruments relied on the principle of conductance, and could only transmit sound practically for a few miles, by harnessing the powers of electricity for this purpose there was "practically no terrestrial limit to our range of hearing". Prof. Barrett also explained the telephone's advantages over the telegraph. It did away with the need for signs, for example. In conclusion, after a number of experiments, Prof. Barrett showed how it was possible to construct a telephone for a few pennies.¹⁸ So popular was Barrett's lecture that he gave a repeat lecture two weeks later in a London theatre.¹⁹

Similar treatment and publicity was given to Edison's carbon telephone. This was first demonstrated in November 1878 on a private commercial telegraph wire, 115 miles long, between London and Norwich. The experiments were designed to confirm reports in American journals that Edison's carbon telephone could work over great distances and under conditions fatal to other systems. Despite the stormy weather, and the considerable interference from neighbouring telegraph wires, successful conversation was carried out between the two places. Special note was made of the ability to identify the American accent of Mr. Edison's professional agent, and to pick out the individual voices of speakers.²⁰ Later, when Edison's loud-speaking telephones were introduced to Britain in March 1879, they were first demonstrated in Lombard St, in the City of London. The instruments were placed half a mile apart, one at 6, Lombard St, the other at 1, Princes St, the wire passing by way of the Exchange Telegraph Company's offices in Cornhill, making a circuit of about half a mile. Conversations were maintained between the two points, songs were sung, and the voices could be distinctly heard 15 feet from the instrument. *The Times* reported that the tests demonstrated satisfactorily the invention's simplicity, and promised that telephonic communication would shortly become as general in the commercial and manufacturing centres of England as it was already in the United States.²¹ On April 2, 1879, and again on April 29th, Edison's loud-speaking telephone was exhibited at Royal Society Soirées held at Burlington House. Among those in attendance were the President of the Royal Society, the Speaker of the House of Commons, the First Lord of the Admiralty and several other prominent politicians, scientists and businessmen. With one end of the wire placed in the laboratory at the Royal Institution, a passage of Mr. Gladstone's recent speech read over the wire from Albemarle

Street was distinctly heard at Burlington House.²² Similarly on May 21, 1879 at the Royal Society of Arts, Mr. Conrad Cooke lectured on the telephone and illustrated the operations of the Edison telephone. In familiar fashion, "songs sung through it from a distant room ... tunes played on the cornet, and also whistled, were reproduced with force and fidelity in the lecture-hall, to the gratification of a crowded audience".²³

Aside from demonstrations at scientific societies the telephone was also exhibited in a range of settings, traditionally used to introduce new inventions. The telephone was exhibited in coal mines, in hospitals and on the railways. These uses highlighted the telephone's emergency value as an instantaneous means of communication. Thus in November 1877 Lord Kelvin officiated at a set of experiments at Prescot Colliery, near Liverpool. Successful communication was held with miners at the bottom of the pit. Questions asked in the office were answered instantaneously from the pit. By registering the vibrations of an anemometer placed below ground, the telephone was also used to indicate to surface officials the level of ventilation in the shafts below.²⁴ Similarly in April 1880, a large group interested in mining operations assembled at Carberry coal mine, at Lord Elphinstone's invitation, to witness an experiment in communicating with the pit interior by telephone. After an explanation by Mr. Charles Wollaston of the General Telephone Agency Company, the company descended the shaft and at lunch music was played over the telephone from outside and distinctly heard in the colliery.²⁵ Following the success of this experiment the mine's lessees ran wires for telephones to different parts of the underground workings. This enabled direct verbal communication between the pit and the surface, and allowed the condition of the pumping machinery to be checked by the engineer above by listening to the sounds given off by the valves and other moving parts. *The Times* also speculated on the telephone's utility in the event of a mining accident for alleviating the anxiety of those at the surface and for aiding the exploring parties below.²⁶

The telephone was similarly applied in the treatment of the sick. In fever hospitals, asylums and in the private homes of medical practitioners it was used as a safe means of communication with those isolated because of infectious disease.²⁷ In one case in Dundee the telephone was used to broadcast a sermon and church service to the bedside of a bed-ridden congregant.²⁸ The telephone was also recommended for saving the time and effort of medical staff. When the children's hospital near Manchester installed telephones

between the superintendent's room and each of the six wards, the kitchen and pantry, it was found to save much time and labour in running to and fro.²⁹ Similarly the railways' concern for safety and for the efficient management of traffic ensured that, as with the telegraph, the telephone was swiftly applied to the railways. The telegraph, long employed by the railways as a safety device, was never entirely superseded by the telephone. On only one or two lines did telephones entirely displace the telegraph. Yet the telephone provided something that needed no trained staff to work it. Exchange-switching technology with which it was associated, and which was also applied to the teleprinter, enabled greater capacity for communicating information and improved means for the regulation and control of traffic. By use of a very selective telephone apparatus the railway's central office was put in immediate and constant communication with every box, station, yard, office and other key point in the railway's area.³⁰ This accords with the first report in *The Times* of the telephone's application to the railways in August 1881. This was when the London, Chatham and Dover Railway Company connected the office of its superintendent at Victoria Station with Holborn Viaduct, the City terminal station, with Loughborough Junction, where there were large sorting and make-up sidings, and with Wandsworth Road, the headquarters of the locomotive and other departments. The goods manager's office at Victoria was also connected with the goods department at Blackfriars. The newspaper also reported that for some time satisfactory communication by telephone had existed between Victoria and the residence of James Staats Forbes, the railway's chairman, who lived near Beckenham.³¹ Several years later the "pulsion telephone", a new mechanical telephone of great power and clearness invented in America, was tested on the Midland Railway between Finchley Rd and Hendon stations. Conversations carried out between operators at both stations and a musical box placed at one station was distinctly heard at the other. These and other tests ably demonstrated "the remarkable powers of the system and its usefulness in case of a railway accident, or in other circumstances where a telephone station is now at hand".³²

Many of these early experiments and exhibitions were specially designed by the telephone's promoters to publicise the new invention. This was the case for the several telephone concerts or telephone soirées which took place shortly after the telephone's invention and introduction into Britain (see Figure 3.1). Thus on Boxing Day 1877 at the Crystal Palace an experiment, using a wire of over a quarter of a mile in length, resulted

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Figure 3.1 Demonstrating a new invention: New Year's greetings by telephone, 1882
Source: Illustrated London News, 7 January 1882

in successful telephonic communication conducted over the heads of the 50,000 assembled people.³³ During the 1882 Electrical Exhibition at the Crystal Palace the large crowd of electricians were treated to broadcasts of music over the telephone in the form of telephone concerts. In a trial in January 1882 organ music was conveyed to the residence of the manager in Crystal-palace Park, and simultaneously spoken messages and music were transmitted to the house of Colonel Gouraud, a nearby resident. It was also intended to transmit music over longer distances, for example, to transmit the concerts of Mr. August Manns to London and to bring down the Monday Popular concerts from St. James's hall to a specially fitted room in the Palace at Sydenham.³⁴ Similarly the telephone was demonstrated at a small private dinner party in London. Twelve telephones connected to the Natural History Museum allowed guests to be entertained with vocal and instrumental music performed at and transmitted to them from the museum. The assembled company was a distinguished crowd of politicians, journalists and military and naval officials. It included William Preece, Lord Shaftesbury and Lady Ashley, Mr and Mrs Gladstone, the journalist H.M. Stanley, Anthony Trollope, several admirals and the railway engineer and M.P., Thomas Brassey.³⁵

Other early telephone uses reported in the press confirm the telephone's remarkable adaptability, but show also its application mainly to pre-existing settings and social institutions, not to new ones (see Figure 3.2). Of the first reported connections many linked privileged urban institutions. It was also often necessary to devise means to circumvent the powers of London's administrative bodies who controlled the streets. In January 1878 part of a House of Commons debate was transmitted by telephone through the ordinary telegraph wires from the House of Commons gallery to the office of the *Daily News* and published in that journal the following day.³⁶ In February the telephone was installed at Windsor, providing communication between the Palace and the Royal mews.³⁷ In April 1880 wires laid along the Metropolitan District Railway allowed several chambers in the Temple to be connected by telephone with the law courts at Westminster and the House of Commons.³⁸ Later that year *The Times* announced its system of reporting House of Commons' debates by telephone, although its applause was considerably muted. The system comprised a new connection between the newspaper's office and the House of Commons, with Edison's loud-speaking telephones placed at either end. The immediate result was "to bring the compositor at the machine into direct

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Figure 3.2 The telephone and the social hierarchy: early institutional subscribers, 1879

Source: BT Archives, Promotional pamphlet advertising the advantages of the telephone ..., TCA 1/5, Stray MSS, May 1879

communication with the Parliamentary Reporter at the House, and to enable the debates to be reported and printed from half to three-quarters of an hour later than had previously been possible". Improved accuracy was an additional advantage. For this a system of bell signals was installed to allow repetition of misheard or misunderstood phrases. The newspaper pointed out however that any improvement in the speed of reporting was due also to allied technical developments, such as the invention of the typesetting machine. The article mentioned the continuing difficulties posed by problems of induction and vibration, and the impediments placed in their way by the Post Office. To secure its new line *The Times* had to obtain special permission from the Metropolitan Board of Works to lay the necessary wires in the subway of the Embankment.³⁹

Given the telephone's promise of long-distance communication considerable attention was given to experiments involving long-distance telephony. These were important demonstrations designed to prove the telephone as more than a scientific curiosity or musical toy but as a superior and practical form of business communication. During its first year of introduction into Britain telephone experiments were held between mainland Britain and Jersey, Dover and Calais (22 miles), Dublin and Holyhead (67 miles) and between London and Norwich (115 miles).⁴⁰ Every year as technical problems were solved or overcome the distances became greater.

The telephone's military significance?

This thesis concentrates on the telephone's civilian uses but clearly the telephone had military uses. Its military significance was known and considered early on. As early as December 1877 William Preece lectured to the Royal United Service Institution on the telephone's applications for military and naval purposes. Preece explained that the telegraph had already revolutionised warfare but felt that the telephone offered additional advantages. First, no skill was required to operate it. Secondly, the telephone could not be tapped by the enemy, for it was believed at this time that in the attempt to tap a telephone line, the voice of the interceptor would be recognised and the deception detected. Preece concluded that it was uncertain how far the telephone could be employed in warfare but "We do know this", he said, "that it transmits to a distance far beyond the reach of the ear, or of the eye, the words of command, the tones of voice, the distinct and unmistakable articulation of the general as well as of the private. Such an apparatus must

be valuable for military purposes".⁴¹

If the telephone's military advantages were not immediately known or taken up in Britain they were at least reported from overseas. The newsworthiness of the telephone's military significance to other nations, and its implied threat to Britain, is evidence itself of knowledge in Britain of the telephone's more sinister applications. It was not long for example before Preece's initial belief that the telephone was immune to interception was challenged. During Prof. Barratt's lecture on the telephone to a London theatre in January 1878 the audience was read extracts from Vienna papers explaining how the telephone could be used to "tap" telegraph wires. It was sufficient, they were told, to run a telephone wire close by a telegraph wire for a short distance in order to hear through the telephone the signs transmitted by the telegraph apparatus.⁴² In January 1878 it was also reported that a German military report documented the telephone's practical use in warfare for maintaining communication with pickets and outlying posts.⁴³ A letter to *The Times* in April 1879 dwelt on this very subject. The telephone, the correspondent felt, had many advantages over the telegraph and was well suited for use by an army in the field. The telephone required no special knowledge and with but little equipment an army in the field, distant outposts and outlying pickets could be kept in communication with the main body.⁴⁴ In January 1880 it was reported that the United States Ordnance Department had used the telephone successfully to determine the time of flight of small-arm projectiles. By placing telephones near the gun and close to the target the time between firing and the projectile hitting its target could be accurately measured by stopwatch.⁴⁵ Successful experiments made by the Italian artillery in 1890 showed it was possible for artillerymen to follow orders by telephone even when given from considerable distances.⁴⁶ Telephone experiments aboard *HMS Malabar* in the summer of 1887 showed how the telephone could be applied for naval purposes, and used to communicate between ships at sea. Adapted Bell telephones attached to a large gong supported against the side of the vessel and below the waterline were used to transmit underwater signals in Morse code. With two ships equally equipped, signals could be sent a distance of over a mile. A message was transmitted by striking the gong and the signals received in the other ship's bridge.⁴⁷ At the 1881 Electrical Exhibition in Paris *The Times* correspondent found the British telephone exhibits to be generally disappointing but made special note of a portable military telephone.⁴⁸ Several years later a similar "portable telephone" was

demonstrated in London. Described as useful for "military, railway or other purposes" the apparatus comprised a combined receiving and transmitting instrument and was contained in a case which could be slung by a strap in front of the user. For field purposes not one but several outposts could maintain communication and send reports to headquarters in the rear.⁴⁹

For the period immediately prior to and during the First World War military historians have described the importance of improved communication, and in particular the invention of portable and robust field telephones, for changing the conduct of modern twentieth-century warfare.⁵⁰ Between 1906 and 1908, most of the European armies introduced field telephones on at least some level in their combat units.⁵¹ The importance of this and other improvements was in the capacity they gave generals to co-ordinate from a great distance simultaneous battle plans on many fronts, and to communicate effectively between headquarters and scattered troops on the far-flung and fire-swept battlefield.⁵² Carolyn Marvin has also shown how the potential military uses of electrical technologies fostered cultural anxieties over the possible use of these technologies in time of warfare. However she also suggests that in the case of electrical technologies these fears were largely unfounded for when war occurred they were used more for improving communications than for their potential destructiveness.⁵³ Nevertheless the newspaper reports presented above show that the telephone's military significance was understood much earlier than 1914, and suggest the telephone was being used for military purposes long before battle preparations leading up to the outbreak of hostilities. Given the recent remarks by Edgerton and Horrocks that British historians have typically underplayed the speed and significance of military applications of technology, and of military spending on research and development, this is an obvious and urgent area for future research.⁵⁴

A superior telegraph

Throughout the period of this study the telephone was essentially conceived and understood as a superior telegraph. Just as the railway was referred to as the "iron horse", so the telephone was initially understood in terms of the technology which immediately preceded it, and with which it was closely associated. One of the first references to the telephone in the columns of *The Times* was a description of a "TOY TELEGRAPH".⁵⁵ In his speech to the British Association in Glasgow in September 1876 Lord Kelvin

described the telephone as "the greatest by far of all the marvels of the electric telegraph".⁵⁶ This was a way of making something novel seem familiar and less threatening. It was also a practical adaptation of a new technology. The telephone was tested not on new circuits but on existing telegraph lines. One of the first long-distance experiments was between London and Norwich, using one of the longest private wires then available in Britain for commercial purposes.⁵⁷ There is a further reason why in Britain the telephone was considered a telegraph. This was because of a court action brought by the Government against the Edison Telephone Company, accusing the Company of infringing the Government's exclusive rights to transmit and receive telegraphic messages, as conferred by the Telegraph Acts. In December 1880 this resulted in a legal decision which declared the telephone to be a "telegraph" within the terms of the Telegraph Acts.⁵⁸ The immediate consequence of this court decision was that the two private companies recently established in London had now to take licences from the Post Office, licences that were initially very restrictive, forcing the companies for example to operate within a radius of five miles of the City of London.⁵⁹

The telephone was considered a superior telegraph not only in its early years but throughout the first thirty or forty years of its history. The telephone was also during this period consistently compared with the telegraph. The two technologies were similar in mechanism and in function. Their legal and institutional histories were intertwined. When contemporaries made comparisons with the telephone the telegraph was the technology with which it was most commonly and naturally associated. This was true of the telephone's promoters. In a letter to *The Times* in May 1879 Edison's London agent wrote that Edison's mechanical reproduction of the voice represented "an addition to the customary means of communication" which it was "impossible to doubt will not only largely supersede the more costly and more umbrous machinery of the telegraph, but will obviate the necessity for much of that rapid journeying, which forms so large a part of the work and worry of common life".⁶⁰ At the National Telephone Company's ordinary general meetings the telephone's development was normally shown to compare favourably with the telegraph.⁶¹ In terms of its cost per message, the number of messages sent, and the average number of words transmitted by each individual message, the telephone was shown to be superior to the state telegraph system.⁶² The National Telephone Company continued to describe and sell the telephone as a superior telegraph in the Edwardian years

(see Chapter 5). That such a conception was still thought to be effective is evidence both of the telephone's relatively slow uptake in the United Kingdom, and of enduring notions of earlier technologies. The comparison with the telegraph was also made more generally. In one of the first references to the telephone in a contemporary novel, Carrie's friend in *The Diary of a Nobody*, published in 1892, chides Mr. Pooter for his scepticism about spiritualism by saying that if all were as prejudiced as he "there would never have been the electric telegraph or the telephone".⁶³ Furthermore, in newspaper correspondence writers usually expressed their concerns about the telephone with reference to the telegraph. On a range of matters covering the cost, speed, accuracy or efficiency of telephonic communication the common and obvious comparison was with the telegraph.⁶⁴

The telephone's conception as a superior telegraph and its relatively high cost meant that it would develop mainly as a business device. This was certainly the case by the mid-1890s when the early private telephone companies amalgamated to form the National Telephone Company and when this company had destroyed much of the potential opposition by buying out or by undercutting competing companies and municipal systems. There were however alternatives to the telephones sold by the large private companies. To emphasise its simple conception scientists who lectured on telephony showed how telephones could be made cheaply from readily available materials.⁶⁵ In 1880 a small threepenny pamphlet titled *How to make your own telephones for 5s. 6d. per pair* was published by an Oxford don. It described how to make telephones from simple household tools and materials, without the need for expensive equipment or skilled labour. The telephones were said to work over a distance of 400 yards.⁶⁶ The *English Mechanic* explained how to make a pair of telephones for 2s. 6d and boys at Eton College were reported to have made telephones out of the bottoms of preserved meat tins.⁶⁷ A letter to *The Times* explained how all the material for making telephones could be bought for a few shillings at any good optician's or philosophical instrument maker's. The correspondent described how for 15 shillings he made a telephone for his residence which was superior to a speaking tube for it obviated the need to "bawl" at the top of one's voice and reproduced the exact tone of voice at the other end.⁶⁸ There were also the popular string telephones common on the streets of London in the 1860s and 1870s. When Mabel Bell visited London in the winter of 1877 she found shops full of these "Domestic

Telephones". She saw the eternal black box with the word "Telephone" printed on it in large black letters everywhere she went: "on newspaper stands, at news stores, stationers, photographers, toy shops, and fancy goods shops" and quoted advertisements claiming to have sold 700,000 of these telephones in but a few weeks.⁶⁹ These were all primitive telephones but the period also saw the introduction and demonstration of a variety of telephones typically developed by lone inventors, British and foreign. Thus in June 1887 *The Times* described Herz's micro-telephone, easily fitted to existing electric bell systems, and intended for use in homes or hotels and other large establishments. Its special advantages were seen to be its cheapness and compactness. Servants, called by pressing a button, could be informed of the purpose of the summons, and for hotels it was pointed out how this would lead to great savings in time and labour.⁷⁰ Similarly in July 1893 a "loud telephone" was successfully demonstrated. Devised by Mr. Graham of the Electric Wire and Fittings Company, this instrument, by rearranging the electrical circuit and bringing the resistance as low as possible, allowed conversation to take place and be heard in any part of the room where the conversation was conducted.⁷¹ None of these telephones rivalled the potential of the private companies with their exchange facilities and promise of long-distance connections. The severity with which the British telephone promoters prosecuted those who infringed their patent rights and the steady technical improvement in telephony also implied that such primitive low-cost telephones would remain largely undeveloped. Nevertheless they were genuine alternatives which served to familiarise the public with the telephone and provided free publicity for the private telephone interests. They also show the telephone's invention to be a diverse, continuous, and unpredictable process.

Although the conception of the telephone as a business device was dominant in this period the telephone did have alternative uses. We must not exaggerate their importance but they do show how the telephone could develop differently. The telephone was used for example as a primitive broadcasting service. The most famous and successful was *Telephon Hirmondo*, a broadcasting service started in Budapest in 1893. Subscribers could listen in at home to daily scheduled transmissions of news, stock exchange prices, parliamentary proceedings, sport information, theatre, concerts and lectures. The service is thought to have attracted 6,000 subscribers.⁷² In London in 1894 The Electrophone Company was founded on similar principles. Based in Gerrard Street, it allowed

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Figure 3.3 The Electrophone service c.1905
Source: Courtesy of BT Museum, P6842

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subscribers to hear in their own homes or at central offices performances from 14 London theatres, and on Sundays 15 church services were available (see Figure 3.3). Installation was free, and for £5 a year subscription for two sets of headphones, you could listen any or every night of the year, with no extra charge for telephone calls. Automatic boxes were also set up in central London where for 6d per broadcast, subscribers, provided with a key, could listen in to performances. The Electrophone Company, unlike the Budapest service, did not broadcast news. It was also less successful. By 1919 it registered 1,000 subscribers, 2,000 by 1923 but after this a rapid decline set in and it went into voluntary liquidation in 1925.⁷³ The Electrophone Company was initially licensed by the National Telephone Company. The Electrophone syndicate paid to the NTC 55% of its gross receipts collected within a radius of four miles of its exchange, and all Electrophone subscribers had to subscribe either to the NTC's exchange service or to rent from the company a private wire.⁷⁴ The Electrophone service did not therefore exist independently of the dominant private telephone interests and although an example of how the telephone service might have developed differently, as a more popular and democratic technology, it was itself a capitalistic venture to supply entertainment services to a wealthy London audience.

A developing network

Despite alternative uses and conceptions the telephone developed essentially as a business device. The first telephone exchanges opened in the central business districts of Britain's major industrial and commercial cities. This followed the North American pattern and was a sound business decision, designed to tap telephony's most lucrative commercial market. It was also symbolic, locating the telephone business close to potential backers and sources of capital. In London the early private telephone companies, operating respectively Bell's and Edison's patents, opened their first exchanges at 36 Coleman St and at 6 Lombard St, in the heart of London's financial district.

Commercial considerations influenced the telephone network's development and its geography. Long distance or trunk line services were initially privileged over local routes. This was because for the private companies long distance lines were potentially more lucrative and demonstrated more than local lines the telephone's credibility as a commercial innovation and as a serious competitor to the telegraph. The early private

telephone companies pushed trunk lines to the full, sometimes to the exclusion of local lines and local subscribers. For several years the South of England Telephone Company complained that its subscribers were denied access to London by its parent company, the United Telephone Company.⁷⁵ Meanwhile the United Company drove lines through the South of England Telephone Company's territory, first to Brighton and then to Birmingham.⁷⁶ To potential commercial consumers the value of these long distance trunks is clear. The telephone was attractive precisely because it promised privileged access to information and to its immediate exchange over long distances. When the trunk lines were nationalized in 1892 the Post Office immediately sought to provide a national backbone trunk system prior to more extensive trunk line development. It is significant that in 1895 when the Post Office connected the capitals of England, Scotland, Wales and Ireland telephonically for the first time, at the inauguration ceremonies in each city, included alongside local politicians and municipal leaders were the presidents of the local chambers of commerce and provincial stock exchanges.⁷⁷ These institutions were highly vociferous in demanding cheap and efficient long distance telephone services. These institutions did not alone benefit from such services. Nevertheless the demand for long distance lines to connect Britain's commercial and industrial regions shows the telephone's ideological significance, for the exchange of commercial intelligence and the extension of the price system were privileged over other social objectives.

A national telephone system emerged gradually over several decades. Robson, plotting the diffusion of telephone exchanges in England and Wales, shows that the telephone system through much of the 1880s existed mainly as a set of relatively disconnected regional networks constructed by the provincial companies.⁷⁸ By 1892 with the amalgamation of these companies to form the National Telephone Company these regional networks combined to provide a basic national system (see Figure 3.4).⁷⁹ Robson correctly points out that London was relatively isolated by comparison with northern industrial centres.⁸⁰ A trunk line connected London to Brighton in 1884.⁸¹ A separate line connected London to Croydon in 1888.⁸² The line to Birmingham however, which connected London to Manchester, Liverpool and the industrial north, was only completed in 1890.⁸³ Plans existed in 1888 to connect London with Bristol but this western connection was still not made in 1892.⁸⁴ Robson, concentrates however on exchange **diffusion**, not on how the telephone system was used, or its potential for long

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Figure 3.4 The telephone trunk-line network, 1892

Source: BT Archives, The National Telephone Co., Ltd.,
Exchange and trunk line system 1892, ARC 90

distance communication. How quickly, for example, did the developing trunk system enable commercial organizations to conduct business telephonically over long distances? This is a difficult question to answer in an age when telephonic conversations typically leave no record. Company records often make mention of the acquisition of telephones or their first use, but are usually silent on the content of telephone messages or on the uses to which the telephone is put.

The business records of the safemakers and security firm, Chubb & Son, provide an example. George Chubb's interest in security concerns led him to take an early interest in telephones and similar electrical devices.⁸⁵ In 1879 he wrote to *The Times* inquiring when telephones he had witnessed in America would be available in Britain.⁸⁶ In October 1879 his name headed a list of businessmen who planned to establish a telephone exchange to serve Birmingham and neighbouring towns.⁸⁷ Chubb & Son were also one of the first business firms to subscribe to the United Telephone Company's London telephone exchanges, and to advertise the benefits of the telephone. Chubb records show that in late 1879 the company was connected to the UTC's London exchanges. In February 1880 the company printed notices advertising its connection to the telephone exchange, and that orders by telephone would receive immediate attention.⁸⁸ By November 1880 the company's chief office at 128 Queen Victoria St, its West End Branch at 68, St. James's Street, Pall Mall, and its Art Metal Warehouse at 57, St. Paul's Churchyard were connected to the United Telephone Company's exchange system. In addition the company's Wolverhampton works and its branch warehouse in Birmingham were connected with Birmingham exchanges, although there was no facility at this time for telephonic communication between Birmingham and London. Private telegraph wires already connected the company's chief office with its factory in South London and with its West End branch in November 1880.⁸⁹ The South London factory was connected by private telephone wire with the company's chief office, the factory workbook reporting first use of this telephone in April 1883.⁹⁰ Company diaries issued to managerial staff show how the company's telephone network grew simultaneously with the expanding trunk system.⁹¹ A telephone number was first listed along with a telegraphic address (listed from 1896 onwards) in 1900, suggesting that the telephone was not until then used by managerial staff.⁹² The diary for 1910 listed the following: two separate telephone lines for the company's chief office; a private wire to the London works and the West

End Branch; a line each for its City and West End branches; and telephone numbers for each of its provincial offices in Manchester, Liverpool, Glasgow and Wolverhampton, which by this time would have been able to intercommunicate.⁹³ In subsequent years growth was marked by an increase in the number of telephones more than by growth in the system. A set of internal telephones was installed in the south London factory in 1911;⁹⁴ two telephones were listed for the Wolverhampton factories in 1923; a telephone for the Edinburgh branch office was added in 1925; and the 1941 diary now listed three separate telephone lines for the company's head office, and three lines each for its West End branch, and for its Wolverhampton branch and factory.⁹⁵

Throughout our period the majority of telephone calls were local calls. In 1899 it was reported that 98% of telephone calls were local calls, with trunk calls⁹⁶ representing only 2% of the total.⁹⁷ Trunk calls were expensive and, unlike the uniform penny post, were charged at a step rate according to distance. The Telephone Bill introduced into the House of Commons in 1892 to raise £1 million for the purchase of the National Telephone Company's trunk lines set the following rate of charges:

for distances not exceeding 20 miles	3d
for distances between 20 and 40 miles	6d
for every additional 40 miles or fraction thereof	6d ⁹⁸

Because there was insufficient capacity on the trunk lines to meet demand, calls were short, limited to three minutes' duration. Operators could at their discretion allow callers an additional three minutes of conversation. The NTC discouraged this practice, again because of insufficient capacity on the trunk lines. A sample of rates for 1895 shows that a three minute conversation between London and Nottingham cost 1s 6d; to Cardiff 2s; to Plymouth or Liverpool 2s 6d; to Edinburgh or Glasgow 4s 6d; to Belfast 6s 6d; and to Dublin 7s 6d.⁹⁹ There was also a fledgling international service. With the laying of the first telephone cable across the Channel in 1891 the Post Office opened a telephone service to Paris. Two more cables were laid in 1897, and additional cables in 1911 and 1912. A service to Brussels was brought into use in 1903. Both services showed steady increased use. The number of calls between England and France rose from 71,115 in 1909 to 96,806 in 1912, and in the same four year period the recorded calls on the Anglo-Belgian service rose from 25,928 to 29,155.¹⁰⁰ In retrospect, these international

connections were early links in a global telephonic chain. Yet throughout our period international telephony, relative to local, regional and national services, developed slowly, was expensive and highly restricted in its use.

Locally the private companies had to tackle a complex urban geography and an equally complex administrative structure. The telephone's development exposes the patchwork quilt of British land structure and administrative political control. After the Post Office won its court case in 1880, which declared the telephone to be a telegraph, the private telephone companies were forced to take licences from the Post Office. These licences were initially very restrictive and limited the companies to tight areas of operation. The United Company in London was licensed to operate only within a radius of five miles from the General Post Office.¹⁰¹ When in 1884 the Post Office under Henry Fawcett moved to a policy of *laissez-faire* this restriction on the size of exchange areas was lifted. The new policy allowed companies to construct their own long-distance systems but did not grant to the private companies rights of wayleave.¹⁰² The Post Office on the other hand had statutory rights of wayleave bestowed on it by the Telegraph Acts. This meant that the private companies, unlike the Post Office, had to negotiate with as many individual landowners or local authorities as was necessary to construct their system. This caused considerable problems for the private companies. In London, as in other British cities, the problem of wayleaves delayed the expansion of the telephone system, and the diffusion of exchanges out from central areas. In January 1881 the United Telephone Company possessed eight exchanges in London. These were all in central London, at 36 Coleman St, Leadenhall St, Westminster, 11 Queen Victoria St, 77 Cornhill, Eastcheap, Chancery Lane and Heddon St. Further exchanges were opened at 6 East India Avenue, Mincing Lane, Smithfield, King's Cross, East India Dock and at Edgware Rd so that by the close of 1882 there were probably 15 exchanges in London.¹⁰³ The number of London telephone exchanges continued to grow as development spread to the suburbs (see Figure 3.5). Their number rose from 30 in October 1893 to 47 at the end of 1900, and to 62 by 1912.¹⁰⁴ Nevertheless the telephone companies experienced considerable difficulty extending their system. At the United Company's annual general meeting in 1887 the company admitted great difficulty in connecting the system to the suburbs because of problems of wayleave.¹⁰⁵ The difficulty of obtaining wayleaves also obstructed trunk line development and the positioning of call

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Figure 3.5 London's telephone exchanges, 1896

Sources: BT Archives, Post 90, Maps and diagrams, Box 9, London districts, Tariffs and boundaries, 1896; History of exchanges, 4 vols. (n.d., unpublished); F.G.C. Baldwin, The history of the telephone in the United Kingdom (London, 1938) 83 ; D. Occomore, "Number please!" : a history of the early London telephone exchanges from 1880 to 1912 (Romford, 1995)

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Figure 3.6 Early NTC advertisement describing and explaining use of the telephone, Kingston-on-Thames, 1893

Source: Courtesy of BT Museum, MUS 1948

offices. The latter were telephones for public use and the forerunners of telephone kiosks.¹⁰⁶ Call offices often had to be placed inside private shops such as chemists or tobacconists instead of on the streets which were public property (see Figure 3.6). The completion of the London-Birmingham trunk line was delayed for a year by the local board at Hendon refusing the National Company rights of wayleave. Similar obstacles delayed the opening of lines to Brighton and Reading.¹⁰⁷

Administrative delays and the telephone's relatively high cost limited the telephone's early development in Britain.¹⁰⁸ Nevertheless, between 1876 and 1912 considerable telephonic development took place. The emphasis on the telephone's delayed adoption in Britain is due partly to over-reliance on histories of the Post Office's involvement with telephones, and to the view that government bureaucracy "strangled" telephony in this period. The papers of the private telephone companies tell a slightly different story. Immediately prior to nationalization in 1912 the National Telephone Company (NTC), controlling 90% of the telephone business in the United Kingdom, had 1,607 telephone exchanges and over 9,000 call offices established nationwide.¹⁰⁹ By 1912 there were over 500,000 telephone lines in service and the NTC regularly transmitted over 1,000,000,000 messages annually. This compares to a peak figure of 84.6 million inland telegrams sent in 1902-03.¹¹⁰ In London, the volume of telephone messages overtook the number of postal telegrams as early as 1883.¹¹¹ Although the letter remained the most common means of non-face-to-face communication, by extending the volume of messages transmitted, and by widening social access to electrical communication, the telephone extended on-going processes of social and spatial integration, and thus contributed to an extension of the "public sphere".

Demonstration, description, and the telephone's social diffusion

The opening of telephone exchanges in London from 1880 onwards should be understood in relation to the city's population growth and geographical expansion. The population of the administrative county of London grew from 3 million in the early 1860s to 4.5 million in 1901. Between 1871 and 1901 London's rate of growth was faster than the national average and faster than any of the provincial conurbations. As Asa Briggs describes it, the growth of London, the "World City", was unique and "seemed to obey no known laws".¹¹² The growth in London's population and area, and expansion in the city's

commerce, placed a considerable burden on existing forms of communication. It is reasonable therefore to interpret the telephone's development as a response to a communications barrier, an urban problem common to expanding cities. Graeme Davison makes this point for colonial Melbourne, that as the city reached a critical threshold size, through growth in population and commerce, there was a proliferation in the forms of "secondary communication": exchanges, agencies, trade journals, telegraph and telephone services, messengers, and credit investigators.¹¹³ London, uniquely large and international, developed such formalised systems of communication earlier than the 1880s. Nevertheless the telephone's introduction at the end of the nineteenth century ought to be considered in this context of unprecedented growth in the world's largest city and in secondary forms of communication.

A major argument of this chapter is that the telephone's social diffusion through London is indicative of the city's social and spatial structure. Specific institutions and social groups unique to this city voiced their concerns about the telephone, shaped its development, and adopted it for their own interests. The technology's development was inseparable from the power of those institutions and social groups that sought to use and to shape it. The opening of telephone exchanges first in the City of London was significant and highly symbolic for it demonstrated that the telephone's primary utility was to London's foremost financial and commercial community. The City of London was quick to take advantage of new developments in telecommunications.¹¹⁴ By 1853 direct telegraphic communication existed with Paris. After the successful laying of the first trans-Atlantic cable in 1866 there could be a market in London for American stocks based on that day's New York prices. The following year saw the invention in America of the ticker-tape teleprinting machine, able to make prices and other news almost instantly available to the financial community; from 1872 the Exchange Telegraph Company was allowed to collect up-to-the-minute prices from the floor of the Stock Exchange and to transmit them by tape to subscribers which included banks, other outside institutions and member firms. The telephone met with initial resistance in the City. However institutions such as the Baltic Exchange swiftly put the telephone to good use.¹¹⁵ By 1884 some 200 Stock Exchange firms were connected to it.¹¹⁶ The Managers and Committee for General Purposes of the Stock Exchange finally allowed the Exchange Telegraph Company to erect telephone boxes in the exchange in 1889.¹¹⁷ Also that year the United Telephone

Company secured permission to erect a special trunk line between the Stock Exchanges of London, Liverpool and Manchester for the exclusive use by members of those exchanges.¹¹⁸ The telephone itself was less significant than the combination of new telecommunications technologies which taken together "led to a perceptible quickening of pace, greater mobility of capital, and the rapid development of highly sophisticated arbitrage dealing, taking advantage of often tiny price differentials around the world".¹¹⁹

The telephone's initial diffusion through London corresponded to the city's social and organizational structure with its principal economic, social and political institutions heading the list of subscribers. At the United Telephone Company's Annual General Meeting in August 1881 it was reported that hotels, clubs and many tradespeople now availed themselves of the telephone.¹²⁰ In October 1881 it was stated that "in the City now there is hardly a business house of importance which is not adopting it".¹²¹ This correspondent also revealed the telephone's spread to London's West End with those already on the exchange system including the district's principal hotels, Bond Street theatre agencies, apartment buildings, a few of the clubs, enterprising tradesmen and many of the offices of the leading daily and weekly papers.¹²² In July 1883 the House of Commons was connected to the system then numbering 3,000 subscribers. There were two telephones: one for the exclusive use of members of the House; and another for the exclusive use of solicitors, engineers, and other subscribers having business with the House or its Committees.¹²³

The telephone was a new and costly technology and simultaneously with electricity and electric lighting remained in the 1880s and 1890s a luxury and élite item of consumption. In 1885 *The Times'* view was that: "To the vast majority of Londoners the telephone is only a name. They are theoretically well acquainted with its working, but they have no real practical knowledge of the convenience attending its use".¹²⁴ Throughout the Victorian and Edwardian years the telephone remained an élite technology. Yet with reductions in the telephone's absolute and relative cost the instrument was swiftly taken up by the burgeoning middle classes. One writer, witness to this social diffusion, felt as early as 1887 the inevitability of this process: "The rapid adoption by the trading community of the medium of telephonic communication and its virtual indispensability renders the future development of this service a foregone conclusion".¹²⁵ Certainly there was felt to be no shortage of demand for the telephone

in the environs of the metropolis. At the 1887 meeting of the South of England Telephone Company the view was expressed that there was "a mine of wealth" within their reach: "The multitude of City and businessmen who resided within a radius of 25 and 30 miles of London would, many of them, be thankful to be able to converse with their offices and places of business, and would pay handsomely for the convenience".¹²⁶

Newspaper evidence suggests that the telephone's social and geographical diffusion out from central London and from other major cities was gradual. This was as true for the residential and business telephone as it was for public telephones which started to appear in the public places of British cities from 1884.¹²⁷ In June 1889 the United Telephone Company established an all-night telephone service throughout London's West End, Chancery Lane and King's Cross. Twenty-eight call rooms were open in and about London with nine more planned, and an arrangement was concluded with the Aerated Bread Company (the ABC) for another 80 call rooms "in the most frequented places in London".¹²⁸ The ABC, along with the Express Dairy, around 1890 opened hundreds of milk-and-bun shops in and about London.¹²⁹ For one London historian these and similar tea-rooms were a significant Victorian social invention, providing an alternative to the tavern, and a safe, cheap and respectable place for women in town in which to socialise, the respectability symbolised by the provision of a "ladies' room".¹³⁰ The provision of tea-room call offices coincided with the issuing by the private telephone companies, from 1890 onwards, of complimentary call room passes to female members of subscribers' families. These passes could be used in any town in the company's district where there was a call room. Because free communication was limited to within the subscriber's local telephone district, the telephone companies presumably expected these passes to be used by female family members, as a way, while in town, to maintain contact with male family members, or as an aid to household management. The passes were regarded by the private companies as a bonus to existing telephone subscribers, who were all assumed to be male, and were designed as a novel way to make the telephone, and the system of telephone exchanges, better known and increasingly popular.¹³¹ Growth in the number of subscribers forced the National Telephone Company in 1901 to discontinue its one volume national telephone directory, formerly issued free to subscribers, and to start charging subscribers for directories other than for their own region.¹³² Also in 1901 one of Britain's principal telephone manufacturers reported growing demand for telephones and

that orders were mostly received from Government departments and railway companies.¹³³ In fact there was a general expansion in demand for telephone facilities during the Edwardian years. This was confirmed in 1940 by M.C. Pink, then Deputy Regional Director of the London Telecommunications Region, who recollected that the years 1905-1911 witnessed "a great awakening to the value of telephone service". "There were" in this period, he said, "increasing demands for residence telephones and Government offices were beginning to realise that they must make use of the telephone service in order to keep pace with modern needs".¹³⁴

By the start of the twentieth century for certain branches of business and Government, having a telephone became a necessity. When the Post Office London telephone system opened in 1901 and the NTC claimed to have 40,000 telephones connected to its London exchanges, *The Times* guessed that it was certain to have on its books "all the largest commercial and business houses of London".¹³⁵ In 1904 the Post Office fitted up a private branch exchange for the Treasury which provided a means of linking up all the principal Government offices.¹³⁶ A similar system was installed in 1905 in the Palace of Westminster which at that time had no system of internal telephonic inter-communication.¹³⁷ In 1907 the presiding judge in a City of London court case expressed the view "that a man must have a telephone nowadays".¹³⁸ This was echoed by a manufacturing firm in suburban Middlesex who complained that delays in connecting them to the telephone system put them in an invidious uncompetitive position, of being "practically out of the commercial world" being unable to communicate with their central office and with their shippers who despatched their goods worldwide.¹³⁹ Growth in telephone usage is shown also by the extension in the range of services the telephone supplied. In 1905 the Post Office Telephone Department connected cab-ranks to the telephone exchange to help clear the streets of crawling cabs, and to enable subscribers to call taxis direct from cab-ranks.¹⁴⁰ By 1908 the telephone was being adapted for use as a signalling device in municipal and private fire alarm systems, and by theatre agencies to connect with a number of hotels and theatres.¹⁴¹

One recognises in this period significant signs of the telephone's popularization. If the mass of the population could not afford to subscribe to or to use the telephone they were at least aware of its existence. As telephony developed *The Times* made the public aware of new advances in the technology: in the quality of telephone transmission; in

exchange switching equipment; in new kinds of cheap domestic telephones and novel business applications; in systems of operating exchanges; and in the provision of public telephones and the extension and range of long distance services. Explanation and description were as important as demonstration. *The Times* reported selectively, usually upon new and significant technological breakthroughs. Sometimes developments were reported first from abroad. In August 1879 a correspondent from *The Times*, who had recently returned from Denver, described before exchanges had opened in London the concept and purpose of a telephone exchange. Details were given of its cost, how it worked and looked, and how connections could be made with butchers, doctors or businessmen, a wife with her husband, or to call taxis or policemen.¹⁴² Only when there was something novel to report did *The Times* inform its readers of the opening of new telephone exchanges. In November 1901 the newspaper described the opening of a new South Kensington exchange equipped on the "common battery system". The newspaper described and explained the features of this new system, initiated in Bristol: that it derived its power from a central battery located in the exchange, and replaced the smaller batteries installed in each subscriber's telephone; its new method of signalling using a number of tiny electric lamps instead of bells and drop-shutters to indicate to the operator when a subscriber was "ringing up" which let her know more easily than before the state of the line being used, for example if it was engaged or not.¹⁴³

Educating the public was a continuous process not a one-off event. Over long periods of time the newspapers informed their readers of many and continuous improvements in telephone technology. Between 1881 and 1911 *The Times* reported on the following telephone themes: solutions for overcoming problems of inductance such as the introduction of metallic or "twin-wire" circuits; the introduction of the central battery system described above; problems associated with the laying of subterranean and subaqueous wires; and the introduction and testing of automatic and semi-automatic exchanges, multiple switchboards, and wireless telephony.¹⁴⁴ Readers were continuously made aware of these and other important and complex technical changes, of how they would be affected by them, and how they were to adjust to them. It was comparatively easy in these years to avoid or do without the telephone but in an increasingly news-saturated society it would have been virtually impossible to avoid reading, talking or hearing about it.

Popularization occurred also through public pageantry and demonstration. During Queen Victoria's Diamond Jubilee celebrations in London in 1897 a stand in Whitehall illustrating material progress during the Queen's long reign was equipped with telephones.¹⁴⁵ Reports of new telephonic inventions suggested the telephone's everyday utility; for example its domestic uses and general use in emergencies. In 1887 a report from Paris described a new "micro-telephone push-button", which introduced "a complete change in our ordinary modes of intercourse". This instrument, adaptable to existing electric push-button devices, extended their scope by enabling spoken communication as well as the electric ringing signal. The report noted the device had already been used to communicate between railway carriage compartments, in hotels and in private houses.¹⁴⁶ Similarly a report of Herz's micro-telephone described it as a "Household Telephone" adaptable to long distance transmission but "better suited for use in dwelling-houses, hotels, and all large buildings where it is desired that messages should be speedily conveyed from one room to another".¹⁴⁷ These devices, compact, cheap and simple to install helped popularise the telephone. In addition to these formal and deliberate attempts to publicise the telephone, the device also reached the public's attention accidentally, as it became the subject of music hall songs, plays and stories. Gilbert and Sullivan, for example, included a reference to the telephone in the lyrics of *HMS Pinafore*, first produced in 1878:

He'll hear no tone,
Of the maiden he loves so well.
No Telephone
Communicates with his cell.¹⁴⁸

Telephone poles and telephone wires also presented to city-dwellers an unmistakable physical feature on the urban landscape. Overhead telegraph and telephone wires were pervasive to late-nineteenth century British cities (see Figure 3.7). Before the mid-1890s most of the NTC's system was overhead. In 1911 of 1,090 miles of Post Office telephone wire in London, 330 miles was still overhead.¹⁴⁹ This was because of technical difficulties associated with underground wires, their prohibitive cost, and because the private telephone companies were for many years denied statutory rights to bury their wires beneath the public streets. Accidents and the fear of accidents associated with overhead wires, added to aesthetic considerations and the problems of routing wires over

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Figure 3.7 Telephone wires, City of London c.1900
Source: Courtesy of BT Archives, E6862

privately owned and publicly controlled urban space, ensured that the spread of the telephone network would be a subject of public attention and comment. The danger and inconvenience of overhead wires in Liverpool and other large towns was recognised by Liverpool City Council as early as 1880.¹⁵⁰ In 1885 the Select Committee appointed to consider the law relating to the control of telephone, telegraph and other wires concluded that the risk of danger to the public from overhead wires was greatly exaggerated.¹⁵¹ The issue nevertheless excited genuine public concern and the press reliably brought accidents, although rare, and the threat of accidents to the public's attention. In February 1901, for example, *The Times* reported two deaths and a dozen injuries, caused by the sudden fall of telephone wires in Liverpool. As they fell, the telephone wires struck the overhead wires of the city's electric tramways, which then fell on the pavements amidst the early evening crowds.¹⁵²

Aesthetic concerns also kept the telephone in the public mind. This had to do both with the physical placing and appearance of telephone poles and wires, and the damage caused during their construction. Thus in May 1896 a resident of Harrow complained of the irretrievable damage done to nearby trees by NTC employees in connection with the erection of telephone poles, and warned all landowners to be on guard "or the beauty of our country roads will be spoiled".¹⁵³ Similarly in 1905 at the instigation of the Commons and Footpaths Preservation Society, representatives of various open space societies, and numerous local authorities urged the Postmaster-General that rural districts of special interest or beauty, and especially commons and open spaces, should be respected by the Department; that alternative routes be adopted or wires placed underground where the "erection of unsightly posts would in any way interfere with the charm of the surrounding scenery".¹⁵⁴ Wealthy districts with political clout such as Oxford or the London borough of Hampstead persuaded the Post Office and the private telephone companies either to place telephone wires underground or to erect light iron telephone poles to blend in with the area's historic or aesthetic image.¹⁵⁵ The local authority responsible for Kenley in Surrey made it a condition of granting the Post Office wayleave rights that it erect light iron poles so as "not to be disfigured by (the) unsightly wooden ones in general use".¹⁵⁶

Administrative difficulties of constructing the telephone network also helped keep the telephone system both visible and in the public mind (these issues are dealt with more

fully in Chapter 4). The early private telephone companies because they lacked statutory rights of wayleave were forced to construct their plant largely overhead. This gave the telephone in the central parts of late-nineteenth and early-twentieth century British cities a greater visibility. The problem was not entirely new. London's early private telegraph system, existing from the early 1860s, was also constructed largely overhead.¹⁵⁷ It was more a matter of the increased scale and visibility of telephone wires, especially as the telephone system was extended to the suburbs. The extent of the early overhead telephone network may be judged by the fact that the London and Globe Telephone and Maintenance Company had erected in London in 1883 more than 400 telephone poles, had run several hundred miles of telephone wire and owned over a thousand separate rights of wayleave.¹⁵⁸ The encroachment of wires on urban space led to a variety of complaints from private citizens and public bodies. Citizens complained of the dangers posed by overhead wires.¹⁵⁹ They also complained when their private property rights were disregarded, as happened when the Post Office or private companies erected poles and wires on private land without the landowner's permission.¹⁶⁰ Disputes with London's public bodies concerned similar issues. Objections to the National Telephone Company's pricing policy and monopolistic practices led many of London's local authorities to refuse the company rights of wayleave. This had the effect either of delaying the progress of telephone wires out from central London or of forcing the companies to find circuitous and usually overhead routes for their wires. Disputes with the Post Office and local authorities also turned on the legal issue of relative rights to the use of public space for the passage of telegraph and telephone wires. Under the Telegraph Acts of 1863 and 1868 the Postmaster-General could execute underground works and erect overhead wires on public space only with the consent of the local street authority. The Postmaster-General had a right of appeal against refusal of consent and against conditions which might be objectionable.¹⁶¹ Court disputes in London between local authorities and the Post Office show the principal lines of argument. Local authorities complained that overhead wires were dangerous, that they obstructed traffic, that they were disfiguring and had a negative effect on property values. Wires should thus be placed underground in the public interest. In response, the Post Office argued that the dangers of overhead wires were exaggerated, that underground wires were considerably more expensive than to go overhead, and that the increased cost entailed would force the service either to be conducted at a loss or with

many people debarred from the advantage of the telephone.¹⁶² In these two cases the court found in favour of the Postmaster-General and the wires remained visible and overhead. The point is that these were not isolated cases, and even if the telephone wires were there principally to service wealthy districts they did not only pass through those districts but were visible to all.

The physical mass of overhead wires visible on the urban landscape also gave force to the view that something unusual was happening to the city. This was noticeable in descriptions of telephone plant in the newspapers and electrical trade journals, and in self-styled publicity put out by the private telephone companies. Newspapers rarely failed to mention the complex mass of wiring involved when giving descriptions of new exchanges. Of the National Telephone Company's principal city exchange in Lime Street, London, in 1894 *The Times* gave the following description:

To the top of the building wires to the number of some 6,000 converge from every point of the compass, some coming direct from subscribers' instruments, some from other exchanges in London, and some from provincial towns such as Birmingham and Leeds. The majority of the company's lines are overhead ...¹⁶³

Other descriptions gave a sense of something more unnatural happening:

"Voices! Voices! The voices of a mighty multitude, year in and year out, holyday and holiday, noon and night, flow over our heads, around us, and under our feet in a ceaseless, silent chorus".

Thus began Henry Thompson's description of "Telephone London", a feature article originally published in "Living London" in 1902. Thompson drew attention to London's growing network of overhead and subterranean telephone wires, and to the innumerable telephone messages passing Londoners largely unnoticed. The article proceeded to describe the developing NTC and Post Office telephone network, the training and working conditions of telephone engineers and operators, and the process by which telephone calls were handled and connected. "Thus", Thompson concluded, "over mammoth aerial and subterranean wire-webs does London, annihilating distance, work and play by the aid of science".¹⁶⁴

The telephone's social uses

The telephone's social diffusion says little of how the telephone was used, and who by.

This is difficult to reconstruct in a period when the absolute and relative number of telephone subscribers was still small. Nevertheless scraps of evidence from telephone company advertising, newspapers and contemporary novels provide insights into this important question.

Throughout the late-Victorian and Edwardian years the telephone was used primarily for business purposes and was marketed as a business machine. The images that survive from the publicity department of the National Telephone Company sustain this commercial conception of the telephone prior to 1912. Figure 3.6, an NTC advertisement published in 1893, provides an early demonstration and description of the telephone and its social uses. It indicates how the telephone's promoters expected the telephone to be used at this time. The advertisement, comprising of a short play set in a London pharmacy, describes the telephone as a useful device for communicating with merchants to purchase stock, or for its emergency use, to order medicines, or medical staff and equipment, at short notice. The telephone is also valued for its associations with modernity. The telephone is described as being "quite modern", and the chemist, in possession of a telephone, "up-to-date" (see Figure 3.6). A sample of images from the first decade of the twentieth century illustrates similar themes (see Figures 3.8-3.15).¹⁶⁵ The captions generally portray the telephone's modern features as a machine for doing business, or for improving business efficiency: "HOW TO SAVE MONEY"; "HOW TO INCREASE BUSINESS"; "The Most Modern Service at the Most Moderate Cost"; "The Universal Time Saver"; "The WHOLE COUNTRY at your FINGERS' ENDS". Similar themes were used to market the telephone in the United States at this time.¹⁶⁶ Another common theme was to illustrate the telephone's emergency use: "ACCIDENTS WILL HAPPEN Then minutes, yes seconds may save LIFE PROPERTY MONEY". When depicted in the home the telephone was shown to improve household management, as a device for example which saved time or dispensed with servants, but not for expressly social purposes. Thus women are depicted receiving telephone calls, rarely initiating them except in emergencies. One image shows two young women receiving and discussing an invitation presumably to a party: "How charming! Shall we accept?" The conversation is brief and businesslike, for this was the age before telephone "sociability".¹⁶⁷

Other evidence, mainly from newspapers, supports this dominant business-like usage of the telephone. The President of the National Telephone Company reported to

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**Figure 3.8 NTC advertising c.1900:
telephone as economiser**

Source: Courtesy of BT Museum, MUS 431



Image removed due to third party copyright

**Figure 3.9 NTC advertising c.1900:
the modern telephone**

Source: Courtesy of BT Museum, MUS 425

Image removed due to third party copyright

**Figure 3.10 NTC advertising c.1900:
“annihilating” time**

Source: Courtesy of BT Museum, MUS 430

Image removed due to third party copyright

**Figure 3.11 NTC advertising c.1900:
“annihilating” space**

Source: Courtesy of BT Museum, MUS 427

Image removed due to third party copyright

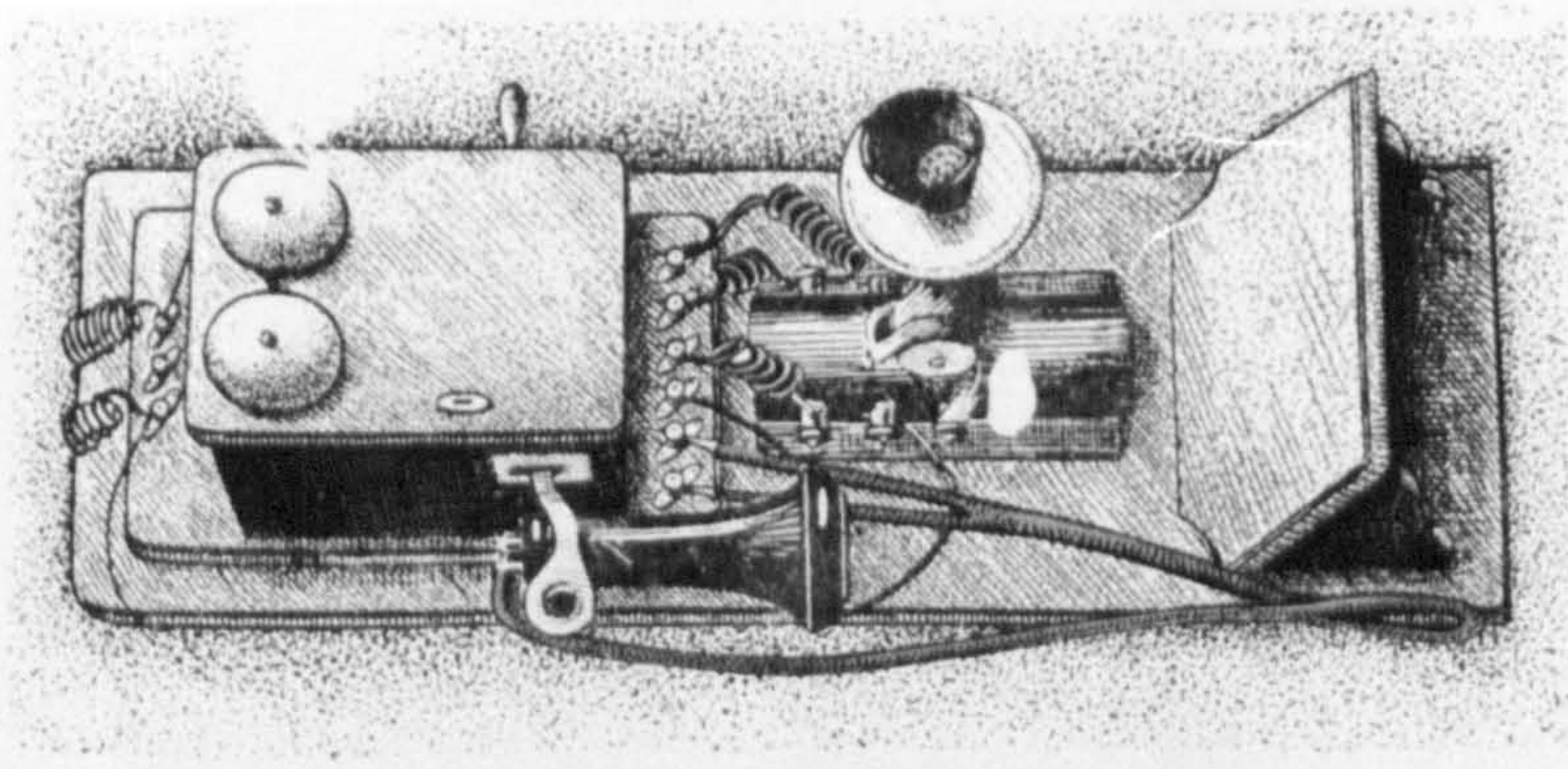


Figure 3.12 NTC advertising c.1900: telephone in emergencies

Source: Courtesy of BT Museum, MUS 424

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Figure 3.13 NTC advertising c.1900:
telephone in emergencies

Source: Courtesy of BT Museum, MUS 437

Image removed due to third party copyright

**Figure 3.14 NTC advertising c.1900:
telephone as labour-saver**

Source: Courtesy of BT Museum, MUS 422

Image removed due to third party copyright

**Figure 3.15 NTC advertising c.1900:
household management**

Source: Courtesy of BT Museum, MUS 441

shareholders in 1897 that seventy per cent of messages were between merchants, financiers and large tradesmen, "who resorted to it because it was infinitely cheaper and more valuable than the telegraph".¹⁶⁸ In August 1901 a Richmond resident wrote to *The Times* that in that neighbourhood citizens used the telephone principally to communicate with their London business houses.¹⁶⁹ The telephone's business uses was a dominant theme in newspaper correspondence and editorials. F.E. Baines, former Surveyor-General (Telegraphs) wrote to *The Times* in June 1902, explaining that a single private wire might allow a wealthy household to communicate with a local doctor, and that exchange connection enabled communication with the score of tradesmen who served the house, with the long-distance telegraph and telephone service and with London at large.¹⁷⁰ In November 1902 a correspondent wrote that he had for several years installed a telephone in his house and that the principal object was to communicate with the House of Commons.¹⁷¹ Other newspaper commentary and correspondence in this period mainly describes the telephone's use in business: to communicate with merchants, solicitors or financiers in the City of London and in London's West End, to connect up branch offices of a business, or to speed up the despatch across London of an urgent communication.¹⁷² For example the common examples given in a letter and a subsequent editorial on "The Telephone in Business" in December 1905 are for use of telephone to contact one's lawyer or one's broker.¹⁷³ This evidence collectively confirms the view that the importance of the vast majority of telephone use in London prior to 1912 was to sustain and improve *local* intra-urban commercial communication.

Although relatively infrequent there is enough evidence to show that the telephone was used for emergency purposes. This does not conflict with the view of the telephone as a business device but shows how the telephone was considered useful for the business of the state. I referred earlier to the telephone's military significance, but we know little of how electrical technology was integrated into the management of urban services such as the police and fire department. Once again British audiences would have read of such developments elsewhere. In January 1878 *The Times* reported successful experiments in Cincinnati with the telephone tested on the police telegraph in that city.¹⁷⁴ In January 1880 a trial was made at Portsmouth for connecting the police station and the offices of the waterworks company for use in case of fires.¹⁷⁵ The "Pulsion Telephone" invented by Lemuel Mollett of Boston was tested on the Midland Railway in London in 1889 and

the system's usefulness for communicating between officials and in case of a railway accident was demonstrated.¹⁷⁶ Also in 1889 the Postmaster-General allowed the telephone's use to convey information concerning the outbreak of fire or of rioting. This was at the request of Leicester Town Council, after an incident where Post Office officials refused to allow the renter of a telephone to use it to warn of a fire which did not originate from his premises, telephone communication being restricted "to his own business and private affairs".¹⁷⁷ The National Telephone Company's 1906 Sales Catalogue included a description of a police signal system (see Figure 3.16). The existing system of personal messengers was described as slow, expensive and unreliable. The police signal system comprised a signal box, an ornamental cast iron structure, placed at a central point where several beats converged. When the officer in charge wished to communicate with the constables on their beats the ringing of a telephone bell caused the movement of a red glass globe round the gas jet in the lamp of the roof of the box, forming a conspicuous light. It was the duty of the first constable to see the signal to open the box with his key and speak to the Police Office. It was similarly possible for the constable to communicate information to the Police Office or for "respectable citizens" to be issued with keys for similar purposes. The sales catalogue stated that several of these boxes had been installed in the suburban districts of Glasgow.¹⁷⁸

References to the telephone in contemporary novels are rare prior to 1920. Although the telephone receives an occasional mention, in general one searches in vain for references to the telephone in the novels of authors such as George Gissing, E.M. Forster, Henry James, H.G. Wells and Virginia Woolf. This is despite the fact that there is sometimes frequent mention of the telegraph or to new twentieth-century technologies such as the motor car or the aeroplane.¹⁷⁹ One speculates that this is because of the telephone's relatively delayed development in Britain and because the telephone was largely a private technology. It is possible that there was greater mention of the telephone in particular kinds of popular fiction, such as cheap thrillers and crime stories, or in music hall songs. In this context the telephone was probably included as an object of humour, to poke fun at the rich, or at particular classes of consumer associated with having telephones.¹⁸⁰ The telephone's omission from highbrow literature is probably also the result of the form of the nineteenth-century novel which relies on misunderstandings and missed communications to generate plot movement. Unlike the telegraph, a telephone

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Figure 3.16
Police signal box,
1906

Source: Courtesy of BT Archives,
Post 84/129,
NTC Equipment sales
catalogue, 1906,p10

message requires someone present to receive it. Prior to the First World War the telephone is hardly mentioned but it receives passing comment in several novels such as in H. G. Wells' *Ann Veronica* (1909), where the voice of Ann's lover is likened to "a badly connected telephone".¹⁸¹ In E.M. Forster's *Howards End* (1910) the Wilcoxes possess a telephone in their Ducie Street house near Chelsea Embankment but not in their country home. The telephone is mentioned only once and for urgent communications the telegraph is used.¹⁸² Only after the war do telephone references become more frequent. P.G. Wodehouse's *Piccadilly Jim* (1917) provides the first glimpse of sustained telephone use. Although published in America it is set in London and New York. It is a fast action book with plenty of references to the telephone. Other than by mail the telephone is the dominant means of communication. Uses are typically business-like: for summoning people, detectives or the police; for arranging assignations; for arranging to have goods sent; and for informing others of information in a hurry. Conversations are short and have a business-like purpose. All calls are local; trans-Atlantic communications are made by telegraphic cable.¹⁸³ The telephone becomes relatively common in contemporary fiction only in the decade after 1914 although even here it is still mainly aristocrats and wealthy financiers who use it. It is only in Virginia Woolf's *Orlando* (1928) that mention is made of the possibility of trans-Atlantic telephone calls.¹⁸⁴ We must await the 1930s and thrillers such as Agatha Christie's for the telephone to make a frequent appearance. *The ABC Murders* (1936) describes frequent police use of the telephone both for local and for trunk calls, although mention is made of delays in the long distance service.¹⁸⁵ Inspector Crome of Scotland Yard has a telephone on his desk with a connection to Sergeant Jacobs in the adjacent office whose job it is to screen the Inspector's calls.¹⁸⁶ To warn possible murder victims in Devon the police try to contact all residents whose names begin with C "by phone when possible".¹⁸⁷ Calls are still brief and business-like. In this case the detective novel easily integrates the telephone into a plot form that requires the speedy relay of accurate information. The indication is that by this time experience and knowledge of the telephone's use was now widespread. Furthermore, the idea that the telephone might one day become a common item of domestic consumption, had begun to enter popular consciousness.

It is more difficult to ascertain who used the telephone given that newspaper correspondence on this subject is filtered through an ideological lens (see Chapter 4). For

example comparing telephone usage in Britain and America in April 1904, William Gaine, NTC General Manager, complained that while in New York the telephone was invariably handled by principals, in London "it is relegated to the office boy, who makes every conceivable operating mistake and causes confusion in a complicated and intricate system".¹⁸⁸ Nevertheless the suggestion is that if answered by a servant or a clerk the telephone was intended for use by the office manager or principal, or in the home by the household head. The telephone could even be used "protectively" with clerks given instructions to telephone the office manager to break up a prolonged conversation.¹⁸⁹ It is impossible to gauge the extent of illicit use of the telephone in this period but it did occur. Unauthorised use of the telephone was revealed when the telephone companies introduced measured rate services in the first decade of the twentieth century, and started charging for telephone service by the number of calls made. Both the Post Office and the National Telephone Company insisted on the accuracy of their systems of measuring calls. When discrepancies occurred the blame was usually put on subscribers who were unaware of how their telephones were used. The NTC's General Manager said that it was impossible for private establishments and individuals to police use of the telephone and admitted that with the spread of the "telephone habit" to all classes of the community a large amount of private use of the telephone went on in most business establishments. With some hyperbole he explained:

Every day office boy discusses with office boy football or other subjects of vital interest; the junior clerk makes appointments with the fair typewriter of another firm, and in bad weather holds long and tender conversations with her; even the senior clerks have more serious affairs to discuss with friends in other offices. Then there is the betting; the evil practice in which so many wage-earners indulge of betting in small sums is responsible for a great amount of illicit use of the telephone service in offices and houses all over the kingdom.¹⁹⁰

In 1908 the Postmaster-General gave the example of a subscriber who claimed he was improperly charged. The Post Office was adamant the man was correctly charged. Later the subscriber revealed that his housemaid had been using the telephone without authority to communicate with her young man.¹⁹¹

Available evidence suggests that with the possible exception of large business establishments the telephone was not used all that much, although there is also evidence to suggest that this was changing. This corresponds with the fact that the telephone was

mainly used for brief business communications. Comparing telephone use in London with New York in 1904 a correspondent from *The Times* explained that in London "we only want to telephone for business purposes" whereas in New York they use the telephone for all purposes.¹⁹² In fact, this was slightly inaccurate. In 1907 the number of private telephones in London was 120,000 and the number of daily calls about 650,000, or 5.4 per telephone per day. In New York the average was about 4.3 per telephone per day so that London worked its telephones much harder than New York.¹⁹³ This is explained by the fact that although the telephone's diffusion in the United States far exceeded that of Europe in the early years, growth in American telephony was initially greatest in rural areas.¹⁹⁴ In Britain, the growth and expected growth in use of the telephone service was a reason for introducing measured rate services in the 1900s. In 1907 a Post Office representative explained to a meeting of the Newcastle and Gateshead Chamber of Commerce that they wanted a system of charging which would meet the extraordinary variation in the use of the telephone. He believed that in Britain the possibilities of the telephone service in modern life and business were not realised. The Post Office predicted that as the system grew the number of calls a subscriber would make was likely to grow in a great many cases. They knew for instance "that large firms were telephoning all day, whilst a man in a small way of business made one or two calls per day".¹⁹⁵ This relatively limited actual use of the telephone should check the exaggerated view posited by Stephen Kern, that the period prior to 1918 was characterised by the incessant ring of the telephone.¹⁹⁶ Yet things were changing. In 1888 there were about 1,400 telephone subscribers in Manchester and about 5,000 in London. A night service was inaugurated in London about that time, but from 10 p.m. until 6 a.m. there were only 40 calls a week. By 1909 about 18,600 calls originated on the NTC's system in London each night between 8 p.m. and 8 a.m. and the 103,287 exchange stations originated 500,000 calls per day. In Manchester the number of exchange stations¹⁹⁷ had increased to 20,000, giving 138,000 calls per day.¹⁹⁸ Moreover there is a sense that the use of electrical communication was becoming more casual. In a letter referring both to telephones and telegraphs a correspondent wrote in 1902: "In the days of shilling telegrams they were thought something of. People did not telegraph unless they had something to telegraph about. A telegram was feared and respected, and expedited in every possible way. Now people telegraph about nothing at all".¹⁹⁹

How reliable was the telephone?

Some social observers referred to the telephone as having led to the "annihilation" of space and time. The journalist W.T. Stead, for example, suggested that "the greatest triumph of the 19th century has been the subjection of time and space by the mind of man [sic]", and said of the telephone that it "mounted sound upon the wire" and "annihilated distance, just as the phonograph had annihilated time".²⁰⁰ But how reliable was the telephone? In other words, how rapid and dependable was telephonic communication in the years prior to 1920?

The contrast between actual and potential use of the telephone is striking when one compares the experiences of telephone subscribers with statements of the private telephone companies. Herbert Laws Webb, General Manager of the National Telephone Company, in 1906 provided a typical description of the telephone's contribution to business efficiency: "The telephone adds enormously to the efficiency of every business man who uses it. If a man does by telephone in 15 minutes that which formerly occupied him half an hour using other means, his efficiency is raised 100 per cent. In most cases the saving of time and effort by the telephone service is enormously greater, with a corresponding increase of efficiency to the user".²⁰¹ Widespread condemnation of the telephone service prior to its nationalization in 1912 not only shows how much of an exaggeration such a statement was but also exposes its ideological underpinnings. The telephone companies sought vigorously to persuade people of the telephone's potential to increase business efficiency, and it was in their interest to do so, but this does not mean that we should assume it ourselves.

The reality was that throughout this period the telephone in Britain was generally considered to be unreliable. Problems began with delays in connection. Insufficient plant and difficulties of obtaining wayleaves meant that subscribers waited sometimes for long periods to be connected up to the system. Because telephone exchanges were usually first established in the central areas of major cities suburban or outlying districts faced considerable delays. This pattern of delay was not entirely consistent because the telephone system developed initially in haphazard fashion, responding to perceived rather than actual demand, with the need to balance the various kinds of telephone subscriber with available capital plant and equipment generally left unplanned. As it was, for a long

time demand for the telephone service outstripped its supply.

Once connected subscribers faced a series of disturbances and interruptions to the telephone service. Sometimes this resulted from technical considerations. Early subscribers contended with poor reception mainly due to inductance; interference from neighbouring telegraph or electricity wires. The use of improved insulation techniques and the replacement of single wire systems by double wire or "metallic" circuits in the 1890s reduced the problem of induction. The transfer from single wire to metallic circuits itself caused a certain amount of disruption. Commencing in London in October 1892 the transfer was only completed in May 1898, although it was expected the change would lead to better reception and fewer complaints.²⁰² Mr. A.H. Hastie of The Association for the Protection of Telephone Subscribers admitted in February 1898 that the local telephone service in London was now excellent but that the present working of the trunk lines was abominable. It was found impossible to obtain communication between London and Brighton in under an hour and a half.²⁰³ Nor did the improvement in local services lead to a reduction in the frequency of complaints against either the National Telephone Company or the Post Office when it established its London Telephone Service in 1901. An insufficient number of junction wires between exchanges led subscribers to complain of a high incidence of engaged signals. A similar shortage of trunk wires between towns led to considerable delays on the trunk service. Delays were compounded by operational errors and mismanagement. Subscribers complained of poorly trained and inexperienced operators who were sometimes rude, lack of relevant information such as telephone directories supplied by the telephone companies, and on occasion of providing deliberate misinformation and falsehoods. Another interruption was the weather. Because telephone wires were still largely overhead, the system was prone to storm and frost damage, sometimes causing lengthy breakdowns in the telephone service.

To show the inferiority of Britain's telephone system it was also common to make comparisons with other countries. One must again appreciate that these comparisons and criticisms were ideologically charged depending on who was making them. Nevertheless the consensus was that the development of telephony in Britain was relatively inferior to most continental countries and to North America. One of the most ardent critics was the Duke of Marlborough. The Duke for a long time took a special interest in telephone developments and was later influential in establishing the New Telephone Company, a

rival to the National Company in London but eventually absorbed by the former company. In 1890 in a speech to the House of Lords the Duke excoriated the progress of telephony in Britain stating that the telephone was more advanced, reliable and considerably cheaper abroad.²⁰⁴ The Duke's criticisms, severe as they were did not go unchallenged, but they were not unusual. Similar criticisms were made in and by the press, and by assorted politicians and business organizations. In 1885 *The Times* found the telephone to be in far more general use in Paris than in London despite the latter's size and blamed the British Government and Post Office for bullying the private telephone interests.²⁰⁵ At a meeting of the London Chamber of Commerce in 1892 its Chairman stated his opinion that other nations had greater advantages at lower cost.²⁰⁶ Several things make these comparisons worthy of attention. First, contemporaries generally expressed the view that the telephone was neither as effective nor as advanced as it might have been. Secondly, it was widely assumed that the relative deficiency in the provision of telephones was a sign of and contributed to uncompetitiveness. Finally, the generality of criticism levelled at the telephone system obscures the almost total lack of criticism by the public through the press of the telephone itself as a communications device. If one is struck by the political obstacles placed in the way of the telephone's development in Britain, one must also marvel at the relative ease with which Londoners, and the British public more generally, adapted themselves both to the principle and function of the telephone.

Conclusions

At the chapter's start I suggested that the social reception of technology would reveal three main themes about how urban populations adapt to and are educated to new technologies. These were first, to provide a measure of how modern or traditional was the process of a technology's social diffusion; secondly, to reveal the set of social spaces significant to the process; and thirdly, to disclose contemporary attitudes to new technology. The chapter applied these themes to the specific case of the telephone and to its social reception, mainly in Victorian and Edwardian London. In conclusion, I will draw these themes together and highlight some of the major points raised.

The telephone was technically and conceptually new. However the means and institutional path of its early adoption in Britain, and in London in particular, was far from new. Many of the methods, institutions and social spaces used to publicise the telephone

were traditional ones, well practised historically for the introduction of new urban innovations. Acts of demonstration and description were of continual importance. Royalty and leading political and social figures provided symbolic patronage for the telephone's inventors and promoters, and the expanded late-Victorian and Edwardian urban court the main thrust of social and economic demand for the new invention. Particular social spaces retained their traditional role as sites of exhibition and consumption. These included the scientific society, the coal mine and the military battlefield. There was nothing essentially modern or democratic about the telephone's initial phase of diffusion. However as the telephone spread to the middle classes, and as the telephone network itself was extended and became more visible, the public was increasingly made aware of the telephone through modern means. The means were modern because learning about the invention involved social comment and talk about it, often mediated by newspaper coverage. This was both a formal and an informal process. The latter included the telephone's introduction into contemporary fiction and music hall songs, and the talk and press comment generated by the dangers, aesthetics, and issues of land-ownership presented by the physical presence and location of telephone poles and wires. The former included deliberate attempts to generate press comment and talk about the telephone, through the use of public exhibitions, the conscious and visible display of telephone equipment, and through mass advertising.

A combination of evidence suggests that the telephone filtered down the social hierarchy and closely followed the city's prevailing social geography. The telephone was demonstrated first at London's leading scientific societies and before influential audiences of politicians, businessmen and journalists. Its early applications were traditional ones in places such as coalmines and hospitals. It was speedily adapted for use by the railways and if not instantly used in warfare its military applications were immediately appreciated. Within months of its introduction into Britain the telephone received royal patronage, in the form of an audience for Alexander Graham Bell before Queen Victoria. In the 1880s the telephone spread to London's financial district, and to the city's clubs, hotels and larger business houses but remained an élite technology. During the late 1880s and 1890s the telephone became increasingly available to the burgeoning middle classes. By the 1900s the telephone was indispensable to Government departments and certain branches of business. Its social utility was also recognised through adaptation to urban services such

as the police and fire departments. In opposition to the general trend there were countervailing tendencies, such as the existence of manuals to construct inexpensive home-made telephones or the existence of cheap imported and imitation telephones. The overall pattern, however, was that of an innovation filtering down the urban social hierarchy.

Nor was the telephone interpreted socially as something completely new. Described early on as a "superior telegraph" the label stuck, and this interpretation endured, for comparisons, when made, typically assessed the telephone in contrast to its parent technology, the telegraph. This conception of the telephone as an improved telegraph, designed mainly for business use, shaped the telephone's social uses and the telephone network's social geography. Initial priority was given to the construction of long-distance inter-urban trunk lines rather than to shorter distance local lines. This was to connect Britain's major political and economic urban centres. Business uses were consistently favoured over social uses. Throughout the period the telephone was used primarily as a business machine, and in domestic settings as a device for improving household efficiency. Despite some illicit use of the telephone there is little sense prior to 1920 of the telephone's use in Britain as a social device. These points illustrate the telephone's ideological significance. To favour business efficiency, national political integration and the extension of the price system over other possible social objectives, shows how the telephone developed as an essentially middle-class technology, designed and marketed to help the middle classes pursue their class ideals.

One is easily captivated by the telephone's potential to provide a means of simultaneous and immediate communication. This, one might suggest, is partly a legacy of arguments, both historical and contemporary, used to sell the telephone, and similar, as well as more recent, space-binding technologies. Thus the telephone was marketed as a system of communication which would lead to improved business efficiency and tend to diminish the significance of time and distance in communication. These were ideal qualities and deterministic arguments, deliberately pushed by the telephone's promoters, and designed to appeal to middle-class consumers. Reality was very different. The telephone system developed gradually. The majority of calls were local calls. Trunk calls were costly and calls were brief. International telephony prior to 1920 was barely beginning. While telephonic communication had the potential to improve business

communication it was often criticised for being unreliable, slow and inefficient. Nevertheless it is easy to exaggerate the continuities at the expense of the new. By 1892 there existed a basic national trunk network, and by 1902 the volume of telephone messages outnumbered inland telegraph messages by a factor of twelve. The developing telephone network thus contributed to an extension of the "public sphere". The telephone also provided cities with another valuable secondary form of communication. There is also evidence from 1900 onwards of increased frequency and casual use of the telephone.

Notes

1. The Times, 12 November 1877
2. R.V. Bruce, Bell: Alexander Graham Bell and the conquest of solitude (London, 1973) 200
3. C. Mackenzie, Alexander Graham Bell: the man who contracted space (Boston, 1928) 138
4. Nature, 14 Sept 1876
5. Mackenzie, Alexander Graham Bell, 72
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7. Bruce, Bell, 3
8. F.G.C. Baldwin, The history of the telephone in the United Kingdom (London, 1925) 14
9. Mackenzie, Alexander Graham Bell, 184-85
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11. Bruce, Bell, 237-40
12. Mackenzie, Alexander Graham Bell, 187
13. Bruce, Bell, 241
14. The Times, 16 January 1878
15. The Times, 28 November 1877
16. The Times, 20 December 1877
17. The Times, 21 December 1877; 21 January 1878
18. The Times, 27 December 1877
19. The Times, 8 January 1878
20. The Times, 11 November 1878
21. The Times, 17 March 1879
22. The Times, 2 April; 1 May 1879

23. The Times, 23 May 1879
24. The Times, 16 November 1877
25. The Times, 9 April 1880
26. The Times, 11 September 1880
27. The Times, 11 May 1878
28. The Times, 26 November 1881
29. The Times, 30 August 1879
30. H. Ellis, British railway history: an outline from the accession of William IV to the nationalization of the railways 1877-1947 (London, 1959) 367; H. Parris, Government and the railways in nineteenth-century Britain (London, 1965) 175-82
31. The Times, 31 August 1881. In 1892 James Staats Forbes became president of the National Telephone Company, Ltd., and the company's leading spokesperson. Further information on Forbes may be found in later chapters of the thesis. For discussion of Forbes' role in the telephone industry, see Chapter 4, pages 126-28. For further information on Forbes' background and career, see Chapter 5, page 163
32. The Times, 6 December 1889
33. The Times, 28 December 1877
34. The Times, 30 January 1882
35. The Times, 19 March 1878
36. Tegg, Posts and telegraphs, 311
37. The Times, 16 February 1878
38. The Times, 10 April 1880
39. The Times, 27 May 1880
40. The Times, 16 November, 3, 21 December 1877; 1 January, 11 November 1878
41. The Times, 22 December 1877
42. The Times, 9 January 1878
43. The Times, 24 January 1878
44. The Times, 8 April 1879
45. The Times, 5 January 1880

46. The Times, 5 September 1890
47. The Times, 28 November 1887
48. The Times, 20 October 1881
49. The Times, 2 October 1889
50. Stephen Kern, The culture of time and space 1880-1918 (Cambridge, Mass, 1983) Chapter 11; David G. Herrmann, The arming of Europe and the making of the first world war (Princeton, New Jersey, 1996) 73-74
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53. Carolyn Marvin, When old technologies were new: thinking about electric communication in the late nineteenth century (New York, 1988) 144-49
54. See D.E.H. Edgerton and S.M. Horrocks, British industrial research and development before 1945 Economic History Review 47 2 (1994) 213-38
55. The Times, 13 November 1877
56. Nature, 14 September 1876
57. The Times, 11 November 1878
58. Baldwin, The history of the telephone, 43-45
59. Ibid., 51
60. The Times, 10 May 1879
61. British Telecom Archives (hereafter BTA), Post 84/119, Annual general meetings, Minutes of proceedings, 1904-1913
62. Ibid.
63. George and Weedon Grossmith, The diary of a nobody (Harmondsworth, Middx 1965) 213-14
64. The Times, 7 November 1883, 1 April, 12 August 1901
65. The Times, 28 December 1877
66. Charles Madan, How to make your own telephones for 5s. 6d. per pair, without a lathe or tools which require skilled labour (Manchester, 1880)
67. The Times, 18 December 1877

68. The Times, 19 February 1878
69. Bruce, Bell, 242
70. The Times, 3 June 1887
71. The Times, 25 July 1893
72. Asa Briggs, The pleasure telephone: a chapter in the prehistory of the media, in Ithiel de Sola Pool (ed.), The social impact of the telephone (Cambridge, Mass, 1977) 50-53
73. New Scientist, 23/30 December 1982, 794-96
74. BTA, Post 84/44, Electrophone syndicate and The National Telephone Company, Ltd., Agreement (London, 1893)
75. The Times, 4 July, 25 November 1887; 28 June 1889; 19 July 1890
76. The Times, 28 June 1889
77. The Times, 8, 11, 13 June 1895
78. Brian T. Robson, Urban growth: an approach (London, 1973) 165-77
79. Ibid., 176
80. Ibid.
81. Ibid.
82. The Times, 5 July 1888. This line, constructed by the United Telephone Company, was independent of the earlier Brighton trunk line
83. Robson, Urban growth, 176; The Times, 12 July 1890
84. The Times, 5 July 1888; Robson, Urban growth, 176-77
85. Noel Curren-Briggs, Contemporary observations on security from the Chubb Collectanea 1818-1968 (London: n.d.) 23-24
86. The Times, 20 August 1879
87. Chubb Archives (henceforth CA), Chubb Collectanea, Vol. 5, 276
88. CA, Chubb printed notice, 18 February 1880
89. CA, Chubb Collectanea, Vol. 6, 39
90. CA, Glengall Road Works (London) Minute book, 82

91. CA, Chubb Company diaries and almanacks, uncatalogued. These exist from 1893 onwards
92. Ibid.
93. Ibid.
94. CA, Glengall Road Works (London) Minute book, 174
95. CA, Chubb Company diaries and almanacks
96. Trunk calls were calls extending beyond the local exchange area (or in London beyond the metropolitan exchange area) and usually had to be booked in advance
97. The Times, 10 May 1899
98. Charles R. Perry, The Victorian post office: the growth of a bureaucracy (Woodbridge, Suffolk, 1992) 167
99. The Times, 13 June 1895
100. BTA, Post 86/28, Telephone policy 1874-1913, Anglo-continental service, April 1912
101. Baldwin, The history of the telephone, 51
102. Charles R. Perry, The Victorian post office: the growth of a bureaucracy (Woodbridge, Suffolk, 1992) 159
103. Baldwin, The history of the telephone, 51-53
104. BTA, Post 84/118A and 118B, Lists of centres, sub-centres and number of lines, Parts 1 and 2, 31 October 1893, 31 December 1900, 31 December 1911
105. The Times, 6 July 1887
106. Most early public telephones were placed in simple glazed wooden cabinets. These "call offices" if placed indoors were termed "silence cabinets". Public "call offices" were first authorised by the Postmaster-General in 1884. Private companies competed for business and to install public call offices in busy places like railway stations, hotels and shops. Access to "silence cabinets" in shops was restricted by opening hours and by the attitude of shopkeepers. After the turn of the century, the companies began erecting free-standing telephone kiosks for easier use. These were entered either by inserting coins into the lock and operated automatically by operator, or opened and operated by an attendant. See Gavin Stamp, Telephone boxes (London, 1989) 2-3
107. Special report and report from the Select Committee on Telegraphs Bill, together with the proceedings of the committee, and minutes of evidence, BPP, Vol. 17 (1892) 24
108. For detailed information on the telephone's absolute and relative cost see Chapter 5, pages 166-67

109. BTA, Post 84/118B, National Telephone Company, Ltd., Lists of centres, sub-centres and sub-exchanges and number of lines, 1904-1911, 31st December 1911
110. W. Ashworth, An economic history of England 1870 to 1939 (London, 1960) 117
111. The Times, 7 November 1883
112. Asa Briggs, Victorian cities (Harmondsworth, Middx, 1968) 311-12
113. Graeme Davison, The rise and fall of marvellous Melbourne (Carlton, Victoria, 1978) 131-33; Richard L. Meier, A communications theory of urban growth (Cambridge, Mass, 1962)
114. See R.C. Michie, The London and New York stock exchanges 1850-1914 (London, 1987)
115. Hugh Barty-King, The Baltic Exchange: the history of a unique market (London, 1977) 179, 181, 238
116. David Kynaston, Cazenove & co: a history (London, 1991) 68
117. The Times, 2 January 1889
118. The Times, 5 June 1889
119. Kynaston, Cazenove & co, 68
120. The Times, 10 August 1881
121. The Times, 25 October 1881
122. Ibid.
123. The Times, 25 July, 18 August 1883
124. The Times, 19 January 1885
125. The Times, 10 February 1887
126. The Times, 4 July 1887
127. Stamp, Telephone boxes, 2
128. The Times, 5 June 1889
129. Roy Porter, London: a social history (London, 1994) 324
130. Michael Harrison, London by gaslight 1861-1911 (London, 1963) 33-34
131. Post 84/7, Western Counties & South Wales Telephone Company, Annual report and accounts for year ending 31st December 1890, 4

132. The Times, 6 August 1901
133. The Times, 16 October 1901
134. British Telecom Museum (hereafter BT Museum), M.C. Pink, The story of the London telephone service. Described by M.C. Pink O.B.E., Deputy regional director, London telecommunications region (Unpublished, 1940) 21
135. The Times, 20 November 1901
136. Pink, The story of the London telephone service, 21
137. Ibid.
138. The Times, 12 January 1907
139. The Times, 22 May 1907
140. The Times, 1 November 1905
141. The Times, 28 May 1908
142. The Times, 23 August 1879
143. The Times, 23 November 1901
144. The Times, 13 December 1881, 17 July 1882, 29 August 1883, 27 May 1892, 17 April 1896, 22 September 1900, 3 April 1902, 18 October 1902, 8 April 1908, 17 June 1908, 19 July 1910, 20 July 1911.
145. Elizabeth Longford, Victoria R.I. (London, 1964) 548
146. The Times, 9 March 1887
147. The Times, 3 June 1887
148. As quoted in Asa Briggs, Victorian things (London, 1988) 382
149. The Times, 5 December 1911
150. The Times, 9 July 1880
151. The Times, 15 May 1885
152. The Times, 5 February 1901
153. The Times, 23 May 1896
154. The Times, 20 January, 16 February 1905

155. R.A.J. Earl, The development of the telephone in Oxford 1877-1977 (Oxford, 1978) 10, 37
156. The Times, 21 May 1907
157. John Durham suggests that London's early private telegraph companies experienced considerable difficulty obtaining wayleaves to route their wires. For the London District Telegraph Company (registered 1859) to wire the districts of Camberwell, Elephant and Castle, and Bermondsey necessitated 4,000 interviews with local residents. See John Durham, Telegraphs in Victorian London (Cambridge, 1959) 9
158. The Times, 5 July 1883
159. The Times, 29 November 1883
160. The Times, 7 September 1883, 19 January 1886, 31 May 1898, 21 May 1907.
161. The Times, 2 August 1905
162. The Times, 7 July 1907, 4 November 1909
163. The Times, 20 November 1894
164. Henry Thompson, Telephone London, in Living London, (ed.), George R. Sims (London, 1902), reprinted in Edwardian London, Vol. 4. (London, 1990) 28-32
165. BT Museum, Picture reference numbers: MUS 422, 424, 425, 427, 430, 431, 437, 441
166. Claude Fischer, America calling: a social history of the telephone to 1940 (Berkeley, 1992) 60-69
167. See Claude Fischer, "Touch someone": the telephone industry discovers sociability, Technology and Culture 29 1 (Jan 1988) 32-61
168. The Times, 30 July 1897
169. The Times, 12 August 1901
170. The Times, 30 June 1902
171. The Times, 24 November 1902
172. The Times, 16 February 1901, 24 November 1902, 7 April 1904, 28 December 1905
173. The Times, 26, 27 December 1905
174. The Times, 3 January 1878
175. The Times, 21 January 1880

176. The Times, 6 December 1889
177. The Times, 20 December 1889
178. Post 84/129, The National Telephone Company, Ltd., Equipment sales catalogue, 1906
179. See for example Gillian Beer, The island and the aeroplane: the case of Virginia Woolf, in Homi K. Bhabha (ed.), Nation and narration (London, 1990) 265-90
180. A search of the British Library computer catalogue listed 383 separate references to the telephone in the titles of pre-1900 publications from around the world. Some of these had obvious humorous intent such as a play by Emmett Heskett, titled "The wonderful telephone: a farce in one act", and the musical by Gustave Kerker, titled "The telephone girl: a musical comedy", both published in 1890
181. H.G. Wells, Ann Veronica (London, 1993) 140
182. E.M. Forster, Howards End (London, 1947) 339
183. P.G. Wodehouse, Piccadilly Jim (London, 1969) 33, 41, 56, 61, 77, 98, 135, 137, 140, 141, 151, 160-61, 172-73, 204, 219, 225-26.
184. Virginia Woolf, Orlando (London, 1977) 187-88
185. Agatha Christie, The ABC Murders (London, 1962) 18, 21, 57, 77, 90-92, 95, 171, 173, 178-180
186. Ibid., 173
187. Ibid., 91
188. The Times, 8 April 1904
189. The Times, 19 January 1906
190. The Times, 2 November 1907
191. The Times, 17 July 1908
192. The Times, 15 April 1904
193. The Times, 7 January 1907
194. Fischer, America calling, 42-50, 54-55. Fischer shows that the telephone's diffusion in America far exceeded that of Europe in the early years. In 1910 the United States had about eight telephones per 100 people, Canada three-and-a-half, the Scandinavian countries roughly three, and Germany and the United Kingdom under two. The reasons for this are unclear. Fischer suggests that one reason was America's greater relative wealth. He also explains that because America's comparative advantage was greatest in

rural areas, and emerged most rapidly in the early 1900s, the advantage was probably the result not of Bell's private, largely urban-based monopoly, but of an era of competition between thousands of independent, mainly rural, suppliers of telephones. In Europe, although telephone systems generally began as scattered private enterprises, they were soon absorbed by government telegraph and postal administrations. In the United States isolated farm families linked themselves up by telephone whereas in Europe telephone administrations placed a single or several telephones in village centres. In 1927 the United States had 15 telephones per 100 residents, Canada 13, Scandinavia about 8, Switzerland 5, Germany 4 and the United Kingdom 3, although the advantage of the United States was still considerably greater in smaller cities

195. The Times, 31 August 1907

196. Kern, The culture of time and space, 187-88

197. An exchange station refers to an individual subscriber's telephone line which is routed into and connected to an exchange switchboard

198. The Times, 17 November 1909

199. The Times, 4 December 1902

200. As quoted in Asa Briggs, Victorian things, 395

201. The Times, 19 January 1906

202. Neil Johannessen, (ed.), "Ring up Britain": the early years of the telephone in the United Kingdom (London, 1991) 184; The Times, 27 June 1895

203. The Times, 18 February 1898

204. The Times, 12 July 1890

205. The Times, 19 January 1885

206. The Times, 23 February 1892

Chapter 4: Competing ideologies and the "telephone question", 1876-1912

This chapter's main aim is to examine the role of ideology in the telephone's development. The discussion focuses mainly but not exclusively on London. My intention is to show how the telephone's development was shaped by a set of urban institutions and institutional ideologies. But the telephone's development did not evolve entirely from above. I wish to show also how the telephone's development was equally subject to public scrutiny through the press. Employing a broader definition of ideology than that usual among political scientists, I argue that the telephone's development can be understood as the outcome of a competing set of rational arguments designed either to legitimate the status quo or to effect change. The telephone's development in other words may be understood as a complex negotiation between conflicting urban interest groups and urban "publics". My aim is to show that it is not only urban institutions themselves that matter but also the means of expressing and of communicating ideology. This was a highly political process and in the nature of politics there was nothing inevitable about it. The chapter is chronological and thematic in structure. Issues are discussed as they emerged historically.

Alternative development paths

The telephone in Britain developed differently from other "essential" public urban services. Although the political ideology of municipalism, common to mid- and late-Victorian Britain, did not in theory exclude the possibility of municipalities owning and operating systems of urban communication, in practice this was an unusual activity for municipalities to be involved in. At the municipal level the telephone was simply not considered a public good in the same way as were other "essential" urban services such as water supply, gas, electricity and tramways. Between 1870 and 1912 local authorities took an active interest in supplying these services. From the 1890s municipal undertakings accounted for two-thirds of the organization and distribution of the early electricity industry. In 1905 of 276 tramway systems, 161 were local authority owned and run. By Edwardian times local authority gas supplies comprised 37% of the total and by 1914 two-thirds of the population were supplied with water by a public authority.¹ The same could not be said of the telephone. Of 1,334 local authorities only 13 applied for

municipal licences, and only six opened telephone exchanges.²

From the start, the development of the British telephone system was more a national issue than a municipal one. The idea of a municipally owned set of public services run in the public interest generally did not include the telephone. This was in part because throughout this period the telephone was generally considered an item for the wealthy classes, not something that would soon if ever become generally available. The telephone's relatively high cost was seen to limit its local social use so that the municipality was thought too small a social and technical unit to sustain a telephone system. The main public issue was whether the telephone system was best left in state or in private hands. National political disputes and ideologies were therefore important in shaping the telephone's development. The main precedent for this was of course the nationalization of the telegraphs between 1868 and 1871. Like the telegraph, the telephone was often interpreted in terms of its contribution to national effectiveness, for example to speeding up the flow of trade and commerce. But the telephone was also appraised locally for its urban social utility by a variety of institutions such as local authorities and chambers of commerce, as well as by individuals. To be sensitive to the complexity of the diffusion process our analysis must combine the different scales of social and institutional appraisal of technology.

The telephone system might well have developed differently from the way that it did. In Manchester, for example, in 1890 a group of local businessmen established the Mutual Telephone Company, based on co-operative principles, offering telephone subscription at a rate (£5 p.a. for shareholders or £6 p.a. for non-shareholders) far below the commercial average. The venture did not survive. It was resold several times until the New Telephone Company bought it in 1892, and was itself incorporated into the National Telephone Company.³ Nevertheless it shows that there was no certainty involved in the creation of a national telephone monopoly run essentially for private profit. There were also alternative visions of how the telephone might develop. Politicians, engineers and interested individuals debated the telephone's development in the press. An important component of this debate was how the telephone might be made more generally available, and how the telephone might be exploited more for its social value. These interventions may usefully be read as a process of popularization, an argument favouring the telephone's general social appeal and social value. They reveal something of the process

by which an élite technology becomes a popular one. If the telephone remained in this period an élite technology there were clear attempts -- by some at least -- to make the telephone popularly available.

The National Telephone Company and its critics

Until its nationalization in 1912 the National Telephone Company was subjected to intense criticism from politicians, local authorities, the press and from the public. The criticism was straightforward and not untypical for a private monopoly: that the telephone system was inefficient and inferior to that of other countries, that rates were too high, and that the telephone was not as generally available as it might be. The criticism reveals who the various participants were and how they thought the telephone system should develop. The National Telephone Company, in defending itself, reveals the company's ideology and sense of purpose. The telephone's development was shaped by these sustained public arguments. They also show how a modern organization, always subject to public scrutiny, had necessarily to defend its actions in the public sphere.

This chapter focuses on the National Telephone Company's political statements and its public image. How the NTC sold telephones is covered in the next chapter. The United Telephone Company, the National's parent company in London, already faced significant criticism but the criticism intensified when the National Telephone Company became a truly national supplier of telephones. This occurred with the amalgamation of several regional telephone companies between 1889 and 1893. The amalgamation, coinciding with the expiry of the master telephone patents, was designed to place the company in a better competitive position.⁴ Amalgamation also gave the company a more powerful public voice. The absence of any real competition in the telephone service, especially in London, which Post Office policy was designed to promote, led to intense criticism of the NTC and early calls for its nationalization.

The general criticism levelled at the NTC was that it was an inefficient private monopoly, engaged in unfair monopolistic practices, charging excessive prices for an inferior service, thereby preventing the telephone becoming widely available. The most ardent critic was the Duke of Marlborough, who in the early 1890s made a series of public statements heavily critical of the NTC. Marlborough criticised the telephone's slow development in Britain where except for a few large centres, where service was inferior

and the cost prohibitive, the telephone was practically unavailable. Matters were worse, he said, in London where there were only a few thousand subscribers, mostly in the City of London. There was in general practically no development of the telephone for social purposes, and the price was above the means of the many. He reserved his main criticism for the high cost of £20 charged by the NTC to subscribers in London, and for the largely overhead single-wire system and primitive system of exchanges, responsible he thought for a telephone system that was typically inaudible and which suffered from innumerable delays in "getting through".⁵ Marlborough, convinced that a cheap and more efficient telephone system could be developed in London, established a rival telephone company. The New Telephone Company, as it became known, planned a twin-wire system of telephone exchanges to cover a 23 square mile area of central London, to serve 25,000 subscribers, with a tariff of £12 12s p.a. for unlimited calls for the first 5,000 subscribers and £14 for subsequent subscribers.⁶ With the publication of a Treasury Minute in May 1892, announcing the Government's intention to purchase the trunk lines and relaxing restrictions on the operation of the private companies, accommodation was reached between the New Telephone Company and the NTC. The NTC bought a third of the New Company's capital in June 1892, stating the intention was to avoid unnecessary duplication of plant, and after the Duke of Marlborough's death acquired the entire company.⁷ James Staats Forbes presided when the New Company was finally wound up in December 1894.⁸ The New Telephone Company was one of several telephone companies which died in infancy, bought out by the company it intended to compete against. The Duke of Marlborough's criticisms lived on. They were threatening because they were made publicly, and because similar criticisms were made by countless politicians and newspaper editors.

The National Telephone Company was forced to defend itself. In statements to Select Committees, to its shareholders and subscribers, and in letters to the press, the National Telephone Company replied to its critics. NTC Directors repeatedly maintained that the company was denied rights that would make it an efficient organization and make for an efficient national telephone system. In testimony to the 1892 Select Committee on the Telegraphs Bill, NTC Chairman, James Staats Forbes, admitted that the NTC, responsible for 93-94% of the country's telephone business, conducted a great deal of it "monstrously badly", but that this was the fault of Parliament for not granting the

necessary powers.⁹ Forbes argued that numerous obstacles stood in the NTC's way. They had to take licences from the Post Office and to pay the Government a 10% royalty on their gross receipts. They were subject to the unpredictability of Post Office telephone policy, to the threat of Post Office competition, and to the threat that the Government might at any stage decide to nationalise the telephone service. An important component of Forbes' argument was also that the NTC lacked statutory wayleave powers: permission to lay wires or to erect poles on privately owned or publicly administered land. The problem manifested itself most in the capital:

Take London for instance; London is very badly served, but why is it very badly served? Because the whole of this structure upon which this enormous business in London depends is erected upon sufferance, subject to the caprice of individuals, of landowners, subject to constant disarrangement from the exercise of that caprice. When we get outside London we have the same thing; not so much arising on the part of individuals as of local bodies.¹⁰

For Forbes, the answer to these problems was to stop denouncing the NTC, and instead to grant them adequate powers to allow for improvement.¹¹ The Post Office had at this time limited statutory rights of wayleave, granted to it under the Telegraph Acts of 1863 and 1878. These allowed it exclusive rights of wayleave on railway land and, with local authority approval, the right to bury wires or to erect poles on local authority land. Where the local authority refused permission the Post Office could appeal to a stipendiary magistrate. The NTC petitioned for similar powers. Both the NTC and its precursor in London, the United Telephone Company, sought on several occasions to pass private Parliamentary Bills to achieve this end. All failed. In the press, representatives of the NTC made their case and challenged the views and assumptions of its critics. In 1891 F. Faithfull Begg, in a series of letters with the Duke of Marlborough, defended the NTC's actions. Begg explained the series of obstacles placed in the way of private telephone companies. He admitted, however, disgraceful mismanagement by the United Telephone Company in London, which with amalgamation the NTC were now putting to right.¹² Begg also challenged Marlborough's opinion that a telephonic millennium was near at hand: "we have been hammering at the public for ten years, and know how thick (telephonically) their heads are".¹³ As well as public resistance to the telephone, the comment reveals the degree of persistence necessary to persuade people to subscribe to

it, and how the need for persistent argument, however successful, was understood to be necessary to achieve this end.

The NTC argument was a mild form of "entrepreneurialism": that if granted adequate legal powers, if given "free rein" to develop their system as a capitalistic enterprise, they would be able to construct an efficient telephone system. The argument was as follows: lack of such an environment made it impossible for them to provide what was demanded of them. This was why the service was not as efficient as it might be, and why comparisons with other countries were false comparisons. In July 1890, for example, responding directly to a speech by the Duke of Marlborough in the House of Lords, stating that the telephone service was obtained much cheaper abroad, F.R. Leyland, explained to shareholders that the comparison between the cost of the telephone in Christiania and Stockholm, and cities such as London, Manchester, Liverpool and Glasgow was a false one. First there was the cost and transport of timber whereas in Norway and Sweden poles were on the spot. In Norway and Sweden there was no 10% royalty, nor did they have to pay anything for wayleaves.¹⁴ In 1894, J.S. Forbes, while explaining to shareholders the false comparisons of telephone cost and performance with other countries, cited the Post Office royalty, differential labour costs and the high cost and complexity of wayleaves. On this last point, he explained that telephone construction was cheaper and more efficient when lines were direct. In Britain "we are compelled to go by round-about ways of a very difficult and complicated character and that costs not only more per line, but involves a great many more wayleaves than would be necessary in a direct system".¹⁵ London's size and the high cost of wayleaves, double that of any other British city, was the typical reason given for why Londoners paid a differential rate, and why the service was inefficient by comparison.¹⁶ This was not the case in Stockholm, Forbes explained, where the Government go where they please, or in Paris where the Government did not pay excessively for wayleaves.¹⁷

Other voices?

As a licensee of the Post Office, the National Telephone Company was continually subject to control by the Post Office and indirectly by the State. In London the Post Office took little active involvement in telephone matters until the establishment of the Post Office London Telephone Service in 1901. Until this time, other of London's institutions and

social groups, often very critical of the NTC, actively debated publicly how the telephone system should develop. National and local debates intertwined. This section outlines some of the contours of this discussion. If the NTC's arguments are broadly termed "entrepreneurialism", these arguments espoused "professionalism". This had many variants but it involved some kind of state owned and managed telephone service, with the skills of technicians and engineers put to public service. There is an obvious danger of portraying this contrast between "entrepreneurialism" and "professionalism" in stark terms. One sees after 1895, for example, the NTC adopting a policy that sees itself providing a public service. Similarly, when the Post Office sought to make the telegraph and telephone departments financially separate in 1908, this was part of a general attempt to run the telephone service on sound business principles.¹⁸ This blurring and shifting of the ideological sands should not blind us to the fact that ideology mattered.

The most contentious issue during this period were the rates charged for the telephone service. The issue of rates was important, and was generally understood to be so, because reductions in cost were known to widen the telephone's social availability. As with the penny post or the sixpenny telegram, reductions in the cost of the telephone service extended the "public sphere". The perceived high charges of the NTC were therefore open to widespread criticism. Nor was the Post Office immune from such criticism when the trunk lines and local service were nationalised respectively in 1896 and 1912. Several leading figures and organizations campaigned for reductions in the scale of telephone charges. The Association for the Protection of Telephone Subscribers was formed as a direct result of the NTC's refusal to reduce telephone charges in London. At a largely attended meeting of the Association in April 1891 in Lincoln's-inn-fields, members were told the association's purpose was to protect the interests of members "especially by lowering rates and obtaining a double wire system, by which alone the voice can be heard". The association then numbered about 400 members.¹⁹ A committee was formed at this meeting to represent the association. It comprised the leading men and firms in every trade and profession in the metropolis. The committee then sent a circular to the NTC's London subscribers. The association found two principal causes of complaint: 1) Inefficiency in the system partly arising from the company not having the latest improvements, and partly from the carelessness, wilful and otherwise, of the staff; 2) the expense of the exchange system, the charge being £20 per annum. The association

accused the NTC of having watered capital, implying a tendency to issue shares without a corresponding increase in the company's assets. Dissatisfied with its discussions with the National, the Association entered into an agreement with the New Telephone Company, dated April 25, 1892. The Association handed the company a list of 1,700 subscribers and in return the company agreed, after establishing its system, to supply subscribers with telephone service for twelve guineas per annum. When the company was floated and the Association found a third of the capital was owned by the NTC and half its directors NTC representatives, the Association accused the NTC of having "nobbled" the New Telephone Company, as it had done with many predecessors, by paying a premium of 25% on its paid-up capital, thereby watering the NTC even further.²⁰ The Association was subsequently successful in obtaining a reduction in London telephone subscription. In March 1893 the NTC reduced the rate for London private house telephones, for communication over the whole metropolitan area, from £20 p.a. to £10 p.a., provided subscribers signed a five year agreement.²¹

The subject of the telephone service was also discussed at a special meeting of the London Chamber of Commerce, held in February 1892. Representatives of the NTC and the New Telephone Company were present at the meeting. In his opening remarks the Chairman, Sir A.K. Rollit M.P., made reference to the importance for commerce of the perfection of transport and communication: "despatch was an essential element of modern business, the saving of time being not the only source of profit, but a chief means of cheapening the cost of production and distribution". He asked them to consider if the telephone had received its full development in England, if other nations had greater advantages at less cost, as he believed they did, the comparative absence of long trunk lines, and whether or not the current system was really effective. The private telephone Bills before Parliament also raised the issue of how far a private trading company ought to be entrusted with compulsory powers over the public. The telephone committee of the Chamber heard opinions from both the National and the New Telephone companies and expressed their view to Council that London would not obtain an efficient telephone system unless sufficient statutory powers were granted to the companies. The Duke of Marlborough felt the issue of telephones was of enormous importance to the community at large, that the trunk lines should be taken over by the state and that Parliament would never give private companies the powers they were asking for. He again criticised the

high cost of telephone subscription in London. Colonel Jackson, of the NTC, spoke of the difficulties the company faced in regard to wayleaves. The cost amounted to £1 10s per subscriber with the additional cost of £2 per subscriber in royalties. They also had to run double the length of wire than necessary if they could route wires directly. They were in favour of lowering charges but until they were granted sufficient powers they were unable to do so in London. Mr. Provand M.P. spoke of the efficiency and cheapness of the Mutual Company in Manchester. Other members spoke of the importance of improving and cheapening the service in London. The meeting concluded with a resolution to meet with the Postmaster-General, and to urge upon him the "supreme importance" of the Government passing a General Powers Bill in Parliament to afford facilities for the development of the telephone in London, and for inter-trunk services throughout England, either by a private company or by the State.²²

Another important contributor to the debate about the development of the telephone were professional engineers. They provided ammunition for other interested parties, by virtue of their technical expertise. For example the Duke of Marlborough based his claims for a cheap and efficient London telephone service on the papers of William Preece, Chief Engineer of the Post Office, and of a Mr. Bennett, who planned a complete scheme for telephoning a large city like London.²³ Bennett calculated in 1891 that it was possible to operate a telephone exchange system in London for a subscription of less than £10 per annum per subscriber.²⁴ The most vociferous engineer was C.E. Webber. Webber, formerly a director of the United Telephone Company in London, trained as a Royal Engineer and oversaw a company of engineers seconded to the Post Office during the nationalization of the telegraphs from 1869 to 1871. Webber also helped found, and was for a while President of the Institution of Electrical Engineers.²⁵ He became an ardent critic of the NTC, and a great advocate of widened social access to the telephone. As early as 1884 Webber lectured to the Society of Arts on the telephone's potential in daily life. He explained how no electrical difficulties lay in the way of practically indefinite extension of telephony, and how the subscription of £20 p.a. might easily be reduced to £8. In 1892 Webber blamed the NTC monopoly for the retardation of the telephone industry and for its inefficiency, which, in his view, was second to none. Webber generally favoured competition, and supported the Duke of Marlborough's scheme for "telephoning London". With the demise of the New Telephone Company initiative, and

its control by the NTC, he opined that the fruits of monopoly would not benefit the public, but would restrict the individual householder's use of the telephone to a "call office", and confine the telephone's use to a paltry 200,000 subscribers. If the telephone service were to remain a monopoly, he then opined, it was better left in State hands so the "light of public opinion can be brought to bear on conditions of efficiency and cost".²⁶

Considering they controlled much of London's public land, upon which the telephone companies wished to route their poles and wires, London's administrative and elected bodies could not avoid involvement with the telephone's development. London's authorities sometimes acted in unison, sometimes unilaterally, but their decisions and actions were collectively interpreted in a process of continual exchange of information between authorities and councillors. The power of local authorities over private companies was considerable, demonstrated by the actions of the City of London Corporation.

When in March 1891 the NTC applied to the Commissioners of Sewers to place some of its cables underground, its entire system of wiring was still overhead, because of the Commission's refusal to grant any private company lacking statutory powers permission to interfere with the public footpaths and carriageways of the City.²⁷ Similarly, when the City of London Electric Lighting Company laid wires for electric lighting, and tubes for telephones were laid surreptitiously, the Commission of Sewers accepted their being used in principle for telephones but insisted that the telephones had double wires, all the latest improvements, and would be supplied to citizens at a cost not exceeding £8 p.a.²⁸ Representatives of the Commission before the 1895 Select Committee on Telephones expressed the view that the sole object of the City of London Commission was to obtain for its members an efficient and cheap telephone service. In March 1895 the Streets Committee had passed a resolution stating that provision now made for telephones was inadequate and that telephones should be supplied at a rental not exceeding £10 p.a. The decision on price was arrived at by comparing the charges made in different cities of the United Kingdom and in other foreign countries.²⁹ The Commission thus sought to use its power as the road authority in the City of London to obtain concessions from the private companies as to cost and effectiveness of the telephone service. The Commission did not at this time express an opinion in favour of competition or of state ownership. Nor did it consider the prospect of operating its own

telephone system or of applying for a licence, but it did favour having the legal right to do so. The Commission's representatives argued before the Select Committee that the corporation be allowed to retain its existing powers, and the right to apply for a telephone licence be entrenched in law, the reason being that this was the sole check they had to prevent the levying of extreme charges by a private company for telephones.³⁰

In its turn the London County Council (hereafter the L.C.C) took an active interest in the question of the telephone service in London. This was not surprising. The vision of the Progressives, who dominated the L.C.C. until 1907, was of a municipality that fostered togetherness, in part through a co-ordinated transport system. John Benn, who headed the Council's Highways Committee until 1904, for example, was passionately committed to the construction of a network of tramlines, believing this would create a single municipal entity.³¹ Although the telephone was suggested as a possible remedy for relieving London's traffic congestion after the 1905 *Royal Commission on Metropolitan Transport*, L.C.C. interest in telephones was less a matter of fostering communal and civic spirit, and more one of curbing the excesses of a private monopoly.³² When in 1892 the NTC brought in a private Parliamentary Bill to extend its powers, the L.C.C., along with many other local authorities, opposed it. The Bill was subsequently dropped with the passing of the Telegraph Act of 1892. In 1893 the matter of the telephone service was referred to the L.C.C.'s Highways Committee. The Council asked the Postmaster-General to allow it to send a deputation after the agreements between the Post Office and the NTC had been laid on the table of the House, and after the L.C.C. had time to study them.³³ The deputation was duly received on 4th February 1895.

At this meeting L.C.C. representatives complained of the hurried passing of the 1892 Telegraph Act, stating that insufficient time had been given for London to state its case. At the meeting Mr. Willoughby H. Dickinson, Deputy Chairman of the L.C.C., argued that the agreements as they now stood would be detrimental to the interests of London. London, he said, was in the hands of a "gigantic monopoly" which had virtually done away with all competition. The company, it was felt, gave a poor service, two million pounds of its £4.5 million capital the Council considered "promotion money", essentially watered capital, and as far as they could gather the cost to subscribers was higher than it was elsewhere: in London the cost varied from £12 to £20 p.a.; in Canada

it was £4, Australia £6, Stockholm £4, in Glasgow the same company charged £10, and in Manchester the charge was £6. Dickinson was convinced the telephone service could be provided in London at a maximum cost of £10 p.a. per subscriber. The real issue was whether the National Company, like other monopolists, should be restricted to its charges and profits, or be taken over by the State.³⁴ Similarly, in testimony before the 1895 Select Committee on the Telephone Service, Dickinson expressed the Council's view that the agreement between the Post Office and the NTC would strengthen the latter's position. He concluded that there were three possible courses of action: either severe restrictions be placed on the NTC, that the State take over the company's business, or the municipality do so. Dickinson's personal view was that the telephone service ought to be in the hands of the Government but that if nothing was done to curb the practical private monopoly then there should be competition by municipal authorities, and that the L.C.C. should operate telephones in the area of the County of London.³⁵

The Postmaster-General's reply to the L.C.C. deputation reveals Post Office policy to the telephone service at this time. Post Office policy to the telephone was never static but the basic considerations are apparent here. The Postmaster-General explained the Government's policy was to take over the trunk system and to leave the licensees of the Post Office to operate the telephone service in restricted areas. The NTC's licence had 17 years to run, and unless the company failed to carry out the obligations of the licence there was no reason to take it away from them. There was no intention to compulsorily purchase the company. As to competition, there was nothing more detrimental than to have two companies working the same area. The Government believed that no monopoly had been conferred, and that if the NTC failed to provide a reasonably efficient service in any one area the Post Office retained the right to set up their own system in that area, or to grant to another body a licence to do so. The Postmaster-General did not consider the NTC's charges high by comparison to American cities, and noted the NTC was rapidly installing a double-wire system. In a comment revealing the limited view of the telephone's social use, held by many Post Office officials in this period, the Postmaster-General reminded the L.C.C. delegation that "the telephone was a luxury" and "could never be brought down like the penny post". Mr. Jones of the L.C.C. replied that "it was a necessity for commercial purposes". The Postmaster-General assented but repeated that the telephone "was a luxury of the commercial and wealthy classes; the system could

never be made an ordinary medium of communication for the great mass of the public".³⁶ This was not an unusual view at the time. In June 1895 at the annual meeting of a telephone manufacturing company the Chairman explained that "those who purchased telephones were, and always would be, limited in number".³⁷ The Postmaster-General, for this reason, doubted the wisdom of a municipality taking out a licence as the liability would be imposed on the rates but benefit only a minority of ratepayers. He assured the L.C.C. officials, however, that local authority powers, especially with regard to wayleaves, would be safeguarded.³⁸

The L.C.C. were sufficiently interested in the telephone service to survey the views of London telephone subscribers. The survey, put out by the Council's Highways Committee, explained the committee's view that the "telephone service in the metropolis should be rendered cheaper and more efficient".³⁹ With this leading question the survey asked subscribers if the NTC's service was efficient or satisfactory; if not satisfactory, in what respects it was unsatisfactory; and what suggestions (if any) they would make to improve the service.⁴⁰ The results of the survey were not published. The L.C.C. also commissioned reports from its Chief Engineer, Alexander R. Binnie, and from J.L. Newland, another engineer, on the feasibility and cost of an L.C.C. operated telephone service. These explained that a plan for an independent municipal telephone service for London had been under consideration for some time. Both gave estimates of the capital cost of establishing such a system and the annual expenditure necessary to maintain and work it. Binnie's plan estimated a capital expenditure of £400,000 to cover the cost of exchanges and their fittings, wiring and instruments, and junction wires between the exchanges. This would cover the administrative County of London. The estimated maintenance cost was £90,000 per annum. This would provide between 12 and 20 exchanges to serve in excess of 10,000 subscribers, the assumption being that with a cheapened and improved service the number would considerably increase. Wires would be overhead except for junction wires and the system would be of metallic circuits. To reduce capital costs the plan included using some of the Council's fire brigade stations as telephone exchanges, with the advantage "of assisting the communication of information as to fires". Newland's plan was similar, with estimates for capital expenditure of £356,743 and £75,898 per annum for maintenance. This plan proposed the need for 15 exchanges. Both engineers estimated the cost to subscribers considerably

below prevailing NTC rates; Binnie at £10 p.a., Newland at £8 p.a.⁴¹ Although the idea of applying for a telephone licence for London was considered later on, neither of these plans came to fruition.

Between the Select Committee of 1895 and the establishment of the Post Office's London Telephone Service in 1901 relations between the NTC and the L.C.C. remained strained. The L.C.C. persisted in its view that London was afflicted with a bad and costly telephone service, the result of a "scandalous monopoly", and that an efficient telephone service would only be achieved with a competing telephone service.⁴² The NTC for its part, claimed that it was strenuously attempting to combat inefficiency by rapidly replacing its single wire circuits with metallic circuits, and by seeking to place its wires underground, so as to generate greater capacity. Forbes complained however that it lacked the authority in law to do what it did. In London where "there was no municipal life at present and no order" he blamed the L.C.C. for denying them the necessary wayleave powers, with "no arbitrator to appeal to".⁴³ Authorities in the north were more enlightened, he declared. This was a reference to Manchester, one of the first provincial cities to give the NTC underground wayleaves, and to the Corporation of Liverpool which signed a similar agreement in June 1896.⁴⁴

In London, the NTC and the L.C.C. reached a preliminary agreement in 1897 allowing the company to place its wires underneath the city's streets. In June 1897 the L.C.C. passed a series of resolutions setting out the terms attached to its consent but then took another twelve months to prepare a formal document. Two new conditions were imposed in the draft: that the NTC pay the L.C.C. an annual payment for wayleaves amounting to several thousand pounds, and that the L.C.C. maintain the right to fix the rates the company charged to its subscribers in London. The company was finally compelled to abandon hopes of reaching agreement with London's principal authority.⁴⁵ Mr. Benn, Chairman of the Council's Highways Committee, admitted in 1898 that delay in settling the issue was a serious issue for London. It was also costly, as London was punished to the extent of at least £50,000 per annum on the telephone service to pay the dividend on the NTC's watered capital.⁴⁶ The L.C.C. welcomed the report of the 1898 Select Committee which concluded that the telephone was of little practical benefit to the country, and would remain so as long as it remained a private monopoly. It was then too late in the Parliamentary calendar for the L.C.C. to follow Glasgow's example and apply

for a municipal telephone licence, so the Council satisfied itself that the Select Committee's recommendations would place sufficient pressure on the Postmaster-General to ensure London was not placed at a disadvantage with other United Kingdom cities.⁴⁷ However, relations between the NTC and the Post Office over the London market stalled for the year from the summer of 1900, with the Post Office obtaining an injunction preventing the NTC laying its wires under the streets, and effectively blocking further expansion.⁴⁸ The stalemate was not resolved until the metropolitan agreement between the NTC and the Post Office was signed in August 1901.⁴⁹

The telephone question

The early 1890s marked a watershed in Government policy towards the telephone service. The Government in an 1892 Treasury Minute announced its intention to nationalise the trunk lines, and to widen the powers of the private companies but to limit their operations to local areas. The broad aim was to extend telephone facilities available to the public. The trunk lines were nationalised in 1896 and the transfer completed by 1897.⁵⁰ With a turnover of NTC directors, broad co-operation outside London between the NTC and the Post Office, and the NTC from 1895 defining itself as providing a "public service", there was a subtle change of emphasis, from entrepreneurialism to professional management in what was considered the "public interest".⁵¹ Yet major issues remained unresolved. Who would best manage the telephone service? The state, private enterprise or municipalities? What rates should be charged? And, inseparable from this, how widely available socially ought the telephone to be? These issues were grouped, and debated in the national press under the heading of "The Telephone Question", a term first used by *The Times* in 1897.⁵² This was a national debate involving the Post Office, national and local politicians, engineers, and national trade organizations. The debate was also a local one which in London involved the city's local authorities, individual landowners and news-reading publics.

The main issue of how best to achieve an efficient and affordable telephone service stemmed from anxiety and criticism of high rates and poor service, and the perceived backwardness of the United Kingdom telephone service relative to North America and other Continental countries. Diverse individuals and organizations blamed the Post Office, the NTC, or both, for mismanagement. The NTC was blamed for

inefficiency and high charges, the Post Office and the Government mainly for stifling the telephone service through "procrastination and timidity", and for high charges on the trunk service.⁵³ Criticism was also made of the Post Office's policy of competition, which by July 1897 resulted in only 37 telephone exchanges, none of which were in London, a maximum of 1,708 subscribers (compared with the NTC's 100,000), an average of 46 subscribers per exchange.⁵⁴ Because high rates were seen to prevent the telephone service's extension and its wider use, intense criticism was reserved for local and trunk service charges. Several commercial and trade organizations passed resolutions critical of the telephone service, pointing out delays and irregularities on the trunk service, and complaining of high charges relative to prevailing continental rates. The views of these organizations were made known to the Postmaster-General and published in the press. These included the Association of Trade Protection Societies, the Associated Chambers of Commerce, the Liverpool Cotton Association and the Norwich Telephone Users Association.⁵⁵ The resolution passed by the Association of Trade Protection Societies, for instance, pointed out that the difficulties of the telephone service were "a serious impediment to business", and urged for a swift extension of the number of lines, uniform charging by distance and a reduction in rentals.⁵⁶ Many organizations later passed resolutions favouring nationalization of the telephone service.⁵⁷ But this was more a measure of frustration at the telephone service than an index of political support for nationalization.

Criticism also came from other sources. Engineers and engineering organizations questioned the advisability of complete nationalization, or of licensing local independent or municipal telephone systems. The Institution of Electrical Engineers appointed a committee of members on the subject, and concluded that for the progress of electrical engineering, the local telephone industry was best left as a monopoly.⁵⁸ C.E. Webber accused the Liverpool Chamber of Commerce, and similar commercial organizations, of self-interest, for they represented "the wealthy minority, which up till now has had the almost exclusive use of the telephone". It was not "on behalf of that constituency, who for nearly twenty years have had the benefits of the telephone monopoly, at probably much too cheap a rate, that the battle is being fought out in the Press in favour of popularization". He challenged the view that a telephone service lacking a single central organization would automatically create inefficiency.⁵⁹

In a series of letters, articles and public statements Webber assessed the Government's proposals for the telephone service. Prior to the Government announcing its intentions, Webber insisted that the practical question was the cost of placing telephony in Britain within reach of all classes, and making it as useful as the railway and postal service. He calculated a figure of £12 million. He suggested the Government either encourage effective competition between independent companies, municipalities or between the Post Office and the NTC, or adopt a bolder policy of announcing their intention to purchase the NTC in 1904, pass a Bill raising £12 million over a six year period, and appointing a commission to distribute the money, with a Bill protecting the public with a provision that the minimum average local exchange subscription must not exceed £5 per annum.⁶⁰ Later, assessing the provisions of the 1899 Telephone Bill, which for the first time allowed municipalities to apply for telephone licences, he challenged arguments in favour of the telephone's nationalization, encouraged local authorities to inquire into the conditions of the telephone service in their areas, and urged for the extension of the telephone's advantages from a wealthy minority to assist the daily life of millions.⁶¹ Speaking to the London Chamber of Commerce in January 1900 he wondered if the Post Office was up to challenge of the 1899 Act. He urged them to start with London. There was also enormous potential for development in the rest of the country, even in rural areas where growing knowledge of telephone facilities would enormously increase its use. To the sound of cheers he explained that it was all a question of rates.⁶²

Developments in London thus contributed to and were influenced by the national debate on the telephone question. The issue of backwardness was magnified in London, for commentators wondered how the Imperial capital, and the world's largest city, could be relatively deficient in something so recognisably modern as a telephone service. The assumption that technology was a measure of civilization, and of Imperial greatness, was common currency. In November 1897 a letter writer to *The Times* described as "deplorable" how "the greatest and richest city in the world should be at the tail of civilization ... instead of triumphantly at its head".⁶³ Webber in 1899 urged that the priority for Government was to inaugurate in Greater London a telephone service "worthy of the metropolis of the Empire".⁶⁴ The issue of providing London with an adequate telephone system was the topic of seven London-wide conferences organised on the

subject between 1898 and 1904, hosted either by the L.C.C. or the Corporation of London. Five of these conferences took place between March 1898 and March 1899. They dealt with various aspects of the London telephone service, the NTC Bills before Parliament to enhance its powers, and the possibility of London's local authorities combining to apply for a municipal telephone licence. The 1901 conference was called to discuss the charges announced by the Post Office for its London telephone service, and the 1904 conference the proposal to purchase the NTC's undertaking. London's numerous local authorities were represented at these conferences. The opinions expressed were predictably varied but indicate the views of London's diverse administrative bodies on the value of the telephone service.

The first conference, convened and hosted by the Corporation of London in March 1898, had as its aim ascertaining the views of London's local governing bodies as to the cost and efficiency of the telephone service in London. The Lord Mayor, Mr. A.C. Morton, in welcoming delegates, explained that in addition to the Corporation, 36 local boards and vestries out of 41 signified their intention to send delegates and 25 had applied to the Treasury for an inquiry into the cost and efficiency of the telephone service in London. The Corporation's opinion, he said, was that "the roads and streets of the metropolis belonged to the people" and ought not to be given up to any trading company unless under conditions which would protect the public. The conference presented another opportunity for the NTC to express its views, in the form of a letter from J.S. Forbes, read out by the Town Clerk, Sir John Monckton. Forbes, in explanation of the criticisms made against the company, admitted the service was imperfect. This was not for lack of will on the company's part, or of skill or money, he explained but for want of reasonable facilities in the hands of London's local authorities. Playing on civic rivalry he inquired why London, "generally so advanced", should lag behind cities like Liverpool, Manchester, Birmingham, and Leeds in this respect. He also defended the company's progress in London and its charges. The conference was unconvinced, and passed resolutions stating the London telephone service was "inadequate, inefficient and costly", and urging the Treasury to inquire into the matter. The conference further resolved that it was undesirable for local authorities to permit the NTC to place its mains, pipes or wires under London's streets until the public interest was secured by statute, as in the case of the tramways and electric lighting companies.⁶⁵

Subsequent conferences raised similar issues: London's backwardness in telephones relative to other British and foreign cities; the inefficiency and high cost of the telephone service; and the issue of control over private enterprise on London's public space. The May 1898 conference on the telephone service convened by the L.C.C., with representatives of corporations throughout the country, passed resolutions critical of the NTC's practical private monopoly, its watered capital and excessive charges. This and insufficient trunk wires were blamed for the non-use of the telephone in British cities, especially London, relative to foreign cities. Additional resolutions urged the Post Office to take over the whole telephone service forthwith, or to empower municipalities to provide a telephone service in their localities. A final resolution insisted that the power of breaking up the streets demanded by the NTC was a "grave interference with the rights of municipal authorities".⁶⁶ Similar resolutions were passed at a conference in June 1898, between the L.C.C., the conference convenor, and representatives of London's local authorities.⁶⁷

What is evident from all these discussions is that London's principal administrative bodies sought proposals, and to petition the Government and the Post Office authorities, to bring about a more efficient and accessible telephone service for London. In the words of L.C.C. Chairman, Mr. T McKinnon Wood, there was "almost unanimous agreement that use of the telephone under present conditions was grievously restricted; if cost could be materially lowered and the service improved in efficiency a great development of the system was to be expected".⁶⁸ London had a special grievance, McKinnon thought, for it had the most costly telephone service, and its system was poorly developed relative to its size. Only a small proportion of people used it, "chiefly ... the large commercial houses, and there was only a very small private use".⁶⁹ The telephone was considered to have "general public importance".⁷⁰ Its utility was never questioned. The telephone was instead generally considered to be important to the administration of London, to the efficiency of its businesses, and to the maintenance of the city's position as a major centre of international trade and finance. An efficient telephone service was also something any city with pretensions for greatness ought to have. In a period when London was governed by a jigsaw of authorities with overlapping and unco-ordinated activity, and when Londoners were not especially known for their civic pride, such unity of interest was unusual.⁷¹ One can only surmise that on a subject as important to London as the

telephone question, London's different administrative institutions may not have been as far apart ideologically as their practical politics implied.

Feelings ran so high that the City of London Corporation convened a conference in February 1899 to consider an application by London's local authorities for a municipal telephone licence, to be managed jointly by the L.C.C. and the Corporation of London.⁷² Mr. A.C. Morton addressed the conference and explained that for businessmen an efficient telephone service at reasonable cost was an absolute necessity. It was widely agreed, he thought, that the telephone service should be controlled by some public authority but as Mr. Benn, of the L.C.C., explained, the Post Office showed no inclination to assist London's telephone users. Resolutions were therefore passed unanimously to make a joint application to the Postmaster-General for a municipal telephone licence for London.⁷³ The Government instead of granting a licence promised an inquiry.⁷⁴ With the NTC and the Post Office reaching agreement, and with the announcement of the latter's intention to establish a London telephone service, the proposal was later shelved. The fact that London never established a municipal telephone system is historically unimportant. That London's municipal bodies considered the proposal seriously demonstrates how the telephone might have developed differently in London, and signifies the social and economic importance attributed to a metropolitan telephone service.

The NTC meanwhile continued to press its case for additional statutory powers. The company sought through an Act of Parliament to dissolve itself and to re-incorporate as a company with enhanced powers. The Act was intended to empower the company with all or some of the powers vested in the Postmaster-General by the Telegraph Acts 1863-1892, and to grant a right of appeal against local authorities if they refused them the right to exercise these powers.⁷⁵ With this objective in early 1899 the NTC introduced two Bills into Parliament. The first Bill sought to establish the NTC as a Parliamentary Company with a share capital of £6 million and the power to raise an additional £3 million in debenture stock. The company was to be granted adequate facilities to place and maintain its wires in public authority districts in which hitherto these powers were denied. So Parliament could consider them separately, these clauses were the subject of a second Bill.⁷⁶ The Bills resulted in considerable opposition. There were 548 petitions from all over the country against these Parliamentary Bills, many from local authorities who opposed the principle of noncompliance with their ordinary rights.⁷⁷ In March 1899

a conference of representatives of London's local authorities, convened by the Corporation of London, passed resolutions condemning the NTC's Bills which would "seriously prejudice" the rights of London's local authorities, be "inimical to the interests of the State", and which ought strenuously to be opposed.⁷⁸

Finally, in a Treasury minute of May 8, 1899, the Government announced its intention to empower local authorities to apply for telephone licences, and that the Post Office would soon open exchanges in London.⁷⁹ Details of the Post Office system were announced in November 1901. The Post Office sought to meet the requirements of varying classes of subscribers. It thus incorporated the recommendations of the 1898 Select Committee Report, which concluded that the unlimited rate was fair to those classes of subscribers able to use the system to a considerable extent but did not meet the requirements of numerous classes to whom moderate use of the service would be a great advantage. The system's novelty was to introduce a party line and measured rate service in London. The NTC discouraged party lines, and measured rate services had been introduced during the last two years in other parts of the UK but not in London. The ordinary message rate was £5 p.a. within the County of London, £4 p.a. outside the County, with a minimum charge of 30 shillings annually for message fees, which involved payment, in addition to the annual telephone rental charge, of a fixed fee for each call made. This meant that it was possible for as little as £5 10s to be an individual subscriber to the telephone in London. Party-line rates were set at a minimum of £3 10s 0 p.a. with calls in addition charged at 1d per message. The unlimited rate was fixed at £17 p.a. for the first line, and for additional lines £14 p.a. The agreement between the Post Office and the NTC allowed for inter-communication between the two systems, and the organizations agreed to provide the same services and to charge the same rate.⁸⁰

News of the system was greeted with acclaim by the editor of *The Times* who wrote that London was "at last about to enjoy that improved and extended telephone service which has been so long promised". The editor congratulated the Post Office on its services and rates, and on obtaining agreement with the NTC for intercommunication. The former would make the telephone available to "many, who, glad of the facility, are yet uncertain to what extent they will make use of it and are therefore indisposed to risk any considerable sum". Intercommunication "is a boon to the public which cannot be over-rated" because it allowed subscribers to communicate with the NTC's estimated

40,000 subscribers including "all the largest commercial and business houses of London".⁸¹ Others were less enthusiastic. The L.C.C.'s Highways Committee welcomed intercommunication and the application of the message rate service to London, but felt the aim of "general, immediate and effective competition", recommended by the 1898 Select Committee, had not been attained.⁸² In an address to the City's Liberal Club, J.W. Benn argued that London's citizens and merchants had a right to an efficient telephone service at the lowest possible price. The Government's proposals were far from this ideal, he felt, with charges between 50 and 70% too high, and unless the tariffs were altered London's business would be seriously hindered. He admitted that the scale of charges offered advantages to the small user but the minimum charge based on 360 messages a year, or one a day, was a small allowance if the telephone was to be of general utility.⁸³

A.D. Provand found the Post Office's London system wanting when compared with Glasgow's municipal system. Glasgow, with a telephone area of 143 square miles and a population of 1,000,000, offered subscribers an unlimited rate of £5 5s p.a., and a toll rate of £3 10s p.a. and 1d a call. The NTC offered a £10 p.a. unlimited rate with no toll rate. Provand concluded that Post Office competition in London was nothing less than a "side-show".⁸⁴ Others defended the Post Office, arguing that efficiency was as important as cost, and that the high costs were because London was the most difficult city in the world in which to construct a telephone system. This was because of its vast size, because of its administrative complexity, and because of the expense and difficulties involved in obtaining wayleave agreements.⁸⁵ With less altruistic spirit, George Manners, from the Carlton Club, wondered if high charges were necessarily a bad thing, as a cheap telephone service meant crowded lines, and crowded lines a poor service.⁸⁶ London's public bodies were unconvinced. The Corporation of London's Streets Committee arranged a conference of London's local authorities to protest at the proposed scale of charges, and to express hope that the agreement between the Post Office and the NTC would not come into effect.⁸⁷ The conference, held in December 1901, criticised the Post Office for failing to provide by "real and active competition" an efficient telephone service in London, for failing to consult them before fixing rates, and expressing the opinion that the charge for use of a telephone in London ought not to exceed £10 p.a. for unlimited service.⁸⁸

The Post Office telephone service was designed to be technically up-to-date, and

to avoid problems associated with earlier telephone systems. The whole system was designed to cover an area of 640 square miles, with a population of six million. Its boundaries were marked by Chipping Barnet and Enfield in the north, Bromley, Croydon and Redhill in the south, Romford in the east and Harrow and Hounslow in the west. The system was entirely underground, thus avoiding the problem of overhead wires, and constructed throughout with metallic circuits (see Figure 4.1). Paper, a novel form of insulation, was used to prevent induction, instead of gutta percha, a vegetable product that was becoming scarce and expensive. Wires were wrapped with paper, twisted in pairs and then dried in ovens to remove moisture. These strands were then twisted together and covered with a leaden sheath to form cables. An additional advantage of using paper for insulation was that paper had a lower electrostatic capacity, allowing speech to be carried four times further in length through a paper-covered cable than with a cable covered with gutta percha. Paper was also thinner, increasing by a factor of five the capacity of wires capable of being packed into each subway conduit. Cast-iron pipes and earthenware ducts were used to carry the cables under the city's streets. Constructing subways for the wires and laying the cables was a colossal undertaking. Mr Gavey, Post Office engineer-in-chief, likened the work "to the navigation of an unknown sea filled with shallows and rocks". This was because there already existed beneath London's streets an assortment of pipes and electrical cables, many of which were unmarked on the city's plans. Exchanges were equipped with multiple switchboards and the central battery system, the latest technical developments in telephony.⁸⁹

Despite the inauguration of the Post Office telephone system, and its technical sophistication, this did not lessen the criticism that London, relatively, was poorly and inefficiently served with telephones. Subscribers continued to complain of delays in connection, poor service and problems with intercommunication.⁹⁰ Neither the NTC nor the Post Office was immune from this criticism. The Chairman of the NTC admitted at the July 1903 meeting of the company a considerable increase in the company's business, and of Post Office business, in London, proving in his view there was enough demand for the two organizations to compete in London.⁹¹ But there were continuing problems. In February 1904 the NTC had 10,563 unexecuted orders for telephones, up from 8,315 a year earlier. The Chairman blamed the additional capital expenditure necessary for each order, and the constant difficulty of obtaining wayleaves.⁹² At a conference of London's

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Figure 4.1 The networked city: constructing an underground subway for the Post Office's London Telephone Service, 1901

Source: Courtesy of BT Archives, E320

local authorities, convened in May 1904 to consider the Government's proposal to purchase the NTC's London system, the Lord Mayor, Mr A.C. Morton stated that London was the prey of companies and trusts, while they still waited for the Government to fulfil its promise to popularise the telephone. Resolutions were passed urging the Government not to purchase the NTC's undertaking until the expiry of its licence, and protesting again at the Post Office telephone tariffs in London, and at the "inadequate and unsatisfactory" trunk line service.⁹³

Central to the issue of telephone rates was the question of who in fact the telephone was for. Many in the British telephone industry accepted that the potential market for telephones in Britain was huge, and only partially tapped, but how far was this market to extend socially? Here, international comparisons are revealing. In 1904 the NTC sent its general manager (Mr. Gaine) and engineer-in-chief (Mr. Gill) to America to report on technical developments in telephony. Gaine was satisfied that if free to develop their business the number of telephone users in Britain could be doubled in a short period but upwards of £10 million of new capital was required to provide for this future expansion.⁹⁴ NTC officials blamed Britain's relative lack of progress in telephony on political inaction, on the Government's monopoly, on the Treasury's unbusinesslike and unprogressive practices, and on public conservatism, especially in the matter of wayleaves. In America and Canada municipalities took the position that all electrical wires in cities should be placed underground, and granted permission for the electrical companies to do so. In American cities it was also common to find a telephone in every hotel room while in Britain this was still unusual.⁹⁵ Britain's relative lack of telephone development was seen as a matter of political obstruction and public education.

It remained the case that the telephone was largely used and conceived as a business machine, not for wider public consumption. This still had to be learnt. But there was considerable agitation against the telephone being limited to the rich. Discussion over telephone rates continued after the Post Office reached agreement in 1905 with the NTC to purchase its London plant in 1912, at the expiry of its licence. The agreement was welcomed because it guaranteed the telephone service's continuity and progressive expansion.⁹⁶ There were genuine attempts by the Post Office at this time to extend the service to marginal groups which for a private company would have been unprofitable. In January 1906 for example the Board of Agriculture and Fisheries issued a circular to

fruit and horticultural associations to further the extension of the telephone system in rural districts.⁹⁷ When in 1907 the Government introduced into the House of Commons a Telegraph Bill, to raise £6 million to develop the telephone service over a four year period, the main criticism was that it was a large sum of money for something that would benefit only the "well-to-do". Why Sir F. Banbury, the City of London representative, asked should the telephone service which was used by the "richer classes" be paid for by the whole nation?⁹⁸ Similar thinking prompted organizations in London and throughout the country to campaign for reductions in telephone rates. When in July 1907 a Telephone Users Protection Association was formed in London it promised to agitate for price reductions.⁹⁹

The Post Office itself attempted to widen social access to the telephone. In 1907, alongside the NTC, it announced its intention to abolish flat rates in the provinces, and to replace these with measured rate services. This was a clear attempt to reduce the telephone's cost to small users. It was argued that charging for use was fairer and more equitable, that it would be easier to manage variable demand for the telephone service, and produce long-term growth.¹⁰⁰ The NTC used similar arguments.¹⁰¹ The country's commercial organizations disagreed. The Secretary of the Newcastle and Gateshead Chamber of Commerce considered the measured rate tariff would restrict telephone use and place an extra burden on retail traders.¹⁰² The Association of Chambers of Commerce and the Association of Municipal Corporations both censored the abolition of flat rates.¹⁰³ In January 1908 a deputation to the Postmaster-General, including representatives of about 70 Chambers of Commerce, 30 town and county councils, and several large trading establishments, argued that flat rates be retained, criticised excessive charges and urged him to appoint a Select Committee to inquire into telephone rates and future telephone policy.¹⁰⁴

These organizations clearly wished for a general reduction in telephone charges but wished also as large users to retain the benefits of unlimited subscription. In reply, Sidney Buxton explained that the Post Office aimed for an efficient and cheap telephone service. Measured rates were necessary to avoid excessive use of the telephone by flat rate subscribers, who paid less than the cost price of calls, and to avoid the high frequency of engaged lines.¹⁰⁵ These specific proposals coincided with broader Post Office policy to place the telephone service on a paying basis and to avoid the experience with the

telegraph service.¹⁰⁶ Mr. Buxton, in reply to a Parliamentary question, explained that the Post Office telephone system ought to be conducted on business-like principles, with revenue sufficient to provide for current expenditure, maintenance, renewal of all plant, 3% interest on capital "together with a moderate but not excessive margin of profit". It was with this intention that the Postmaster-General announced that future telephone accounts would be issued separately from those for the telegraph service.¹⁰⁷

For *The Times* in December 1908 aside from the issue of the NTC's position and its employees after the expiry of its licence, the other outstanding telephone question was rates; the issue being whether the measured rate was in principle a fair and proper method of charging for the telephone service.¹⁰⁸ Up until the NTC's nationalization in 1912 the issue of rates continued to receive press comment, and chambers of commerce and borough councils continued to pass resolutions and make representations to the Postmaster-General urging for reductions in charges.¹⁰⁹ Nor did discussions of rates cease then. However from about 1908 onwards it was understood that current rates were experimental, and that major changes would have to await circumstances following upon nationalization.¹¹⁰ The major issue was to secure continuity of the telephone service. With the onset of the First World War significant moves towards popularization were delayed and did not resurface until the 1930s.

Throughout the on-going discussions of telephone rates genuine attempts to widen social access to the telephone were balanced with considerations for the revenue, cost and efficiency of the telephone service. Despite attempts by some to make the telephone more popularly available, the telephone remained in this period a business instrument. The main issue was its cost, efficiency and systems of charging, mainly for the commercial community who used it. Such a conception underpinned and reinforced NTC and Post Office policies which sought to make the telephone service pay. That the wider public had need of the telephone and that this was a potentially profitable market had still to be learnt. Yet, as with extensions in the franchise, with the introduction of new services and reductions in cost, the public was gradually granted access to telephonic communication, and thus admitted into a broadened public sphere.

The NTC, for its part, until the company's nationalization in 1912, continued to criticise state and municipal management of the telephone service, and to argue that the telephone was better managed by a private company. During the first half of its existence

the NTC did attempt to extend its licence, from 31 to 42 years, the latter being the term of licence granted to electric lighting companies by the 1882 Electric Lighting Act. Such attempts were abandoned after 1892, with the announcement of the Government's intention to purchase the NTC's trunk lines, as a first step in the full nationalization of the telephone service. After this date the NTC no longer challenged the essential basis of the decision to nationalise the telephone service, although it continued to campaign vigorously for new business and to compete fiercely with municipal and post office exchanges where these existed. One may speculate that the NTC's senior personnel realised that public opinion, for a long time critical of the NTC for alleged inefficiency, had finally shifted irretrievably in favour of the telephone's nationalization. Another factor, of more subtle significance, was the decision in 1880 that declared the telephone to be a "telegraph". This early on established the principle of state control of the telephone so that NTC officials must have realised from the outset that the prospect of nationalization was really only a matter of time.

The issues associated with the "telephone question" were only temporarily resolved with the transfer of the National Telephone Company's remaining property, and most of its staff, to the Post Office on the 31st December 1911. After the transition period telephone usage in Britain remained low by comparison to other countries. In 1921 there was 1 telephone for every 47 people in the United Kingdom as opposed to 1 for every eight in the United States, and one for every ten in Canada. The onset of the First World War seriously impeded further development. Thirteen thousand of the 20,000 employees in the Post Office's engineering department joined the armed forces, expansion of exchanges and trunk lines after 1915 was seriously cut back, and the payment of a "war bonus" added to wage costs. Perry suggests that the war delayed the development of the telephone in England "almost as much as the long period of uncertain public policy between 1880 and 1905". Moreover, now entirely under state control there was still no unanimity between the Post Office and the Treasury for a policy of expanding the telephone service. The administrators of the Post Office now regarded efficiency, not lower rates, as their top priority.¹¹¹ Earlier criticisms of the telephone service resurfaced under Post Office management. In general the Government was criticised for its inconsistent telephone policy, for high telephone rates, for lack of investment, which combined were considered to place a "strangle-hold" on the telephone service, and for

failing to develop the telephone to the same extent as in other industrial countries.¹¹² These issues, and the issue of telephone rates in particular, continued to be a subject of select committee inquiries.¹¹³

Local social geography

The previous chapter described how the telephone was kept visible in part because of the difficulty of obtaining wayleave powers. In this chapter the NTC is shown repeatedly to petition for enhanced powers to place its wires and poles on privately owned and public administered urban space. The issue of wayleaves is given cursory treatment in telephone histories. Yet it was a continual problem for the private telephone interests. Even the Post Office had limited rights of wayleave. Robert Hunter, Post Office solicitor, admitted to an 1892 Select Committee that if landowners insisted upon their extreme rights "the Post Office would be scarcely able to put up a wire at all".¹¹⁴ Wayleave rights were not incidental but show the continuing importance of individual private property rights and traditional urban land structure. In short, individualism and public comment on the infringement of private property rights was an important element in the public debate over how the telephone was to develop in British cities.

For Britain's private telephone companies the problem of routing wires and poles was a continuous problem. Lacking statutory wayleave powers the companies were forced to request from individual landowners permission to locate telephone equipment on private land. In a city as complex as London this was no mean feat. The early private telephone companies paid employees on a commission basis to persuade people to allow them to erect poles, derricks and other telephone equipment on their roofs and gardens. This was Bernard Shaw's job in London's East End when in 1879-80 he was employed in the Wayleave Department of the Edison Telephone Company. In six weeks he obtained only one consent.¹¹⁵ In central London, where institutional landownership was considerable, it was necessary to gain permission of large landowners. One of the first telephone lines in central London, connecting the Temple with the Westminster law courts and the House of Commons, utilised the Metropolitan District Railway for this purpose.¹¹⁶ We have seen how London's public bodies used their powers over the streets to block private telephone companies' access to public space. Institutional landowners could also cause havoc for the private companies. The refusal in April 1900 of the Bedford Estate to allow

the NTC permission to place overhead wires on its land caused considerable public inconvenience.¹¹⁷ Similar problems were experienced in Belgravia and Westminster.¹¹⁸

The subject of wayleaves was a complex legal as well as a public issue. Individual landowners challenged the legal rights of private companies to place wires and poles on privately owned land. In a City of London court case in 1883, involving the relative rights of property owners and telephone companies, the presiding commissioner concluded that according to English law "an owner was entitled to the enjoyment of everything between his property and the heavens".¹¹⁹ Property owners also wrote to the press to warn other landowners of the potential threat. In May 1898 a land agent wrote to *The Times* to warn telephone applicants and large landowners against signing the NTC's written agreement which bound subscribers to give the telephone company every facility to dot poles and hang wires all over their estates whether or not such facilities were of service to the subscribers.¹²⁰ Public authorities, as has been described, used their powers to restrict the activities of private companies on public space, and conferred with one another on how best to achieve this.

The issue of wayleaves in a city as complex as London demonstrates the continuing significance of traditional land structure and individual private property rights. In constructing their system the telephone companies, and sometimes the Post Office, faced the political prejudice of London's public bodies, and the individualism of private property. They also faced public scrutiny, as the diffusion of telephone wires over and beneath London's streets generated public debate about the political control and aesthetics of urban public space.

A modern debate?

The NTC was continually subject to press criticism and to public scrutiny. The Post Office was also not immune from criticism. When criticised these organizations had ritually to defend their actions publicly. It was not solely the act of having to defend themselves that mattered but also the means of doing so. The means were various but the principal one was to use rational argument that was publicly witnessed. The NTC, the Post Office and individual correspondents traded in a language of ideology, systematic arguments that drew selectively upon publicly available information including news reports, statistics, engineering reports, and government documents.

Until its nationalization in 1912, the NTC in London faced considerable criticism on a range of issues. It was criticised for its poor service, delays and inefficiency, and described as a monopoly, engaged in unfair practices, operating solely for its shareholders but with watered capital. Comparisons with other countries and with other British cities were routinely made. The Post Office after 1896 was criticised for its operation of the trunk lines, and after 1901 for the operation of its London telephone service. Politicians, civil servants, engineers and letter writers also engaged in debate about whether the telephone service was best run by municipalities, the state or by private enterprise. In each case where the criticism was publicly vented the accused organizations sought to defend themselves, sometimes remarkably quickly.

The means of argument were equally important. The NTC used prepared answers to Select Committees, letters to the press and planted news stories to make its views public. It also sought through the introduction of Parliamentary Bills to extend its powers. The NTC, in addition, sought through the physical presence of telephone equipment, as well as through advertising and canvassing, to keep a positive image of itself and the telephone in the public's mind (see Chapter 5).

Conclusions

The way the telephone system developed in Britain was not inevitable. In London the technology developed and was shaped by several parties. These included private telephone interests, the Post Office, London's numerous local authorities, engineers, the press and the public. These parties engaged in a public debate over the telephone question; a set of issues that concerned the cost, management and regulation of the telephone service. To make their case, each party employed structured rational arguments, supported by a range of evidence, including official and unofficial statistics, engineering reports, and political rhetoric. These were public arguments designed to convince an educated urban population through the means of rational persuasion. The arguments were either made directly through the newspapers or in venues where the press were certain to report on events. That appeal was continually made to the public's rational mind, and that newspapers were used both to make claims and to challenge criticisms, are signs of the modern means by which the telephone question was debated, and by which this important public issue was resolved.

The NTC, a private telephone monopoly, sought to provide the country's premier commercial market with an efficient telephone service but argued that it was continually obstructed in its task by limited statutory powers, and by fickle public authorities and private individuals. It made its case publicly in various forms, sought to extend its powers through the passage of private Parliamentary Bills, and made sure that criticisms made against it were quickly repudiated. At times, the Post Office, subject to similar criticisms used similar arguments. In constructing their system the NTC faced the problem of a traditional land structure and the individualism of private property. London's local authorities argued collectively for an efficient and cheap telephone service, worthy of a national and imperial capital city. These arguments and ideological standpoints were played out physically over and beneath the city's streets, as London's public bodies acted to deny the NTC access to the city's public space.

Throughout this period the telephone was generally considered as a business machine for the wealthy classes. National trade organizations, telephone users, and public bodies criticised the telephone service's inefficiency, and continually campaigned for reductions in charges. Except for a few solitary engineers and politicians, who made genuine arguments for the telephone's popularization, the immediate concern was to improve and cheapen the telephone service for a self-interested commercial community who were its principal users. That the telephone could be generally useful, and profitably so, had still to be learnt. How this happened, and the processes of communication necessary for such a significant historical transformation, is an important area for further research.

Notes

1. P.J. Waller, Town, city & nation: England 1850-1914 (Oxford, 1983) 302, 304-06.
2. Charles R. Perry, The Victorian post office: the growth of a bureaucracy (Woodbridge, Suffolk, 1992) 184
3. Neil Johannessen (ed.), "Ring up Britain": the early years of the telephone in the United Kingdom (London, 1991) 181
4. The Times, 5 June 1889
5. The Times, 29 August 1891
6. Johannessen, "Ring up Britain", 183; The Times, 5 September 1891
7. The Times, 27 June 1892
8. The Times, 20 December 1894. Further information on James Staats Forbes is included in Chapters 3 and 5. For details of Forbes' early use of the telephone while he was manager of the London, Chatham and Dover Railway, see Chapter 3, page 62. For information on Forbes' background and career, see Chapter 5, page 163
9. Special report and report from the Select Committee on Telegraphs Bill, together with the proceedings of the committee, and minutes of evidence, BPP, Vol. 17 (1892) 18
10. Ibid., 19
11. Ibid., 18
12. The Times, 3 September 1891
13. The Times, 8 September 1891
14. The Times, 12 July 1890
15. The National Telephone Company, Limited. Proceedings at an extraordinary general meeting of the shareholders ... 18th day of January, 1894, 4-5, Telegraph reports 1892-93
16. The National Telephone Company, Limited. Proceedings at the meeting of the shareholders of this company ... 22nd January, 1891, 6, Telegraph reports 1890-91
17. The National Telephone Company, Limited. Meeting of the shareholders ... 18th day of January, 1894, 4-5, Telegraph Reports 1892-93
18. The Times, 2 April 1908
19. The Times, 16 April 1891
20. "The grievances of the telephone user", The Pall Mall Gazette, 20 January 1893

21. The Times, 20 March 1893
22. The Times, 23 February 1892
23. The Times, 29 August 1891
24. The Times, 8 September 1891
25. Dictionary of national biography (DNB) Supplement, Jan 1901-Dec 1911 (London, 1912) 625-27
26. The Times, 24 August, 13 September 1892
27. An exception was to permit in 1883 the Exchange Telegraph Company to lay a tube from Cornhill to the end of the subway beneath Queen Victoria Street, near to the Mansion House, and also one from Crown Court, Fleet Street to the Victoria Embankment Subway (both for journalistic purposes). Report to the streets committee of the Honourable the Commissioners of Sewers of the City of London, on the application of the National Telephone Company for permission to lay cables beneath the pavements of certain of the principal streets in the City of London, by William Haywood, engineer and surveyor to the Commission (London 1890) 5, 14.
28. The Times, 8 December 1893; Report from the Select Committee on the Telephone Service; together with the proceedings of the committee, minutes of evidence, appendix and index, BPP Vol. 13 (1895) 111
29. Ibid., 112
30. Ibid., 112, 115, 117
31. James Winter, London's teeming streets 1830-1914 (London, 1993) 191
32. Engineering 1905, Vol. 80., 85, as quoted in Winter, 192-93
33. Report from the Select Committee on the Telephone Service; together with the proceedings of the committee, minutes of evidence, appendix and index, BPP Vol. 13. (1895) 86
34. The Times, 5 February 1895
35. Report from the Select Committee on the Telephone Service ..., BPP, Vol. 13. (1895), 87, 95, 97.
36. The Times, 5 February 1895
37. The Times, 7 June 1895
38. The Times, 5 February 1895

39. Report from the Select Committee on the Telephone Service ..., BPP, Vol. 13. (1895), Appendix 9, 314; The Times, 18 May 1895
40. Ibid.
41. Report of the Select Committee on the Telephone Service ..., BPP Vol. 13 (1895), Appendices 4 and 5, 303-06
42. The Times, 7, 9 November 1898
43. The Times, 31 July 1896
44. Johannessen, "Ring up Britain", 184, 186
45. Ibid., 186-87
46. The Times, 9 November 1898
47. The Times, 9 November 1898; Select Committee on Telephones, Vol. 12, BPP (1898), iii
48. Johannessen, "Ring up Britain", 187; Perry, The Victorian post office, 180
49. Perry, The Victorian post office, 182
50. The Times, 6 April 1896, 18 February 1898
51. The Times, 18 March 1895
52. The Times, 17 July 1897
53. The Times, 16 August 1898
54. The Times, 17 July 1897
55. The Times 19 July 1897; 18 February 1898; 1, 4 April 1901
56. The Times, 19 July 1897
57. Provincial organizations passing resolutions in favour of nationalization, and referred to in The Times, included: in Liverpool, the city's Corporation, and in addition the city's dock board, Chamber of Commerce, and professional and trade associations, The Glasgow, Belfast, Dewsbury, Cardiff, Bradford, Oldham, Bristol and Edinburgh Chambers of Commerce, the Convention of Royal, Parliamentary, and Police Burghs of Scotland, the Association of Municipal Corporations, the Council of Associated Stock Exchanges, the Glasgow, Liverpool, Manchester, Birmingham, Sheffield, Leeds, Dublin, Belfast, and Bristol stock exchanges and numerous newspapers including The Times, The Daily News, Statist, Liverpool Daily Post, Glasgow Herald, Scotsman, Fortnightly Review, Electrician, Electrical Review, Electrical Engineer, Edinburgh Evening News, Glasgow Citizen, Liverpool Mercury, Daily Mail, Yorkshire Post, Leeds Mercury, Nottingham Express,

Dundee Courier Globe, Dundee Advertiser, Birmingham Daily Post, Leicester Post, Manchester Courier, Bristol Mercury, Liverpool Express, Belfast News Letter, Irish News and many others. The Times, 23 September 1897; 11, 27 April, 4, 10 May 1899

58. The Times, 14 March 1899

59. The Times, 29 March 1899

60. The Times, 23 January 1899. Webber's suggestion that the Government purchase the National Telephone Company's undertaking in 1904 refers to the specific provisions of the new set of telephone licences issued to telephone companies by the Postmaster-General in 1884. In that year a change in Post Office policy led to the early restrictions on the operations of the private telephone companies being lifted. The new licences, which would lapse at the end of 1911, included the option for the government to nationalise the telephone companies in 1890, 1897 or 1904

61. Electrical Engineer, 7, 14 April 1899; The Times, 8 April, 26 May, 15 August, 2, 11 September 1899, 18 January 1900

62. The Times, 18 January 1900

63. The Times, 3 November 1897

64. The Times, 23 January 1899

65. The Times, 18 March 1898

66. The Times, 24 May 1898

67. The Times, 15 June 1898

68. Ibid.

69. Ibid.

70. Ibid.

71. Waller, Town, city and nation, 58-59, 62

72. The Times, 23 January 1899

73. The Times, 2 February 1899

74. The Times, 26 November 1901

75. The Times, 21 November 1898

76. The Times, 5 January 1899

77. The Times, 21 March 1899

78. The Times, 2 March 1899
79. The Times, 13 May 1899
80. The Times, 20 November 1901
81. Ibid.
82. The Times, 25 November 1901
83. The Times, 26 November 1901
84. The Times, 30 November 1901
85. The Times, 3, 5, 14 December 1901
86. The Times, 6 December 1901
87. The Times, 10, 23 December 1901
88. The Times, 23 December 1901
89. The Times, 3 April 1902
90. The Times, 4 January, 7 March, 11, 29 September, 24 November, 26 December 1902, 2, 7 April 1904, 19 August 1907
91. The Times, 24 July 1903
92. The Times, 19 February 1904
93. The Times, 13, 19 May 1904
94. The Times, 19 February 1904
95. The Times, 9 April 1904
96. The Times, 10 August 1905
97. The Times, 16 January 1906
98. The Times, 13 July 1907
99. The Times, 15 July 1907
100. The Times, 31 August, 18 October, 16 November 1907
101. The Times, 22 November 1907
102. The Times, 31 August 1907

103. The Times, 20 September, 28 October 1907
104. The Times, 9 January, 12 February 1908
105. The Times, 12 February 1908
106. The Times, 17 July 1908
107. The Times, 2 April 1908, 5 March 1909
108. The Times, 24 December 1908
109. The Times, 28 April 1909, 12 February 1910
110. The Times, 5 March 1909
111. Perry, The Victorian post office, 193-95
112. See for example, The strangle-hold on our telephones: a practical remedy (London, 1930), issued by the Telephone Development Association, an organization whose object was to promote and to encourage use of the telephone in Great Britain
113. In 1920 the Government appointed a select committee to examine the charges made to the public for the telephone service. The select committee was asked to make recommendations for revising these charges so as to place the telephone service on a remunerative basis. A further select committee was appointed in 1921 to examine the organization and administration of the telephone service and to investigate methods of charging. This committee took evidence in 1921 but issued its report a year later. See, Select Committee on telephone charges, BPP, Vol. 8 (1920); Select Committee on the telephone service, BPP, Vol. 7 (1921); and Select Committee on the telephone service, BPP, Vol. 6 (1922)
114. Special Report and Report from the Select Committee on Telegraphs Bill; together with the proceedings of the committee, and minutes of evidence, BPP, Vol. 17 (1892) 14
115. Michael Holroyd, Bernard Shaw: the search for love, Vol. 1., 1856-1898 (London, 1988) 77-78
116. The Times, 10 April 1880
117. The Times, 18, 21 April 1900
118. The Times, 19 April 1900
119. The Times, 7 September 1883
120. The Times, 31 May 1898

Chapter 5: Educating the public: selling telephones

How was the telephone conceived and managed by those who sold it? This chapter considers how the telephone was sold and socially managed by the National Telephone Company (hereafter the NTC), a private enterprise and the telephone's principal promoter during the Victorian and Edwardian eras. The chapter's main source is the rich collection of papers left by this company.¹ As well as providing insights into the growth and management of a large business enterprise in the late nineteenth century, this collection of papers enables a reconstruction of the corporate ideology surrounding the telephone. My approach to ideology in this chapter treats it less as a superstructural system of beliefs or form of false consciousness, and more as an historically emergent form of rational discourse, an increasingly necessary means of persuasion in the bourgeois city. In applying the concept "ideology" to my interpretation of the telephone's conception and material and geographical development in the hands of a private company, my object is to show the importance of ideology for understanding the telephone and its social meanings.

The NTC conceived and constructed the telephone as a commodity. As such, the telephone was structured by the NTC's entrepreneurial ideology, and by the national managerial and technological system the NTC developed to sell it. Included in the NTC's papers are details of some of the arguments and strategies used to sell telephones, and reports and discussions of contract agents (in charge of canvassers). These documents help delimit the NTC's company ideology, show how stable and comprehensive this ideology was, and offer clues to the meaning of the telephone for potential subscribers. The company's internal discussions reveal something of the resistance canvassers encountered or expected during their efforts to sell telephones to the public. The chapter begins with a brief history of the National Telephone Company, its origins, size and organizational structure. This is followed by a brief assessment of the telephone's cost to subscribers. The bulk of the chapter is devoted to showing how the NTC sold telephones, and to how this was structured by the NTC's entrepreneurial ideology.

The National Telephone Company: origins, size and structure

The emergence of a company supplying telephone service throughout the United Kingdom, the National Telephone Company, resulted from the merger of a set of regional telephone companies. The first telephone companies to operate in Britain, one using Bell's, the other Edison's patents, merged in 1880 to form the United Telephone Company.² In 1880 an important court case resulted in the telephone being legally declared a telegraph.³ Henceforth the private telephone companies were forced to take licences from the Post Office. The initial licences were very restrictive, circumscribing areas for different districts, and limiting operations to an area of four or five miles from the centre of a town. The United Telephone Company in London for example was limited to operate within a radius of five miles from the General Post Office.⁴ To exploit other parts of the United Kingdom, the United Telephone Company established a set of subsidiary companies.⁵ It was intended that the subsidiary companies be formed by local people who were able to raise the necessary capital and develop the telephone business themselves. In possession of the master patents the United Telephone Company leased to the subsidiary companies the necessary equipment on payment of a royalty of £1 p.a. for each telephone or transmitter supplied. The subsidiary companies were to repay to the United Telephone Company the establishment costs of setting up the telephone in the various districts, and in addition an allotment of fully paid shares in the subsidiary companies so the parent company retained a controlling interest in the subsidiary companies. This had the effect of leaving much of the United Kingdom's telephone business in the hands of a single company, the United Telephone Company based in London.⁶

Several factors influenced the subsequent decision to amalgamate the United Telephone Company with its subsidiary companies. One reason was the increased business of the companies, particularly in trunk line traffic. It was necessary to give each company "running powers" over the lines of the other companies, with possibly a clearing house to deal with traffic. Another factor was the impending expiration of the master patents, in 1890 and 1891.⁷ The threat of competition forced the Company's directors to consider the advantages of consolidating the administration and management of the several companies and of adopting uniform methods of working. It was felt that amalgamation would strengthen the NTC's position against the Post Office, improve the company's

financial position and make it easier to raise investment capital. These measures in turn would provide greater facilities to the public and further popularise the telephone.⁸ Thus on 1st May 1889 the United Telephone Company, the Lancashire and Cheshire Telephonic Exchange Company and the National Telephone Company amalgamated under the new and greatly expanded National Telephone Company.⁹ The Northern District Telephone Company was absorbed in April 1890, the South of England Telephone Company in October 1890 and in January 1893 the Telephone Company of Ireland.¹⁰ Thus by the mid-1890s Britain's private telephone interests had created a single national commercial organization and a single functional unit for supplying the telephone service.

Who were the promoters of Britain's early private telephone companies? To an extent British telephone development mirrored the pattern in North America where many of the telephone's inventors and promoters descended from the American telegraph industry. Claude Fischer thus describes a cultural legacy where the telephone's American promoters, schooled first in telegraphy, retained essentially similar conceptions of the telephone as an improved telegraph.¹¹ In Britain there is some evidence of this.¹² At least two members of the United Telephone Company's first board of directors had considerable experience with telegraph matters.¹³ One was James Staats Forbes, later president of the National Telephone Company (1892-1901) and its leading spokesman.¹⁴ Forbes began his career working for the Great Western Railway in the office of Isambard Kingdom Brunel and later managed several railway companies, rescuing them from financial difficulty.¹⁵ Forbes would have picked up considerable knowledge of telegraph developments during this time. In fact shortly after being appointed as managing director of the London, Chatham and Dover Railway in 1871 Forbes investigated telegraph communication from end to end of the line.¹⁶ Certainly Forbes understood the value and principals of communication. Forbes' background in the railway industry also explains the use of railway language in the telephone industry, for example the use of such terms as "exchange stations", "junction wires", "trunk lines" and "traffic". Another director, Charles Edmund Webber, was also knowledgeable about telegraphy. Webber trained as a royal engineer and after service in India, where he was attached for a time to the public works department, he was made assistant instructor in military surveying at Woolwich, a post he held from 1860 to 1866. During the seven weeks' war he was attached to the Prussian army in the field to report on engineering operations and military telegraphs. Between

1869 and 1871 the company of royal engineers which he commanded was lent to the Post Office to assist in constructing and organizing the telegraph service. He also helped found the Society of Telegraph Engineers.¹⁷

The biographies of directors of the subsidiary telephone companies are harder to reconstruct. Most individuals were not influential enough subsequently to be listed in the *Dictionary of National Biography* or in national business biographies. Those I have identified were prominent in local commerce or politics or associated with the telephone's inventors and original promoters. Gardiner Greene Hubbard, the wealthy Boston promoter, patent lawyer and Alexander Graham Bell's father-in-law, was a director of the early National Telephone Company in 1882 and 1884.¹⁸ The M.P., E.D. Gray was chairman of the Telephone Company of Ireland in 1883.¹⁹ H. Fedden, son of a wealthy Bristol sugar merchant, was listed as a director of the Western Counties and South Wales Telephone Company in 1886.²⁰ These were not independent groups. The United Telephone Company had representatives on the boards of each of its subsidiary companies. J.B. Morgan represented the UTC as a director on all the subsidiary companies.²¹ There is a little more biographical information on directors of the amalgamated National Telephone Company for the company had a national prominence and directors were chosen as much for prestige as for their knowledge of business affairs. Frederick Richards Leyland, first president of the amalgamated NTC was a well known Liverpool ship-owner.²² Leyland died in 1892.²³ He was succeeded by James Staats Forbes and in 1901 by the liberal M.P. Sir Henry Fowler. Fowler was a solicitor and active in public life, in municipal affairs in Wolverhampton and later in Parliament and in the Cabinet. For part of Gladstone's fourth ministry (1892-4) he was president of the local government board.²⁴ His time as NTC president coincided with a period in opposition. When he returned to the liberal cabinet in December 1905 George Franklin succeeded him as NTC president. Franklin was a director of the Sheffield Telephone Exchange and Electric Light Company which the NTC absorbed in March 1892, and was an alderman and former Lord Mayor of Sheffield.²⁵

The change from Leyland and Forbes to Fowler and Franklin marked a subtle shift at the helm of the NTC, away from entrepreneurial leadership to leadership by professional politicians. This coincided with the gradual transfer of the NTC's property and personnel to the State. Other appointments confirm the shift in emphasis. Lord

Balfour of Burleigh and Sir Albert Kaye Rollit M.P. were appointed directors of the NTC in 1893 with the view of bringing into the company "some new members of a certain public position and experience".²⁶ Lord Balfour, an able administrator, was known for his shrewdness, business ability and sound knowledge of local government.²⁷ He later chaired the Royal Commission on Local and Imperial Taxation (1896-1901) whose essential issue was to define local and national services so as to determine what was properly a local or national charge, divided between ratepayer and taxpayer.²⁸ Rollit, a Tory Democrat, was a solicitor and steamship owner, at one time President of the Incorporated Law Society and President of the Association of Municipal Corporations from 1890 to 1906.²⁹ He was according to Waller a leading exponent of the view that municipalities should provide what individuals could not provide for themselves, as social investment capital to encourage private enterprise. This was municipal capitalism not municipal socialism, based on the view that to adopt what was good in socialism would prevent what was bad.³⁰ Rollit brought the NTC valuable legal and municipal experience and his opinions suited the NTC's prevailing ideology. The NTC acquired further political experience when in 1896 Sir James Fergusson M.P., a former Postmaster-General, was appointed a director of the company.³¹

By the mid-1890s the NTC was a national organization. Reporting to the President and Board were a General Superintendent, Secretary, Engineer-in-Chief and Solicitor. Each had a set of organizational responsibilities and a sizeable staff.³² The Engineer-in-chief, besides his assistant was responsible for 166 additional people: 49 working on exchange equipment, 2 on stores inspection, 5 on traffic matters, 16 on lines, 63 examining material, 12 in the office, 12 on buildings and drawings, 7 on investigation. The company was also regionally organised.³³ Ultimately responsible to the General Superintendent were a series of regional superintendents (or district managers). In 1909 there were separate district managers for Scotland, Ireland, London and for five other English regions (Northern, North-western, Midlands, Southern and Western).³⁴ London, the largest district, employed 4,195 people. In addition to an assistant superintendent and a staff of four reporting to the Metropolitan Superintendent were a complaint officer (with a staff of 15), a chief accountant (with a staff of 219), an electrician (639), an engineer (895), a traffic manager responsible for exchange managers, operators and call office attendants (2066), a stores and workshops manager (261) and a contract manager or agent

(96) with the number of employees responsible to each given in parentheses.³⁵ This gives some idea of the hierarchical position of contract agents, responsible first to district managers.

What did the telephone cost?

The NTC's emergence from several regional companies, the existence of periodic competition from smaller entrepreneurs and of competition from municipal systems and from the Post Office makes it difficult to generalise about the telephone's cost and the structure of British telephone rates in the period up to nationalization of the telephones in 1912. In reality a variety of telephone companies operated in different parts of the country with different kinds of service and with different rates. Even where national standards applied there were always exceptions, for example in places where municipal systems forced the private companies to lower rates to meet the competition. Widespread criticism of the National Telephone Company and Post Office telephone rates also obscures the degree to which the telephone was economically available to the public. To give some idea of the telephone's absolute cost and its cost relative to average earnings I will restrict my comments to some of the basic kinds of service offered by the NTC and available either nationally or in London.

The first private telephone companies to operate in London charged an inclusive annual rate of £20 and £12 respectively for exchange lines covering an unlimited number of calls within the area of a subscriber's exchange.³⁶ The £20 rate was maintained and the £12 rate abolished when these two companies merged in 1880 to form the United Telephone Company. Provincial rates were often lower.³⁷ On 1st May 1890 the National Telephone Company reduced its rates in Manchester, Liverpool and other towns in Lancashire and Cheshire from £20 to £15 and on 1st January 1891 a general reduction of rates outside the Metropolis was made from £15 and £12 p.a. to £10 p.a..³⁸ London rates remained high relative to the provinces. Under the 1901 Metropolitan Agreement the NTC and Post Office agreed to charge the same rate of £17 p.a. for the first connection and £14 p.a. for additional lines.³⁹ This rate remained in force at the end of the decade implying a reduction in real terms.⁴⁰ The introduction of measured rate services from about 1906 onwards also made it increasingly possible to subscribe to the telephone for less. Under the measured rate subscribers usually paid a lower fixed annual rental and then for a block

of calls in advance, the average price per call diminishing as their number increased.⁴¹ This was in contrast to the message rate where subscribers paid a fixed annual fee and then a constant fixed sum for each call used.⁴² In 1903 it was possible to become a message rate exchange subscriber for £5 p.a. in the County of London or for £4 p.a. outside the County of London. Subscribers guaranteed to pay at least 30 shillings p.a. in fees.⁴³ Still, these figures placed the telephone very much beyond the reach of the working class, considering that in 1908 only 31% of working class families had a weekly income of 40s or above, equivalent to an annual income of about £100.⁴⁴

The above rates were for exclusive telephone exchange service allowing subscribers for a flat fee to converse with other subscribers on the company's exchange system. The National Telephone Company also offered private wire services and shared service through party lines. The rates for these services were less than for exclusive service. In 1880 the United Telephone Company offered to rent private stations for £2 10s 0 p.a. within a radius of one mile of the exchange, with incremental increases further from the exchange.⁴⁵ Private wires provided private telephone service, connecting for example different branches of a firm or an office with a residence. They did not provide exchange facilities. Party lines did provide an exchange service but required subscribers to share the same line with some necessary inconvenience and loss of privacy. Party lines were not encouraged by the National Telephone Company but were recognised as a cheap means of attracting new subscribers. In 1900 subscribers could purchase party line service for £3 10s 0 p.a. with calls in addition charged at 1d per message.⁴⁶ Subscribers could also pay a subscription of 2d, 3d or 4d per person per day respectively for 8, 4 or 2 party line service.⁴⁷ In 1903 the NTC offered in the London area a 2 party line service for £3 p.a. and a 10 party line service outside the County of London for £2 p.a.⁴⁸

The ideal telephone

In what ways might the telephone be conceived of as ideal? The telephone was I think idealised in several ways. First, to potential subscribers, the telephone was presented to them as something that might usefully change their lives. Secondly, for the telephone's producers the telephone was both a symbol and a model of efficiency, of how an ideal business ought to be organised and managed for private profit. This ideology of efficiency impinged upon every aspect of the telephone's development by the National Telephone

Company. It affected the company's internal organization and the methods by which the telephone was sold. More important than the specific arguments used to manage and to sell the telephone was the consistent use of ideology for these purposes. By this I mean, the consistent use of different rational arguments, for different groups of people in different places to persuade potential customers to subscribe to the telephone. It was ideology's adaptability, the adaptability of rational arguments to suit different publics, each with their own unique characteristics, which made it such a potentially effective form of persuasion.

Ideology was not incidental to the telephone's development but was an organizing principle of it. Ideology enveloped the telephone system. It impinged upon the telephone's conception, initially as a business device, on the location of exchanges and call offices, on how exchanges were operated, and on how the telephone was sold. The telephone in the hands of the NTC was as much an ideological system as it was a socio-technical one. This chapter concentrates more on the use of ideology for selling the telephone and on the kind of arguments employed than it does on the company's internal management. This is because scholarly studies already exist of the internal organization of telephone companies and the management of telephone operatives.⁴⁹ While it is true that these studies refer to North America, and the ideology of operation was possibly different in Britain, because my interest lies primarily with the telephone's social reception in the public sphere this aspect of telephone development is largely omitted from this study. I will however make some comments about the company's internal organization if only to show that ideology mattered here too.

From the beginning the telephone in Britain was conceived of as a business device, of primary utility to the commercial classes. Such a conception affected the location of the first telephone exchanges, the classes of subscribers the telephone promoters sought to attract, and the kinds of arguments employed for the purpose. London's first exchanges were located in the heart of the City of London's financial district. Furthermore, although the telephone's potential for social use was understood early on the private companies initially directed their attention principally at the commercial classes. The United Telephone Company stated its intention to open exchanges anywhere in the country provided twenty subscribers could be found within a two mile radius of the exchange. The company sought "to attract the sympathies, interest, and co-operation of the public in each

locality where their appliances are used, and to enlist the assistance of local influence in the management".⁵⁰ Yet the subscribers' guide for 1880 shows commercial subscribers to be the company's principal consumer target at this time. After explaining the telephone's function and the kinds of telephone service available, the guide devotes most space to explaining the telephone's potential uses to "commercial men".⁵¹ Only after this does the guide consider other kinds of subscribers. For those "not much engaged in affairs" or for those confined to the house from physical or other causes "the telephone by economising time creates the opportunity for repose". For heads of families there was no need to dwell on the telephone's value for communicating with doctors, with tradesmen or with co-operative stores. Similarly it was needless to dwell on the "manifold services" which the telephone could render "to other classes of the community".⁵² The guide did not exclude domestic use of the telephone but even here the telephone was conceived essentially as a business device, as an aid for efficient household management, for example to connect the household with "cabstands, telegraph-offices, police-stations, fire-stations, shops, &c" (see Figure 5.1).⁵³

The list of potential uses for commerce reads more as a City of London trade directory. As each group is mentioned it is accompanied by a relevant argument detailing the telephone's advantages for that group. For merchants, solicitors, bankers and company managers the telephone makes much correspondence and many telegrams and messages needless. For insurance offices and banks the telephone's "capacity for immediate and secret communication increases the capacity for the transaction of affairs". For brokers in the metropolitan produce markets "business can be done with less friction and in less time". For shipping interests the telephone was an "indispensable necessity" with the Company now providing "prompt communication between the city and the bonded and other wharves on the riverside". Finally, for businesses dealing with perishable goods the Company offered to provide all-night telephone exchange facilities.⁵⁴ This was unusual at the time for the City's exchanges usually shut down after the day's commercial business was concluded. An all-night telephone service was only established throughout London's West End in 1889.⁵⁵

Further evidence of how the telephone was conceived and sold in its early stages of development is provided by an address made to the people of Inverness in September 1884 by A.R. Bennett, General Manager of the National Telephone Company, Ltd.⁵⁶ This

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**Figure 5.1 Explanatory diagram
of a telephone exchange, 1880**

Source: BT Archives, United Telephone Company
subscribers' guide, 1880, p9

document is interesting because it is an early company view of the telephone's utility and because it shows the kinds of strategies and arguments used to sell the idea of a telephone. Bennett spoke to a public gathering in the Town Hall assembled to consider the Company's proposal to establish in Inverness a telephone exchange. Bennett thought by this time his audience would understand what a telephone was but not a telephone exchange. This he described in some detail and then explained how other places nearby which first thought the telephone of no use had subsequently taken up telephone exchanges with alacrity. He likened the telephone to a snowball: "the more it is rolled the larger it becomes. It makes fields for itself -- the more it is employed the more it is wanted. A hundred new and unsuspected uses are found for it, the more familiar it becomes". With this he listed the uses to which a telephone exchange could be put. Bennett stated first the most prominent uses of a telephone exchange arose from fire, burglary and sudden illness, giving examples and testimonials of how in other Scottish cities telephone exchanges had already been used for this purpose. Then he addressed in turn for different groups in the town the telephone exchange's advantages. The use of ideology and sophisticated arguments is already apparent at this time. Each argument is littered with examples, many of them local ones, of the telephone exchange's advantages to the specific groups addressed.

For private houses an exchange had many uses, for calling cabs, or the police, fire brigade or a doctor in emergencies. A range of goods could be ordered without leaving one's home. If the weather was bad or the master of the house ill he could have his letters read to him from the office and conduct business from home. Showing the collaboration between old and new technologies Bennett explained how a subscriber could send a telegram to the other side of the world simply by picking up his telephone and dictating his message to a Post Office clerk. He gave the example too of two bed-ridden gentlemen having sermons read to them in bed. Businessmen should join because "promptness is the soul of business" and a man with a telephone would hear more of what was going on than a man without. Bennett stated that most arguments for private houses applied equally to offices. Cabs could be ordered and telegrams sent through the Post Office. Instructions for collection and delivery of goods could also be given to railways, shipping agents and carriage contractors. For banks Bennett showed how the telephone could prevent fraud. He gave the example of a man who tried to present a forged cheque for £150 in two

branches of a bank in Aberdeen but the circumstances were suspicious and the cheque refused. A third branch cashed the cheque. Had the telephone been used immediately a warning could have been sent, the fraud avoided and the suspect apprehended. Doctors ought to join the exchange because of all men they "ought to avail themselves of the means which science has placed at their disposal to act promptly for the benefit of their patients". Shopkeepers were encouraged to join because orders were more readily and promptly attended to by telephone than by messenger, mistakes could quickly be remedied, and had the consequence that custom tended to flow to shops within call at any moment. Newspapers could arrange their reporting through the telephone and have advertisements collected by local stores transmitted by telephone to their head office.

Bennett explained the recent lifting of Post Office restrictions on the private companies which allowed telephone exchanges to be connected to the Post Office, the establishment of trunk lines between different towns and the provision of call offices. He scheduled the rates likely to be charged and stated that to enable the Company to establish an Exchange in Inverness £300 in revenue would have to be guaranteed from the outset. He brought a conditional agreement with him for the establishment of an exchange and arranged with two local companies for the Company's instruments to be installed as demonstration equipment. In conclusion he addressed the town's professional men, merchants and manufacturers, and remarked it was their duty to lead the way in a thing of this kind. With Bennett finished speaking the town's Provost consented to head the list of subscribers. The Provost remarked that all were aware of the importance of time in business matters and the evidence of the telephone's utility in saving time was beyond question. The telephone was largely adopted in most of the chief towns and he regarded the telephone's introduction to Inverness would largely benefit the town. He urged the gentlemen present to countenance the scheme. He reminded them of the earlier difficulty of attracting sufficient support for the first telegraphs in Inverness but telegraph wires were now common. As with the telegraph he believed it would be with the telephone. The agreement was then signed by the Provost, the Town-clerk, law agent and other gentlemen to the extent of nearly a third of the required amount. A telephone exchange was subsequently established in Inverness.⁵⁷

Contract agents

The minuted meetings of contract agents held annually from 1903 onwards at the NTC's Head Office in London provide the most compelling evidence for ideology's role in selling the telephone to the public.⁵⁸ Contract departments, staffed by a field of canvassers and office clerks, and managed by contract agents were created by the company in 1903, intended to provide for the first time a formal system for selling the telephone to the public. Prior to this there was no coherent organization for attracting new subscribers. As one contract agent described it: "canvassers mostly working on commission were attached to districts, and had an unrestricted area for obtaining business in any way they liked, without regard for locality, cost of executing, or possibility of connecting the lines they took contracts for, with [the] result [the] company received a large number of orders which for various reasons they were unable to complete" and which led to "a deplorable waste of money".⁵⁹ The establishment of contract departments was a sign of the increasing popularity and market for telephones in the Edwardian years. Accompanying these meetings was a set of papers compiled by the company's staff on a range of telephone matters to be discussed by the company's officers. The contract meetings brought together the company's contract agents from each district to share ideas and experience of selling telephones. Their discussions indicate the extent to which a general company ideology influenced how the telephone was sold and show how this general ideology was implemented by the company's officials in different parts of the country. The discussions reveal also something of the resistance met with by canvassers from potential subscribers on the doorsteps. This is because contract agents, in charge of canvassers, were the closest of all the company's employees to the public.

Each district had its own contract department managed by a contract agent who reported directly to the district manager. Contract departments were low in the company's organizational hierarchy but were the chief "business-getting department". The company stipulated contract departments to have a threefold mission: to get new business, to retain existing business and to increase business from existing subscribers.⁶⁰ Contract departments also served an important function within the company organization. They provided Head Office with regular business reports from around the country and information on the number of new stations connected, the principal measure by which officials of the company assessed the company's progress. Each department employed a

chief contract clerk to oversee correspondence, reports and papers concerning the working of the department, and to collate and tabulate reports. Efficient record keeping was one of the contract department's important functions and served to keep the company's administration informed of what was happening on the ground. Each canvasser was expected to make and submit a daily work report, recording each interview on a separate slip. The Chief Contract Clerk was to collect these slips and tabulate the total number of interviews and successful interviews made by each canvasser. With orders for new contracts and disconnections passing through his hands the Chief Contract Clerk was also expected to produce a weekly summary report showing the total net loss or gain of stations.⁶¹ There was a tendency over time to integrate the records of different departments. This was intended to improve the overall efficiency of the business and in this context was most apparent in attempts to put information collected in the traffic and engineering departments to use in generating new business.

The company specified the ideal qualities it expected from its contract agents and canvassers. This was important because for there to be any hope of educating the public about the telephone service the company's employees had first to be tutored themselves in the company's philosophy. Contract agents were expected to be thoroughly familiar with the company's rates and contracts for telephone service, to be enthusiastic about the telephone service and convinced of its importance and potential value to subscribers. Contract agents were to instill this enthusiasm into their staff, to instruct canvassers as to the different rates and classes of service in force, and to provide them with arguments to use with the public.⁶² Similarly, canvassers were required to have good appearance and "address", good speech and manners, and enthusiasm and knowledge of the telephone service.⁶³ The company insisted that with these qualities a canvasser needed only "industry and method" to succeed.⁶⁴ Canvassers were encouraged to learn as much as possible about the telephone business. They were told the telephone business had a great future and they within it.⁶⁵ Canvassers were presented not only as agents of a great company but as public benefactors given the telephone's positive benefits to subscribers.⁶⁶

From information given to canvassers and to other of the company's staff it is possible to glean a company viewpoint on what it was that was being sold. The most comprehensive company statement on the subject was the *Commercial Handbook of the*

Telephone Service, a booklet intended as a guide for contract departments but issued to all the company's staff in 1906.⁶⁷ It is clear from this that the company viewed the telephone in systematic terms. Canvassers were told they were selling a telephone *service* not just introducing people to the telephone. The company explained that to supply this need they had established a complicated exchange apparatus and a vast system of wires to connect the telephones with exchanges and switchboards, and employed a large staff trained to maintain the telephones, wires and exchange apparatus in order and to operate the service.⁶⁸ The booklet provided staff with information on a range of telephone matters including the basic characteristics of the telephone service, aspects of its operation and the theory of telephone rates. Much space was devoted to a detailed explanation of how canvassers were to approach prospective subscribers and to listing arguments for how to persuade them.⁶⁹

The booklet shows that the NTC used a wide variety of methods for selling the telephone including in addition to canvassing various kinds of advertising. In Halifax, for example, about 1905, the NTC used a shop window display to describe the telephone and its systematic working, and to explain its function, purpose and advantages. In particular, signs explained how distant places were put in close reach by the telephone. Included in the display were a mass of telephone wires, telegraph poles, operators, telephones, operating equipment, and explanatory signs showing how it was possible to shop by telephone (see Figure 5.2). Advertising and canvassing were seen as complementary not alternatives. It was felt that advertising made the canvasser's work easier by stimulating general public interest in the telephone service. The power of advertising to arouse and provoke enquiries from the public was felt to be very great. For this reason the company employed continuous advertising. The company provided funds for regular newspaper advertisements but this was found to be expensive in proportion to the direct results produced.⁷⁰ It was also common practice to befriend newspaper editors and journalists to ensure the telephone received frequent and favourable comment in the press.⁷¹ Sometimes this was useful to ensure a story did not appear or was toned down to make the company appear in better light.⁷² The company encouraged other forms of advertising. The frequent use of well prepared circulars and booklets setting out the advantages of the telephone service for businessmen and householders was found to be the most effective form of advertising.⁷³ This was because they kept the subject of the

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Figure 5.2 NTC advertising: telephone shop window, Halifax c.1905
Source: Courtesy of BT Archives, 59685

telephone service fresh in the public mind.⁷⁴ Circulars, booklets and rate cards setting forth the prices of the different classes of service were distributed periodically, either sent direct to residences or left in prominent places such as railway station call offices or handed directly to early morning business commuters.⁷⁵ Local contract departments developed their own novel forms of advertising, especially in places where there was intense competition from either the Post Office or from municipal telephone systems. In Glasgow, where from 1901 the municipality operated a competing telephone service until 1906 when it was sold and run by the Post Office, a travelling trolley was used and paraded through the streets with a hoarding to advertise the NTC's services.⁷⁶ This was in 1905. When the company's total stations reached a number that would catch the public eye, such as 1,777 and 22,222, these figures written boldly on the hoarding generated considerable public interest. This form of advertising, utilising the public space of the city, was found to be very effective.⁷⁷

Despite advertising the NTC relied on direct canvassing to get its message across. Unlike advertisements and symbols which could speak for themselves, canvassers had to be taught to make a case for the telephone. As I have mentioned the company sought to educate and enthuse its employees about the telephone before they were sent out to educate the public. It was not that the telephone company simply wished its employees to be positive about its product but that for canvassers to be believable and persuasive enthusiasm and knowledge about the telephone were crucial. It is striking how much the company relied on sustained and direct argument both to persuade its staff and the general public of the telephone's utility. This general attempt in persuasion was principally made through an appeal to the public's knowledge and rational mind, as well as to their prejudices. Arguments appealed to the public's knowledge: to their experience of existing communications technologies, to their awareness of public issues such as the debate over nationalization and municipal services, and to views that associated privileged access to a new technology with notions of status or of being modern and up-to-date. In this later phase in the telephone's early diffusion little reference is made to authority figures, for example to royalty, politicians or churchleaders, or to religious morality. The NTC's arguments were also standardised across regions, indicating the significance of the growth and spread of national institutions such as railway and telephone companies for the dissemination of ideology across space. The arguments themselves, dominantly

entrepreneurial in tone, reveal a set of ideological assumptions about the telephone.

The Commercial Handbook of the Telephone Service described the telephone service as "a species of extremely rapid and direct house-to-house telegraph".⁷⁸ Thus the telephone was still in the Edwardian years being understood as a superior telegraph and in terms which made the novel invention seem acceptable. Canvassers were taught that the telephone service's basic characteristics were its superiority over the telegraph and its capacity for "direct" and "complete" communication. The telephone was superior to the telegraph because of its speed of communication, achieving in a minute or two what by telegraph took an hour and a half or two hours. The telephone afforded direct communication between one person and another because there was no question of the message being lost or delayed in transmission or of it not reaching the intended person. Telephone communication was complete because it involved sending a message and receiving an immediate reply or acknowledgement, all in a single operation.⁷⁹

As presented to canvassers the telephone's main qualities were its rapidity, directness and completeness. It was explained that for these reasons the telephone was popular with business people. The telephone increased the average businessman's efficiency enabling him to do more work in a given time, to obtain greater results from his business, to economise his efforts, and make his time generally more valuable. A sign of the telephone's diffusion pattern at this time was indicated by stating to canvassers the relative uptake of the telephone by various groups of the population. Canvassers were told that the intelligent portion of the business community were the telephone's strongest supporters but that there were classes of people, mainly the smaller businesses and trades, who had not yet recognised its value, and in private houses use of the telephone had hardly begun. Canvassers were urged to become enthusiastic about the telephone's value as a means of communication and about its superiority over other means of communication. If the canvasser was enthusiastic on these points he would be able to talk convincingly to any member of the public and to persuade even the most unenlightened people that the telephone service was a valuable facility which no one in any sort of business, or who led any sort of active life, could do without. Canvassers were informed that all business, as well as household and domestic affairs, depended upon communication. It would be easy to explain to any intelligent person that the telephone was the quickest and most comprehensive method of communication.⁸⁰

The company's efforts to make its canvassers knowledgeable about the telephone service are explained by the power the company thought canvassers had to persuade potential subscribers by talk. Canvassers were taught as much about the telephone service as experience had taught the company they would need to know when confronted by consumers. Thus we may usefully read the information and arguments given to canvassers as company responses to pre-existing public resistance to and curiosity about the telephone. There is much information here on the NTC's policy towards the telephone and its development.

Canvassers had explained to them the basic principles behind the telephone's operation.⁸¹ They were expected to be knowledgeable on this subject, to study it and to visit a telephone exchange where they would learn how a switchboard worked.⁸² They were expected to know the various kinds of service offered to small or large users such as private branch exchanges (a branch telephone exchange on a subscriber's premises) and party-line service (one line to which several stations were permanently connected).⁸³ Canvassers were also expected to know the basic principles of charging for the telephone service. They were taught about engaged calls and overused lines and the problems these caused the traffic department.⁸⁴ This was especially useful for persuading existing subscribers to take new lines and additional facilities. The over-used line was described as "the greatest nuisance in the telephone service" which caused annoyance to subscribers and wasted plant and operators' time.⁸⁵ Similarly, canvassers were told that engaged calls caused annoyance to existing subscribers and wasted operators' time in attempting to connect calls, and that the proper remedy for this was that subscribers frequently reported engaged should be persuaded to take more lines.⁸⁶ Canvassers were told of arrangements with the traffic department to provide them with information on lines frequently reported engaged, on the number of times each day the line was reported engaged and who the callers were. With this information it was the Contract Department's duty to canvass these subscribers to take additional telephone facilities. Canvassers were to argue with a subscriber with many engaged calls that he was losing business and that he owed it to customers to provide sufficient telephone facilities for them to reach him quickly and effectively.⁸⁷

The growth of telephone traffic was already sufficient for the NTC to encourage additional telephone lines. Advice to canvassers reveals the principle upon which this was

based. Canvassers were told that telephone facilities should fit the traffic. It was explained that a tendency of the telephone business was to make the telephone available at every point in an establishment where it was potentially desirable to use it. Similarly with the growth of the "telephone habit" the amount of traffic flowing in and out of most business establishments had greatly increased so there was often need for more than one line.⁸⁸ *The Commercial Handbook of the Telephone Service* explained that the secret of the telephone exchange business was "to consider the message or individual communication as the most important point, to give every message the utmost chance to become effective, to carry the message directly to the person for whom it is intended, and to pick up the message directly from the most convenient spot". It anticipated a time when soon a telephone would be found on every office desk, on every counter of a shop, and in every room of a private house, and when there would be sufficient lines between establishments and the exchange to carry effectively the flow of traffic. The "telephone man" had thus a large field to work on, to educate the public up to that conception of what were adequate telephone facilities.⁸⁹

The NTC provided canvassers with a range of arguments for educating the public. There was a general method for introducing and explaining the telephone service to prospective subscribers, specific arguments for business and for private house users, and arguments to counter commonly experienced objections to the telephone service.⁹⁰ Canvassers in addition were given information on municipal competition, on call office development, on long distance and Post Office services, and hints on methods of canvassing and deportment.⁹¹ The specific information and arguments are less impressive than their range, for canvassers were provided with as much information as necessary to meet with potential questions and objections. Yet the arguments themselves do provide considerable evidence for understanding the telephone's ideological significance.

Canvassers were instructed to awaken general subscribers to the importance of communication in their lives and to explain to them the telephone's superiority over other forms of communication: it was quicker, more thorough and cheaper.⁹² In addition they were asked to mention the value of the telephone's inward service. This emphasised the telephone's reciprocal nature, its capacity to receive as well as to send messages. It was explained that for several classes of subscriber where the telephone was chiefly used as a receiving station, such as for certain kinds of business and the majority of shopkeepers,

this would be the most effective argument. Canvassers were advised to point out to this class of subscriber that most of their prospective customers were already on the telephone. Being on the telephone themselves opened another door to their establishments.⁹³ To this class of subscriber canvassers were also instructed to mention the advertising value of the service and its potential value. The fact of being connected, with a permanent advert in the telephone directory, advertised the establishment was up-to-date. The telephone's potential value derived from connection to a vast system of communication with thousands of other subscribers, with the possibility of some unexpected or useful call.⁹⁴

The above arguments were also used directly with businesses. But other more specific arguments were also used. These emphasised the telephone's commercial utility and competitiveness. Tradesmen were told of the disadvantage of not being on the telephone when competitors were, and canvassers were to name competitors who were on the telephone. To small tradesmen canvassers were told to point out the telephone's efficiency, the monetary value of time saved by the telephone, that being without a telephone was to be behind the times and unenterprising and to injure oneself through lost business. It was explained that the largest businesses quickly adopted scientific improvements and found the telephone indispensable. Moreover the telephone helped small businesses become large ones.⁹⁵

Similar arguments were used for private house service. The company recognised that the telephone was not yet considered a necessary part of household equipment but this was because householders had not yet been educated on the subject. The arguments used were business arguments applied to the home which emphasised how the telephone improved household efficiency. The telephone saved time and friction in housekeeping affairs: shopping could be done quickly and effectively over the telephone, and things forgotten or wanted in a hurry could be got by telephone in less time than by other methods. The same business rationale was true for "social affairs": for calling up friends and relatives, for giving impromptu invitations, for making and changing arrangements quickly. Other arguments were the telephone's value to do shopping in all weathers, the telephone's "emergency" value, and that once connected private householders who experience the telephone never give it up. The last two arguments were always to be used with private householders. It was explained that the majority of doctors were on the telephone, that the most important shops, livery stables, theatres, railway stations and

clubs had telephone service, as did fire and police departments with the exception of London's Metropolitan Police, noted for being "the only great police force in the world not connected with the telephone service". Several arguments were also given to confront a businessman who objected to having a telephone in his home.⁹⁶

The Company in addition provided canvassers with a set of arguments to meet with common objections from prospective subscribers. The company documented the following objections: to the cost of the telephone, from the man who had "no use for the telephone", from the "person who does not want to be called up", from persons who "have always got along without it", from establishments that "have more business than they can properly handle", from the subscriber "who wants to lead a quiet life", that the service was "unsatisfactory and inefficient", and that because the telephone left no record it led to errors and misunderstandings.⁹⁷ Canvassers were provided with a set of points to confront each of these objections. Objections to the telephone's cost must have been common for the company reported that "the generality of non-telephone users think the rates for telephone service too high". To counter this criticism canvassers were told to explain that the complexity of the telephone system required extensive organization to maintain and operate it. Usually payment for telephone service was by annual flat fee paid in advance so canvassers were told also to explain that when averaged daily the telephone service cost no more than an average person's daily postage bill.⁹⁸

Other objections were met with by making the telephone seem familiar and less invasive. This was done by likening the telephone to the mail or the telegraph service, and by explaining that the telephone was relatively noiseless and could be answered by servants or not at all. To persons who wanted to lead a quiet life and did not want to be at everyone's beck and call, it was explained that it was impossible to defend oneself from the troubles of daily life and that in any event calls were rarely "unnecessary, frivolous or objectionable", reinforcing the telephone's conception as a business device.⁹⁹ The company also invoked the fear and reality of an increasingly competitive world: the telephone's advantages as an "economiser" and as a saver of time, effort and money were such that no business man could afford to neglect it in an age where "competition in all business was keen and daily becoming keener".¹⁰⁰ The obverse, to be without a telephone, was to appear old-fashioned and would lead to loss of business to competitors who did have it. This argument, exploiting the status value of the telephone service and

common feelings of one-upmanship, was generously employed. It was equally necessary to invent a use where no use was apparent. To the person who said he had no use for the telephone it was to be pointed out that if he looked into the subject seriously and honestly he could not say this. He was told that if he was in any form of business his livelihood depended on communication and therefore did have use for the telephone. Only a hermit, canvassers were told, had no use for the telephone, so a man who said this was speaking without thinking. Canvassers were instructed not to put this bluntly but to lead the subscriber gently to consider how much his business and convenience depended on receiving and sending messages, and to show him how in reality he had plenty of use for the telephone.¹⁰¹

Canvassers were prepared for any likely eventuality in their conversations with probable subscribers, and were provided with information to confront those who opposed private enterprise in telephones in favour of municipal ownership.¹⁰² These are useful comments because they show how the NTC distinguished itself from state-run telephone systems. Active competition was limited to five British towns where municipal systems operated (Glasgow, Hull, Brighton, Portsmouth and Swansea) and in London there was "friendly competition" from the Post Office.¹⁰³ Nevertheless canvassers in all parts of the country were expected to know the advantages of private enterprise over municipal systems. This was because if there was no likelihood of local competition from municipalities or from the Post Office there was often agitation and sympathy for it. Certainly this was the case in London where there was frequent agitation for municipal ownership and operation of the telephones but where this never materialised.

It was explained to canvassers that municipal competition was ineffective and unsuccessful: municipal systems were not laid out in accordance with modern telephone practice; plant and organization were inferior and inefficient with rates fixed without regard to the cost of furnishing service; and municipalities obstructed the NTC's progress and development of a modern telephone system by refusing the company the right to open the streets to lay underground cables in place of overhead wires. Municipal competition was also criticised for leading to a divided service without intercommunication and for wasting capital through the duplication of plant and organization.¹⁰⁴ Elsewhere the NTC argued that to avoid duplication of plant the telephone service was a natural monopoly but that a monopoly was not harmful to the public if it was "efficiently conducted". The

company explained that it ran its business as if there was active competition, with rates based on cost of service plus sufficient profit for reasonable interest on capital, for depreciation and other risks, with every effort made "to please the public and to introduce the service to an ever-widening circle of customers".¹⁰⁵

The company's hints to canvassers on methods of canvassing and deportment show the importance of argument for selling the telephone. Canvassers were told to canvass systematically and thoroughly, to leave no place untouched. Each district was to be worked methodically, each street and house number noted, and whether or not it had a telephone, and if it did from whom it was rented. When canvassers secured an interview they were to be "thorough, earnest, persistent and convincing". The aim was to get contracts but interviews were also important for they allowed knowledge of the telephone to be spread. Significantly, canvassers were asked to total the number of interviews obtained each week as well as the number of contracts. Interviews were important. They planted the idea of the telephone in people's heads and were a source of information about additional subscribers. Canvassers were to ask subscribers for names of friends or customers who they wanted to be on the telephone. Canvassers were also advised on how to sell the telephone successfully. They were told to be tactful, punctual and not to be over-persistent. Knowledge of rates and the theory behind them was important because canvassers had to be convincing. They should never guess or fence. They were to aim high, to try first for the better classes of service and to work down. They should try to sell party lines only when subscribers resolutely refused to pay for exclusive service. Canvassers were told never to give up, to consider no man hopeless until he was either bankrupt or dead. They were told to avoid mechanical methods and to vary the line of argument to suit an individual's circumstances. Other hints included not to make rash promises or uncertain statements, to keep on good terms with the future customer, not to do all the talking, to inspire confidence and interest, and to be punctual and sober. "Courage, patience and persistence" were company watchwords for the successful canvasser and canvassers were told never to give up for always some point or argument would reach the prospective subscriber.¹⁰⁶

The annual meetings of the NTC's contract agents provide information on how the telephone was actually sold. It is clear that contract agents and canvassers had a fair degree of independence from Head Office. Contract departments were new and

experimental. The meetings of contract agents were designed to share information and to decide on best practice. Local knowledge, experience and expertise were deliberately encouraged. It is also clear that ideology and argument mattered in the organization of contract departments and in the process of selling telephones. Efficiency and economy were the general aims. Mr. Webb, presiding officer at the third meeting of contract officers, stated the important questions were the selection of staff, organization of contract departments for general efficiency, record keeping and economical working. He observed that no more than 10% of the possible telephone business in the country was developed so the field for telephony was vast.¹⁰⁷

Webb wanted young male canvassers who did not consider themselves canvassers and to train them for the job. It was generally agreed that canvassers should not exceed 45 years of age, that the best age was between 25 and 35. If possible canvassers should have some experience. Men who had been salesmen in shops and were used to interviewing, and men who had experience in meeting the public were better than men who had none. In choosing men conversational powers, good elocution and general demeanour were useful guides to go by. Technical men were very desirable.¹⁰⁸ Opinion was divided about lady canvassers although it was felt that lady canvassers could obtain interviews under conditions where men failed. For example in residential and competitive areas Mr. McGrath (Edinburgh) thought lady canvassers were especially useful in calling upon ladies in private houses and in impressing upon them the efficacy of the telephone in private life.¹⁰⁹ For the training of canvassers Webb felt it was important to instil canvassers with enthusiasm, to make them believe the telephone service was the most important thing on earth. Testing by dialogue was found to be a valuable training method. This involved role-play. Someone would play an obstinate subscriber opposed to the telephone service and another canvasser would argue with him about why he should take the service. Mr Howell (Cardiff) listed the questions the public were likely to ask canvassers and instituted an imaginary interview between new canvassers and imaginary subscribers. He also made them sit a written examination. To exercise a "moral check" on trained canvassers, they were supervised, the most practical way being to take a canvasser's work for a day and to check it.¹¹⁰

The importance of keeping people aware of the telephone and of maintaining revenue affected the payment of canvassers. Initially canvassers were paid a commission

for each station sold. With the formation of contract departments all commission to canvassers stopped in favour of a fixed salary although discussions continued about payment by results and the best method of doing so.¹¹¹ In 1905 contract agents voted in favour of a bonus scheme instead of individual commission on revenue. They voted unanimously in favour of the bonus being on the value of the total business obtained. It was also agreed that a subscriber who had given notice to cease and was retained should count as revenue for bonus purposes.¹¹² The shift to a performance-related salary scheme instead of payment by commission was designed to make canvassers consider the growth of the telephone service and revenue as a whole, not just to sell the better classes of service to obtain a large commission.

A sign of contract departments' independence was the difference in their speed and style of organization. By 1905 some departments were well organised, some were not. Glasgow, a city where municipal competition was fierce, had the most comprehensively organised contract department. The department was split into four sub-departments under sub-chiefs dealing respectively with new business, corporation canvassers, call office development and cessations. The sub-department dealing with new business included male and female canvassers and a "flying squad". This was staffed by five men under a chief canvasser who were sent out to a district of the city and called door to door missing nothing. They also called at night-time on private houses and tenement houses. Mr Taylor (Glasgow) reported the "flying squad" to be a permanent and successful feature of his department. The call office department had originally four canvassers but with 970 call offices working in Glasgow this was reduced to one man. He attended to enquiries for call offices, kept his eye open for suitable locations, especially tea rooms, attended to signs and periodically collected the list of call office receipts to find out what was the matter with those that were not profitable.¹¹³

Good and efficient record keeping was considered a serious subject for discussion. Webb thought that this was very important. The unsuccessful interview card if properly used would constitute a valuable mailing list in future and was an asset for which commercial firms would pay a large sum of money. Mr Moorhouse (London) kept unsuccessful interview cards and arranged for canvassers to call again on these subscribers three or four months later. He also kept cards for cessations. Mr Webb thought uniformity of practice was important in a company of this size and contract meetings were an

opportunity for the more experienced to teach others how things were most economically and efficiently done. It was also general practice for notices to cease to be sent direct to contract departments so an attempt could be made to retain existing subscribers. A systematic canvass of subscribers was generally agreed to be more effective than general canvassing. By a systematic canvass of individual trades or professions many arguments could be brought to bear about their rivals and customers being on the telephone. Mr Webb also suggested that contract managers keep in touch as much as possible with "plant conditions". In other words, contract managers were expected to have some knowledge of the geographical distribution of wires, and of the availability of existing exchange equipment, in the areas in which they operated, so that they could then make the strongest sales efforts where there was the greatest amount of spare capacity.¹¹⁴

The 1900s saw great efforts by the NTC to persuade existing subscribers to take increased facilities. The issue was of considerable interest to contract agents. Mr. Webb thought the private branch exchange business was largely untouched in Britain and that hotels were a big potential market but proprietors had to be educated up to it (see Figure 5.3). He felt their mistake in the past had been to allow hotel proprietors to rent a flat rate line and let their guests use it free of charge. This he felt stemmed from the original practice of allowing free call office use which fostered the idea that subscribers belonged to a club and could use the telephone's plant wherever they found it. Mr. Moorhouse (London) found great difficulty in persuading hotel proprietors to see the advantages of the private branch exchange system. Hotel proprietors were much averse to making their clients pay for telephone facilities. In response, it was pointed out to them that charging for hotel telephone calls was universal in America and that it was a fair charge to make.¹¹⁵

In 1906 Mr Moorhouse read to contract agents a paper on the private branch exchange's advantages for ordinary subscribers and for hotel use.¹¹⁶ The arguments were familiar ones showing how much the company's ideology had filtered down the company hierarchy and was used by canvassers and contract agents to sell telephones. The arguments for private branch exchanges advertised their economy and efficiency value for businesses: private branch exchanges gave clients direct control over all departments which resulted in labour savings and the quick despatch of goods; business was transacted more quickly; clients could do business without waiting; a firm advertising a private

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Figure 5.3 A private branch exchange c.1910

Source: Courtesy of BT Archives, 2773

branch exchange showed it was up to date and that clients would be well served. Similar arguments were used for hotels: clients would be attracted to hotels with telephone facilities and by a telephone in every room; private branch exchanges led to reductions in hotel staff because one journey was necessary instead of two. Similarly, for large retail stores, private branch exchanges induced the public to shop at stores so equipped, allowed shopping to be done from home in bad weather and inside the shop from one counter telephone.¹¹⁷

Mr Moorhouse found that hotel proprietors were slow to see the advantages of a telephone in every room. He found it necessary on one occasion to point out that although there was no demand for an article, if the article was of serviceable value and put under the nose of the British public people would use it (see Figure 5.4).¹¹⁸ This argument was used often. Mr. Barber (Blackburn) found difficulty with commercial hotels in the provinces who were afraid of offending patrons, especially commercial travellers, who would object to the practice of hotels making an additional charge for the use of hotel telephones. Mr. Taylor (Glasgow) thought the best way of persuading subscribers to take private branch exchanges was to prepare a list of testimonials and that it was also important to get prominent institutions in a locality to adopt the system. He felt there was little likelihood of the smaller private hotels in Glasgow adopting the system until the large railway hotels had done so. Mr Webb thought it was entirely a question of education which would be achieved partly by arguments and illustration, partly by the demands of customers. The difficult issue of charging visitors for calls was he felt an instance of British conservatism, something they often had to struggle against, but that if they kept on struggling in time people would be converted.¹¹⁹

To ensure the efficient flow of information contract agents spent considerable time discussing co-operation between departments, especially between the traffic and contract departments. Mr. Moorhouse (London) provided an example of how such co-operation could help the contract department. The exchange manager routinely informed the department when subscribers lines were found busy, whether or not there was a spare adjacent jack to be worked auxiliary to the existing number and who called for the subscriber. With this information canvassers called on subscribers and employed the various arguments for persuading busy subscribers to take additional facilities. The department was also informed by the engineering department when a cable was about to

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Figure 5.4 Hotels on the telephone. One of a series of NTC publicity photographs taken c.1900 in Manchester and London to advertise the telephone's use in hotels
Source: Courtesy of BT Archives, ARC 59

be completed, the streets it would take, the distributing points and number of spare circuits, and the approximate date for completion. Then the neighbourhood was flooded for a fortnight with telephone literature and the "flying squad" followed this up with a door to door canvass.¹²⁰

The object was increasingly to balance growth of the telephone service and revenue with available plant and capacity. The principle of economy and efficiency went largely unchallenged although there were differences of opinion about how best to achieve it. In 1906, for example, Harvey Lowe advocated the formation of an "intelligence department" to plan the company's progress and to obtain best results at the lowest cost.¹²¹ Lowe criticised contract departments for poor co-ordination and for not adequately utilising the company's plant and resources. In London alone there were 43,000 miles of spare wire, 24% of calls were engaged, wasting plant and operators' time, and in the metropolitan area only 49% of new orders were completed within four weeks. Delays in completion, Lowe felt, were because most new orders originated from London's suburbs where the necessary plant was not yet available, itself a sign of insufficient systematic information. The object he said was for the company to earn maximum revenue on the capital employed. Mr. Wrote felt this was a fine ideal but hard to achieve because demand for the telephone was not always predictable. To confine canvassers to certain areas was to hamper the service. In practice co-ordination between departments was not always effective and other practical matters such as lack of wayleaves or spare capacity intervened to make difficult the efficient use of capital and spare capacity. The best way out of these problems, Wrote felt, was to increase demand for the telephone service, and to plan ahead by laying down sufficient plant for future needs.¹²²

Making space work: the case of call offices

The NTC's entrepreneurial ideology was most apparent in its policy towards call office development although this policy was really no different from that of other of the company's services. Call offices had existed since the 1880s but as with private branch exchanges, auxiliary lines and extension telephones the 1900s saw the NTC push call office development to the full. The NTC valued call offices for three reasons. They were a revenue earner, they educated the public to the telephone and advertised the telephone service.¹²³ The NTC viewed call offices as having educational value because they

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Figure 5.5 Telephone kiosks as symbols. (Above) Street scene showing one of London's first public telephone kiosks, Holborn c.1899. (Left) The same kiosk in close-up, showing NTC symbols. This particular kiosk was staffed by an attendant. As an additional source of revenue inner London telephone kiosks were used to advertise the Great Central Railway

Sources: (Above) Courtesy of BT Archives, ARC 154 (Left) Camden Local Studies Library, Holborn, LP284A

Image removed due to third party copyright

accustomed people to using the telephone who would then want a telephone of their own. Call offices were an advertisement because they kept the existence of the service and the company's name in the public eye (see Figure 5.5).

The location of call offices was obviously important. Local authorities often refused the NTC permission to place call offices on the streets. One method used to persuade them was to argue that call offices in the streets could be used in conjunction with the police signal system and would improve police efficiency.¹²⁴ Because of continual municipal resistance many call offices were initially set up in small private businesses. Revenue was the primary determinant of location. The resultant pattern would be adequately predicted by central place theory. Call offices were principally located in areas with high threshold populations; on or neighbouring the principal streets and thoroughfares of Britain's major cities. Canvassers were told to take great care and judgement in locating call offices and to keep an eye open for good locations.¹²⁵

The NTC recommended shops with good situations and of a class which a lady would not mind entering. Tobacconists' shops were recommended because of their large number of customers, although it was recognised ladies would not much use these.¹²⁶ London had no formal system for opening new call offices until 1905.¹²⁷ Prior to this canvassers or district managers advised the contract agent of suitable locations. The new system listed call offices in street order with their average annual takings. Anything over £12 was considered enough for the street to bear another call office and canvassers were despatched to canvass for another location. The list highlighted call offices which were not paying. These were investigated and closed if they continued not to pay. Railway stations were the most productive sites, with average takings of £52 16s 5d per box. Blocks of offices and hotel premises were also productive and for some reason dry goods stores were more remunerative than retailers of wet goods.¹²⁸ Mr. Taylor (Glasgow) felt the best sites were railway stations and tea-rooms, and found confectioners and tobacconists were also good. Mr Senior (Hull) found the best call office sites were a cafe, the railway station, fancy stationers' shops, hotels, and grocers' shops in populous suburban districts, especially those with a corner site.¹²⁹

The spacing of call offices and call office signs as company symbols was also considered important. The NTC did not have standard guidelines for this but general practice was for contract departments to treat the subject seriously. Mr. Taylor (Glasgow)

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Figure 5.6 Telephone call office sign as symbol.
NTC public telephone call office sign c.1900

Source: Courtesy of BT Archives, P4483

found call offices were extremely useful advertisements. Mr. Haines (Nottingham) agreed that call offices were a very valuable educator and advertisement because they were practically the only means available to non-subscribers to test the efficiency and usefulness of the service. In Nottingham he recommended that in the business part of the city call offices be located 300 yards or three minutes walk apart, on the outskirts of the city 450 yards apart and in the thinly populated areas 880 yards apart. Mr. Albany (Portsmouth) agreed that the fundamental principle was that the public should never be out of sight of a call office.¹³⁰ The same was true for call office signs and contract agents regularly considered the spacing, cleaning and uniformity of these. Mr. Moorhouse (London) felt it important that call offices were properly advertised by the usual standard pattern signs and that they were well placed to catch the public eye (see Figure 5.6).¹³¹ The Chairman of the 1906 meeting argued that call offices made subscribers and urged contract agents to make sure there was always a call office sign in sight: "a man who constantly has a need to send a message, should, by merely looking around, be able to see a telephone call office from which he can send his message. If a man sees the telephone handy he is going to use it, but if he has great difficulty in finding one it checks his desire to use it".¹³² Mr. Lowe felt suitable signs increased call office receipts.¹³³ Mr. Taylor (Glasgow) found NTC signs particularly effective if kept clean and had 1,000 signs in regular use. The sign consisted of a black lion rampant with "National Telephone Service Public Call Office" in black lettering on a bright yellow background. He felt it important to use a standard sign so the public knew what to look for.¹³⁴

Conclusions

By the mid-1890s the telephone service in Britain was largely managed and controlled by a single private enterprise. This company, the National Telephone Company, designed and constructed a national socio-technological system to manage and to sell the telephone. The company's entrepreneurial ideology promoted the efficient and economical use of its plant and capital, and sought to provide sufficient return for investors who had risked their capital. In the hands of the National Telephone Company the telephone became a commodity. The "effective call" was the essential unit by which the company determined policy and its marketing strategies. Effective calls made money, ineffective calls wasted plant and operators' time. By the Edwardian years growth of the telephone system and of

the "telephone habit" was such that the basic principle of the enterprising telephone was systematised. This was to make as many calls as possible effective calls, and to provide telephones wherever it was conceivable a message might be received or transmitted.

The first half of the chapter charts from the mid-1890s a subtle shift in NTC ideology, from entrepreneurialism to professionalism. This was marked by changes in senior NTC personnel, and by a company rhetoric that increasingly saw the NTC as providing a public service. The changes coincided with the announcement in 1892 of the Government's intention to purchase the NTC's trunk lines, the first step in the full nationalization of the telephone service. The NTC's decision after almost twenty years in existence to appoint professional politicians as directors can be interpreted in several ways. This is possibly a trend common to large organizations as they mature, that directors are more likely later on to become politicians or members of government. It was also perhaps a reflection that the route to government was increasingly through business and that successful businessmen were now also often MPs. Certainly the NTC, faced with political obstruction and public criticism, required statesmen skilled in the arts of public communication and political argument, and knowledgeable about the machinery of government. This was a sign of the increasing power of the press, and the need of large corporations to develop public relations machines, necessary to retain the public's confidence.

A shift to professionalism at senior levels of the NTC was not matched by a similar shift at the organization's lower levels. Methods of attracting subscribers, and arguments used to sell the telephone, remained dominantly entrepreneurial ones. This suggests a shifting and blurring of organizational ideology, with different elements in the organization expressing different, and sometimes alternating ideologies. It also suggests a delay both in the transformation of professional ideas from senior to junior organizational levels, and in the transformation of large private businesses into corporations acting ostensibly in the public interest. The chapter shows that throughout the NTC's existence the telephone was conceived of as a business device. This was a legacy from the past. The telephone's promoters considered it a "superior telegraph", of principal use to business or for the efficient management of the household. If the telephone was modern this was because of the consistent use of ideology to sell and to manage it. Through use of rational arguments the NTC sought to persuade a range of

commercial publics to subscribe to the telephone. Canvassers through interviews sought directly to persuade the public of the telephone's advantages for them and their businesses. Advertising was a more indirect method designed to generate talk about the telephone. The spacing of telephones and of telephone signs became a part of this entrepreneurial ideology. The assumption was that the public should never be far from a telephone or a symbol of it. If these were placed within their reach and sight, the public would talk about, and use the telephone.

I want to conclude this chapter by raising several general points concerning the significance of ideology in modern business and urban life. My argument is that the mundane detail of advertising and canvassing documented in the second half of this chapter involved more than the mere act of selling. The evidence shows that in the process of selling, the means were as important as the act itself. The use of company symbols and of rational arguments both to generate talk about the telephone and to appeal to the public's reason were part of an important and emergent historical process. This involved the extension of the "public sphere", socially through the development of a national and popular press, and through the creation of a mass educated "public", and spatially through the development of national communications systems and institutions that extended over time and space. Thus the emergence of the NTC coincided with a set of social and economic changes in the nineteenth and early twentieth century, which saw a general growth in the size of commercial organizations, a managerial revolution and the spread of scientific management and mass advertising in these and similar organizations. Like the telephone company, many of these organizations, such as the railway companies and chain stores, were now national in extent. My argument is not that the NTC's organizational structure or methods of selling were significantly different from these and other organizations. I do want to suggest however that we consider seriously the role of these organizations in the diffusion of ideology.

The NTC sought to use the "public sphere" in its own interest. The NTC's process of selling involved the conscious and sustained attempt to generate through processes of social communication public discussion and reflection about a new innovation. The object was primarily to sell telephones but the sales talk was also littered with references to political debates, such as the advantages of private enterprise over state and municipal management of utilities, and with a set of entrepreneurial arguments concerning the utility

of technology. These arguments stressed that business efficiency and competitiveness were to be attained through the possession of technology. This was because of technology's potential to speed-up communication and to save time and money, and because the possession of technology would be seen to bestow its entrepreneurial qualities on to those who used and owned it. The process of selling, in other words, aided the social and geographical diffusion of entrepreneurial ideology, and also the diffusion of deterministic arguments concerning the entrepreneurial qualities and efficiency of technology. That so much reliance was placed on the press and on the company's national organizational structure to generate public discussion and to sustain the NTC's entrepreneurial arguments, shows both the function of ideology to communicate the values of a self-interested group, and the role of institutions to transmit ideology over space.

Notes

1. BT Archives (hereafter BTA), Post 84, Telecommunications: telephones, Private companies 1879-1915
2. F.G.C. Baldwin, The history of the telephone in the United Kingdom (London, 1925) 40
3. The Attorney-General v the Edison Telephone Company (1880)
4. Baldwin, The history of the telephone, 51
5. Among the companies formed were the National Telephone Company Ltd (its initial territory comprised the county of York, 25 miles around Middlesborough, Glasgow, Edinburgh, Dundee, Aberdeen, Nottingham, 20 miles around Leicester, Belfast and the province of Ulster), the Lancashire and Cheshire Telephonic Exchange Company Ltd, the Northern District Telephone Company Ltd, the Telephone Company of Ireland Ltd, the Western Counties and South Wales Telephone Company Ltd and the South of England Telephone Company Ltd.
6. Neil Johannessen, (ed.), "Ring up Britain: the early years of the telephone in the United Kingdom" (London 1991) 158-59
7. Ibid., 162
8. The Times, 5 June 1889
9. Johannessen, "Ring up Britain", 162
10. Ibid., 179, 182
11. See Claude S. Fischer, "Touch someone": the telephone industry discovers sociability Technology and Culture 29, 1 (January 1988) 32-61; Claude S. Fischer, America calling: a social history of the telephone to 1940 (Berkeley, 1992) 75-85
12. For directors of the early telephone companies I consulted the Stock Exchange Yearbooks for the period 1882-1900, and the annual reports of telegraph and telephone companies for the period 1881-1900. Both sets of documents are held by the Guildhall Library in the City of London. See Thomas Skinner, The Stock Exchange Year-book for 1882 ..., (London, 1882-); Telegraph reports, 1881-1900. Additional information was found in BT Archives. See Post 84/114, Directors' reports and accounts
13. BTA, Post 84/3, United Telephone Company subscribers' guide 1880; United Telephone Company, Report of the directors for the year ending 30th April, 1881, ..., Telegraph reports 1881-1885
14. Further information on Forbes will be found in Chapters 3 and 4. For information on Forbes' early involvement with the telephone while general manager of the London, Chatham and Dover Railway see Chapter 3, page 62. For further information on Forbes'

involvement and role in the telephone industry see Chapter 4, pages 126-28

15. See also previous note. After originally working on the Great Western Railway Forbes became manager and director of the Dutch Rhenish Railway. In 1861 he became general manager of the London, Chatham and Dover Railway (hereafter the LCDR) at a salary of £1500 p.a. In 1870 he also became general manager of the Metropolitan District Railway and in 1871 became a director of the LCDR. He was appointed managing director and chairman of the LCDR in 1873 at a salary of £2500 p.a. In 1874 he stood for parliament unsuccessfully for Dover. Forbes retired in 1898 but was retained for ten years as adviser to the South Eastern and Chatham Railway Managing Committee. See, Dictionary of national biography (hereafter DNB) Supplement, January 1901-December 1911 (London, 1912) 37-39; David Jeremy (ed.), Dictionary of business biography: a biographical dictionary of business leaders active in Britain in the period 1860-1980 (London, 1985) Vol. 2., 392-94; Terence R. Gourvish, The performance of British railway management after 1860: the railways of Watkin and Forbes Business History 20, 2 (1978) 186-200; O.S. Nock, The South Eastern & Chatham Railway (London, 1961) 55-56, 67-68
16. Nock, The South Eastern, 104
17. DNB Supplement January 1901-December 1911, 625-27
18. The Stock Exchange Year-book for 1882 (London 1882); BTA, Post 84/114, The National Telephone Company, Ltd., Report of the directors ... for the year ending 30th June 1884; Robert V. Bruce, Bell: Alexander Graham Bell and the conquest of solitude (London, 1973) 83
19. Stock Exchange Year-book for 1883 (London, 1883)
20. Stock Exchange Year-book for 1886 (London, 1886); David J. Jeremy (ed.), Dictionary of business biography ..., Vol. 2., 332-34
21. The Lancashire and Cheshire Telephonic Exchange Company, Ltd., Report of the directors for the year 1881-2 ..., Telegraph reports 1881-1885; The Stock Exchange Year-books, op. cit.
22. The Times, 6, 8 January 1892
23. Ibid.
24. DNB Supplement January 1901-December 1911, (Oxford, 1920) 49-52
25. Johannessen, "Ring up Britain", 180
26. BTA, Post 84/114, The National Telephone Company, Ltd., Report of the directors ... for the year ending 30th April, 1893
27. DNB 1912-1921, (London, 1927) 71
28. P.J. Waller, Town, city and nation: England 1850-1914 (Oxford 1983) 254

29. Johannessen, "Ring up Britain", 183
30. Waller, Town, city and nation, 299-300
31. Johannessen, "Ring up Britain", 186
32. BTA, Post 84/34, Organization charts 1909-1912
33. Ibid.
34. Ibid.
35. Ibid.
36. BTA, Post 84/3, United Telephone Company subscribers' guide 1880; Johannessen, "Ring up Britain", 156
37. Johannessen, "Ring up Britain", 157
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46. BTA, Post 84/15, Introduction of party line service
47. Ibid.
48. BTA, Post 84/111/110, The National Telephone Company, Ltd., Metropolitan area exchange service telephone rates, October 1903
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54. Ibid., 7
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68. Ibid., 9-10
69. Ibid., 42-47, 54-72, 80-82, 83-87, 88-93
70. Ibid., 109-110

71. BTA, Post 84/126, Meeting of contract agents held at Telephone House, Victoria Embankment ... March 17th and 18th, 1906, 92-101
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103. Ibid., 73-74; C. Perry, The Victorian post office, 184
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112. BTA, Post 84/112, The National Telephone Company, Ltd., Meeting of contract agents ... July 7th, 1905, 12-15
113. Ibid., 15-18
114. Ibid., 18-21
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129. BTA, Post 84/126, The National Telephone Company, Ltd., Meeting of contract agents ... March 17th and 18th, 1906, 49

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131. BTA, Post 84/112, The National Telephone Company, Ltd., Meeting of contract agents ... July 7th, 1905, 26-27

132. BTA, Post 84/126, The National Telephone Company, Ltd., Meeting of contract agents ... March 17th and 18th, 1906, 68

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Chapter 6: Hampstead on the telephone c.1890-1921

This chapter explores the telephone's social reception and its social and geographic diffusion in the first two decades of the twentieth century in the context of Hampstead, a north-west London suburb (see Figure 6.1). The emphasis here is on how the telephone was taken up on the ground. Who demanded it? What kind of social commentary took place alongside the telephone's introduction to Hampstead? Who were the first subscribers? Where were they located? What were they using the telephone for? Finally, what kind of difference did the telephone seem to make as an agent of modernization? These experiences of the telephone's incorporation into everyday life provide a comparison with the socially constructed "ideal telephone", as portrayed by the telephone's promoters. It provides a contrast too with the abstract speculations of historians and sociologists concerning the telephone's supposed economic, social and cultural significance.

My research on Hampstead has two components. First, to access local social comment arising at the time of the telephone's introduction to Hampstead. For this I rely mainly on local newspapers and on vestry and borough council papers. Secondly, to reconstruct the socio-economic profile of early Hampstead telephone subscribers. In this case I systematically sampled Hampstead telephone subscribers from London telephone directories for the years 1902-03, 1912 and 1921, and cross-referenced these with London and suburban trade directories to find additional occupational information (for details of my methodology and sampling strategies see Appendix 1).

Hampstead's social and spatial structure

Much of what is now contemporary Hampstead, excluding the heart of the village proper, took shape in the hundred years from about 1820, when a wave of building swept out from central London and over the village of Hampstead. Many local landowners sold off or leased land for speculative building at this time, so that by 1914, Hampstead, apart from the Heath, was fully developed.¹ The dominant image of Hampstead's social character is probably one of a residential district for the well-to-do. Charles Booth's 1889 poverty map of London confirms this impression. Although covering only the southern part of the borough, Hampstead on this map is shaded entirely yellow or red, indicating the presence of wealthy residents, either the "upper-middle and upper-classes", the "well-

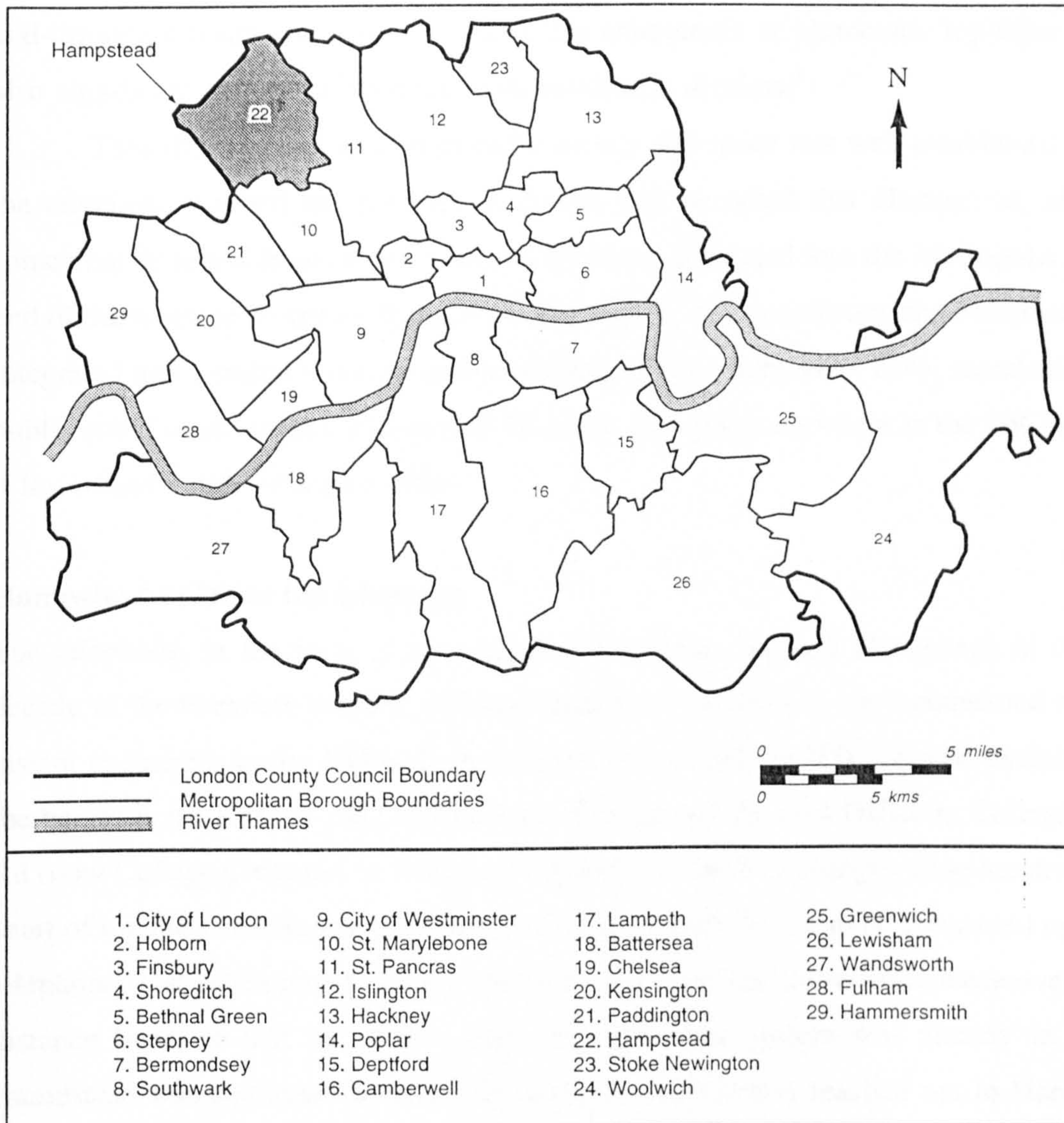


Figure 6.1 Orientation map of the Metropolitan Borough of Hampstead

to-do middle class" or the "fairly comfortable" on "good ordinary earnings".² However, as F.M.L Thompson, Hampstead's most notable local historian, points out, all London's boroughs are heterogeneous, and Hampstead was no exception. If Hampstead was through-and-through a bourgeois borough, with a thin aristocratic or plutocratic top layer, it had also significant pockets of working-class residential districts.³

Thus the structure of Hampstead's society and space was well established before the telephone reached the borough. It should also be noted that Hampstead, although somewhat detached from central London, was well integrated into the Metropolis. At the end of the nineteenth century Hampstead was well served by railways and omnibuses, and integrated into London's system of Post Offices, from where, after 1885, members of the public could send for 6d a telegram of 12 words, to a point anywhere in the UK provided it lay within a mile of a post office.⁴

Hampstead receives the telephone

The telephone, in the form of the telephone exchange, reached Hampstead in the first decade of the twentieth century, although individual subscribers were connected to more distant exchanges in the 1890s. Both the Post Office and the NTC opened exchanges in the borough, the NTC in 1901 in Goldhurst Terrace and the Post Office in College Villas Rd (now College Crescent) in 1904 (see Figure 6.2).⁵ Both exchanges were located in the heart of middle-class Hampstead. Hampstead was relatively late to be connected up to the telephone. The development of long-distance trunk lines had taken precedence over short-distance lines, so that by 1892 a basic national trunk system was already in place.⁶ Hampstead was connected up from the south so that London reached out to Hampstead and not vice versa. The difficulty of obtaining wayleave agreements was the most likely explanation for the decision to locate exchanges in the southern part of the borough. Certainly, as Chapter 4 shows, lack of adequate wayleave powers was a major reason given by the NTC for delays in extending the telephone system in other parts of London and in other British cities. It is difficult to gauge the extent of this problem in Hampstead. It is known, as will shortly be shown, that Hampstead's Vestry and Borough Council, by refusing the NTC wayleave facilities, frustrated the telephone's advance into Hampstead. The extent of similar opposition from private landowners is harder to judge although such opposition did exist. In 1905 a north Hampstead resident who complained to the Post

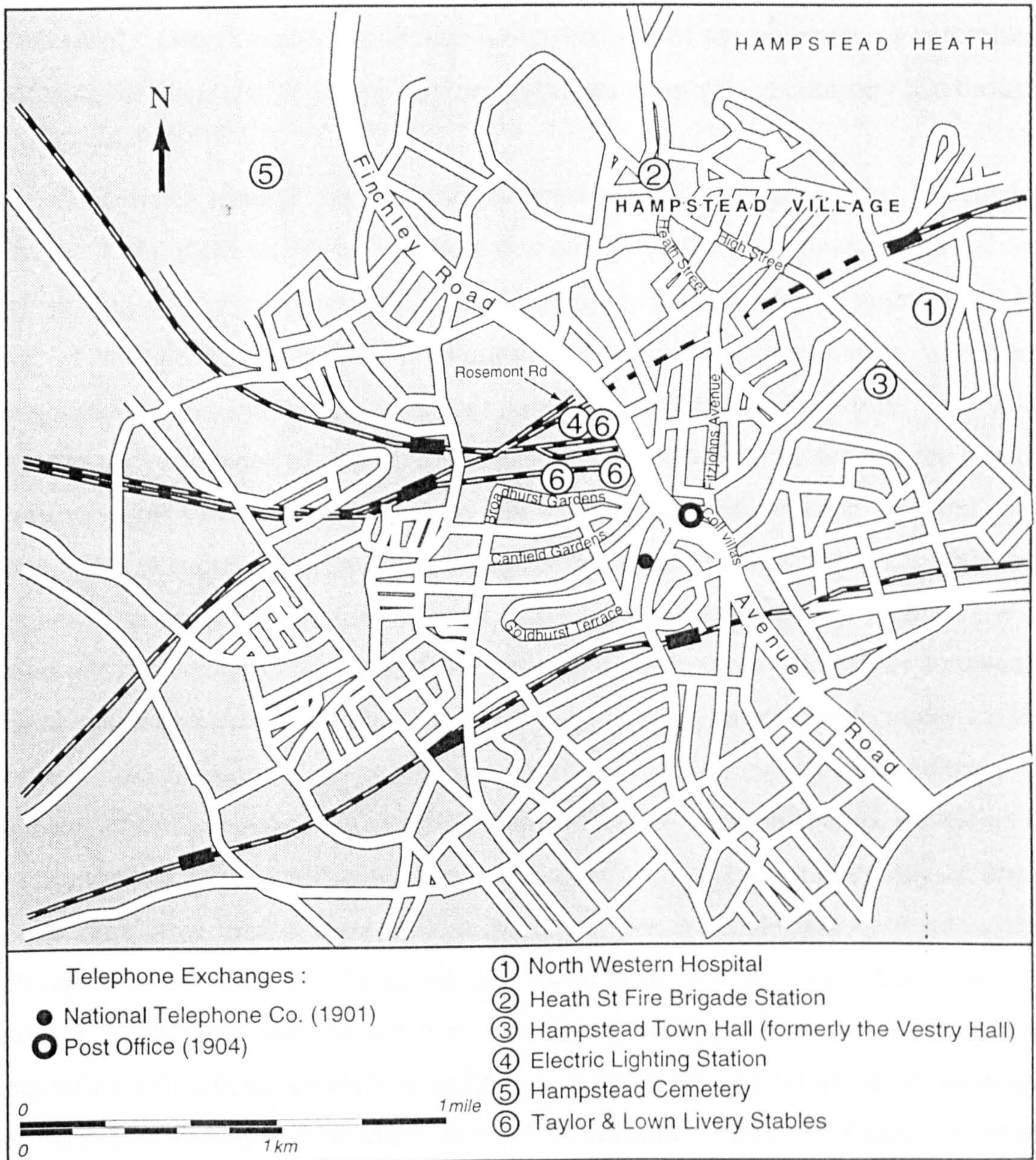


Figure 6.2 Base map of Hampstead showing principal streets and institutions

Office and the NTC of the delay in connection to the telephone service was told that the Ecclesiastical Commissioners, the freeholder in that part of the borough, were to blame for refusing the telephone company wayleave facilities although the company had brought its wires close by.⁷

Considering some of the comments of historians and sociologists that I alluded to in Chapter 1 about the telephone's significance and about the wide-ranging cultural and social anxiety that accompanied it, it is surprising how little social comment on the subject of the telephone one finds in Hampstead's local newspapers and in vestry and borough papers. In general, the telephone crept in to Hampstead silently. This is in contrast to the experience of other technologies of the period: the motor car, the bicycle and electric light and power. In terms of pure novelty value, these each received more column space in local newspapers and occupied more time of Hampstead's councillors. Hampstead's newspapers typically reported motor accidents, accidents or reckless use of bicycles and gave column inches to cover when local tradesmen or transport companies acquired new motor vehicles. When one local trader invested in an electric motor car the *Hampstead and Highgate Express* (hereafter the *Ham & High*) published an editorial on the subject of motor conveyance, describing the vehicle as "easily managed, travels up or down hill without hitch or difficulty, and does regularly about forty miles a day, or about fifty per cent more than a good average pony We welcome this very interesting development in the trade of Hampstead, and cordially wish it success".⁸ Likewise with electric street-lighting, the subject was widely reported, likely because Hampstead Borough Council had established its own Electric Supply Company at a time of municipal experimentation with operating urban utilities.⁹ To speculate, this lack of media attention to the telephone was because it was less public a technology; its development was incremental and largely invisible, with wires often buried beneath the public streets. An additional reason, perhaps, for the lack of comment on the telephone was that the telephone was more a domestic technology, although used primarily for business.

Only when the erection of poles was deemed "unsightly" and out of character with Hampstead's "historic" image, and when poles and wires encroached on private property or interfered with the public thoroughfares did the issue of telephones receive significant comment in local newspapers or in council proceedings. Residents complained when the telephone companies erected poles and wires without permission on their private land. In

April 1898 the Vestry received a solicitor's letter complaining of the erection by the NTC of "a most unsightly pole" at the rear of his client's garden but the Vestry had no power to intervene.¹⁰ Similarly an "Old Parishioner" enquired in a letter to the *Ham and High* if the telephone companies had the right to place wires across land or property without the owner's consent.¹¹ This was in consideration of

The large and increasing number of overhead telegraph and telephone wires [which] has for some time afforded ground for apprehension both as regards public safety as well as in respect of the unsightly character of the system . . . [and] Seeing . . . that the pleasant suburb of Hampstead (especially in its southern district) is largely encroached upon in this manner.¹²

Aesthetic concerns, mixed in on occasion with genuine concerns for public safety, also occupied the attention of Hampstead's Borough Council. In this case, the Council consistently refused the Post Office permission to erect telegraph or telephone poles and wires on public land. The Council insisted wherever possible that these wires be buried.

The telephone found its way into Hampstead despite the absence of public debate on the subject. This occurred *before* the opening of the exchanges. Some of Hampstead's principal administrative institutions were clearly using the telephone in the 1890s. At the turn of the century there were also about two hundred local businesses and private residents, mainly on the margins of Hampstead, who were connected up to neighbouring exchanges.¹³ The first reported instance of telephone use in Hampstead concerned a fire at the North-Western hospital when alarm was sent to the Metropolitan fire brigade station in Heath Street by private telephone.¹⁴ By the end of 1898, 38 of 87 calls received in the year at the Heath Street fire station were being made by telephone.¹⁵ The only other significant institution connected up to the telephone at this time was Hampstead's Borough Council. In 1894 the Vestry Clerk, on behalf of the Vestry, signed a one-year agreement with the NTC to connect the Vestry Hall with the exchange.¹⁶ In 1895 arrangements were made to connect the Vestry Hall with the Borough's Electric Lighting Station.¹⁷ Subsequently the various offices of the Vestry Hall were connected to the "Exchange" and also with each other for a rent of 1s per annum for each instrument. This was in consideration for the Council agreeing for the NTC to lay underground pipes to carry wires in certain parts of the borough.¹⁸ By 1901 Hampstead's cemetery was connected to the exchange, an additional exchange line connected to the Town Hall, and

provision was made for extension telephones to link up the Council offices with the departments of the Medical Officer of Health and the Borough Accountant.¹⁹ In 1903 the Council's proposed alterations to the Town Hall included a system of telephone intercommunication, justified because "this would save a vast amount of the time of the staff and prove a very great convenience and materially assist and facilitate the work of the Council".²⁰ In 1905, on the recommendation of the Finance and General Purposes Committees, the Council requested the Post Office to connect the Labour Bureau to the Hampstead telephone exchange.²¹ In December 1905 the Borough Engineer's private residence was placed in telephonic connection with the Depot so he could "give instructions in matters of urgency which may arise at any time".²² A similar connection was made to the Road Superintendent's house, so he could be communicated with when the office was closed.²³ The Public Health Department was connected directly to the exchange in August 1906 when the existing connection was found insufficient for joint use by the Borough's Accounts and Public Health Departments.²⁴ These comments and connections suggest that telephones first introduced into Hampstead by public institutions were largely for administrative and emergency use.

Before the exchanges opened demands for the telephone came from élite groups in the community. The Hampstead Tradesmen's Association, recently formed to foster good relations between Hampstead's traders and to boost Hampstead trade, in 1899 strongly insisted on "the necessity of telephonic connection between Hampstead and London".²⁵ A year earlier a memorial signed by 854 parish ratepayers urged the Council to give facilities to the NTC to place their wires underground, "in order that delay in making connections might be obviated, wayleaves unnecessary, and the service consequently improved, and the neighbourhood not disfigured by the erection of poles and unsightly cables".²⁶ In addition, select private residents complained of the delay in obtaining service. One local resident, a physician, in 1899 compared the ease with which his consulting rooms in central London had been connected up to the telephone with the delays and confusion experienced in Hampstead: "Why is Hampstead so difficult to deal with?", he asked. "It is useless to fight against the inevitable. The day will come when we shall all be on the telephone".²⁷

Resistance to the telephone per se, rather than to its dominant uses and conceptions, came from the Borough Council, and it was resistance of a formally political

kind. The Council consistently refused the NTC, and on occasion the Post Office, permission to lay or erect wires and poles on publicly owned and controlled land. As such the Council exercised its legal right to control the activities of private companies on public space and tested these rights against the Post Office, which technically had exclusive rights of wayleave on public property, only having to ask permission of a local authority to erect or bury wires as a matter of courtesy. The Council's action, to refuse rights of wayleave to the private companies, and to generally delay the advance of telephone service out from central London was part of a London-wide debate. This turned on several issues: whether the telephone service was best left in private or public hands; how London's local authorities could extract from the private companies efficient service at a moderate cost; and who best should be left to control and co-ordinate access by private companies to public space, at a time when control of London was divided up between twenty-eight Metropolitan Borough Councils, the London County Council and the Corporation of London (see Chapter 4).

Hampstead's Borough Council was influenced by and contributed to this London-wide debate. The Council's decisions ought therefore not to be considered in isolation. The Borough's Councillors and administrators were habitually informed by other local authorities of their decisions on telephone policy and their negotiations with the Post Office and with the private telephone companies on telephone matters. Occasionally, the Borough Council directly enquired of other authorities how they had handled a particular issue. In addition, the Borough Council, often at the behest of other authorities, petitioned politicians and political bodies on matters relating to government telephone policy. The Council sent delegates to metropolitan conferences on the state of the London telephone service and passed resolutions stating the telephone service was best left in public hands. It informed other local authorities of its opinions and resolutions. On these grounds the Borough Council consistently refused the NTC permission to lay underground wires beneath Hampstead's streets.

Negotiations between the NTC and the Vestry for the former to lay wires in Hampstead began in 1894. The Vestry initiated these because it wanted to be connected to the company's exchange system.²⁸ Then in November 1896 the NTC wrote to the Vestry asking to lay underground pipes in parts of the borough.²⁹ The Vestry at first seemed willing to grant such permission on condition the company specified the location

of and the manner of laying pipes, that it agreed to remove them at six months' notice, and that in consideration it connected the various offices of the Vestry with the Exchange.³⁰ Yet in 1897 a letter sent by the NTC to the Vestry complaining of its refusal to grant the company facilities to place underground wires in the borough makes clear the Vestry's continued refusal to grant permission. The letter stated that the Vestry's refusal to grant facilities to place wires underground had "created a position of extreme difficulty" because their Kilburn exchange (opened c.1888) would close at the year's end, and unless the Vestry consented to their line of pipes being continued from Paddington parish up to the Kilburn exchange two or three hundred Hampstead subscribers would be deprived of service.³¹ At this time, the Council received a circular from St. James Vestry, Westminster, stating they had had considerable trouble with the NTC during the past year and had passed a resolution concurring in the action taken by the Commissioners of Sewers in the City of London.³² The Commission of Sewers was using its powers as the roads authority for the City of London to refuse private telephone companies permission to interfere with the public footpaths and carriageways of the City, and thus to try and obtain concessions from the private telephone companies as to cost and effectiveness of the telephone service.³³ In February the Council received a circular from the City of London Corporation stating they had applied to the Treasury for "an enquiry into the cost and efficiency of the Telephone service in London, and all matters relating thereto". They urged the Vestry make a similar request to show the Government the enquiry was desired generally throughout the Metropolis.³⁴

In light of these and other communications from London's local authorities the Vestry continued to refuse the NTC facilities. Even a memorial from 854 ratepayers and a deputation to the Vestry of ratepayers, with Mr Clay, the NTC's Metropolitan Superintendent, alongside them, and further letters from Mr. Clay, all urging the Vestry grant consent for underground wires failed to force the Vestry's hand.³⁵ The Vestry was influenced too by the report of the House of Commons Select Committee which stated that the telephone service would be of no general benefit to the country as long as it remained in the control of a practical private monopoly. Accordingly, the Vestry passed a resolution stating it was "strongly of [the] opinion that general, immediate, and effective competition by either the Post Office or the local authority is necessary, and consider that a really efficient Post Office service affords the best means for securing such

competition".³⁶ In addition the Vestry objected to the NTC's attempts to pass bills in the House of Commons increasing its powers over access to the public streets, believing this would "seriously threaten public and private interests".³⁷ Subsequently, the Vestry passed a further resolution stating the opinion that *after* the Post Office had established a telephone service in the metropolis they should undertake and carry on a national telephone service.³⁸ In light of these resolutions the Vestry remained resolute in refusing the NTC permission to lay wires in the borough. This served to delay and obstruct the development of the telephone service in Hampstead. When in October 1899 the NTC submitted a plan to the Vestry for underground wires the Metropolitan Superintendent claimed there were over a hundred intending subscribers in the district who otherwise they would be unable to connect up by means of overhead wires.³⁹ The Vestry refused the application.⁴⁰ This dispute, a local instance of a more general problem, was resolved locally in 1904 when the Post Office opened its Hampstead exchange. The 1901 Metropolitan Agreement between the NTC and the Post Office resolved the dispute at the London-wide level. This integrated the two systems as a prelude to nationalization and carved up the metropolis between the two organizations. Until this time the NTC resorted to petitioning the Vestry, and the new Borough Council after 1900, and to pleading with as many individual local landowners as necessary for wayleave rights so as to provide service for Hampstead subscribers. If anything, the coming of the telephone to Hampstead thus exposed a very old and at times archaic system of London's land ownership.

Despite the Vestry's overt political resistance it is remarkable how little public disquiet and resistance accompanied the telephone's introduction to Hampstead. Was this because principally the telephone entered the private sphere of the office or the home? Certainly the telephone's embeddedness into existing social, geographical and institutional structures must have made it seem less of a social threat. Any serious technological resistance, if it occurred, would have been restricted to individual responses, and for Hampstead in this period these largely elude the researcher. I would suggest too that this embeddedness makes it inappropriate for us to refer to the telephone in abstract terms. Two examples will suffice before considering in greater detail the telephone's social and geographical diffusion in Hampstead.

For specific Hampstead institutions it is possible to trace the telephone's introduction using local advertisements. Taylor and Lown, a local livery stables is a good

Figure 6.3
Advertisement for
Taylor & Lown's
livery stables, 1911

Source:
Hampstead: an
official guide
(London: Hampstead
Tradesmen's
Association,
1911, p112-12)

Image removed due to third party copyright

example. Opened in 1888 the company provided horses and carriages for hire. By 1910 it supplied motor vehicles in addition to undertaking maintenance and repair work and offering driving lessons. In 1901 the company first included on its advertisements a telegraphic address and a telephone number.⁴¹ In 1901 when they moved from premises in Canfield Place they announced their branch business in Broadhurst Gardens was in telephonic communication with their Rosemont Road offices.⁴² As well as the company's own telephone number, included in the corner of the company's 1901 advertisement was the announcement: "Private Telephone at Mr. RADISIC'S Court Hair Dresser's, 4 Canfield Gardens, for the convenience of our customers and the public in the surrounding neighbourhood".⁴³ This was presumably as much to advertise Mr. Radisic's hairdressing services as it was to retain Taylor and Lown's existing customers. In later years the company included in its advertisements a list of about ten establishments, all of whom were in telephonic communication, and would receive for Taylor and Lown orders for services (see Figure 6.3). This practice of listing premises from where customers could telephone their orders ceased in 1917-18.⁴⁴ By this date the telephone was less of a novelty with more local households directly connected to the exchange.

A second example was the telephone's application to local fire-fighting services. We have seen that one of the first reported instances of telephone use in Hampstead was to sound alarm of a local fire.⁴⁵ Hampstead's fire service at this time was controlled by the London County Council. Fragmentary evidence suggests that by the turn of the century the telephone was applied to the management of London's fire-fighting resources. On 9 December 1899 the *Ham and High* reported use of the telephone to contact Southwark headquarters and send reinforcements to a local fire.⁴⁶ The following July a microphone apparatus was fitted to street fire alarm boxes in the Hampstead district.⁴⁷ By this means a member of the brigade, by attaching a receiver, always carried on the fire engine, to the apparatus in the alarm box nearest to where there was a fire, could place himself in telephonic communication with the Heath Street fire station. When required additional help could be telephoned for, from or near the scene of fire, by the men dealing with it.⁴⁸ The place of this apparatus within the structure of the London fire service and the extent of centralization achieved at this time is explained by a description in the *Ham and High* in March 1910 of how Hampstead was protected from fire:

The London Fire Brigade maintains a complete system of private telephonic communication between all the stations. The Headquarters Depot, which is the residence of the chief officer, is in Southwark-bridge-road, where information is immediately received and recorded of every outbreak of fire, large or small, in the metropolis. From headquarters telephone lines run direct to the divisional officer's station in Euston-road and also to the superintendents' stations. The superintendent's station for Hampstead is situated in Manchester-square, whence private telephones communicate direct with the stations in Heath-street, West-end-lane, Adelaide-road, and fourteen other stations composing the A or West End district of the brigade. Then, in connection with each separate station is a system of public fire alarms, each alarm being located in a conspicuous position in the more important thoroughfares . . . The Heath-street Station has twelve of these alarms, which register calls in the watchroom . . . Each of these alarms is connected by telephone, for the use of the firemen only, with the station.⁴⁹

Who had the telephone? When, where and why, c.1901-21?

The remaining section of this chapter explores the telephone's social and geographic diffusion in Hampstead between 1901 and 1921. What was the absolute increase and number of telephone subscribers in each decade? What was the relative uptake of telephones as a proportion of Hampstead's population? Where were most of these telephones located, in residences or places of employment? Were telephones used predominantly for business or social purposes? Who were the pioneering subscribers? What follows is an attempt to answer and to expand on these questions. For example I investigate which occupational groups and industrial sectors were more likely to be pioneering subscribers. I examine trends in the gender and social class of residential telephone subscribers. Information on subscribers' location enables average distance from a telephone exchange in each decade to be calculated, providing a measure of geographic access to the telephone. A focus on subscribers' location also allows me to comment on the technical limitations of early telephone development (for example the need for subscribers to be close to a telephone exchange), and on the relative accessibility of telephonic communication for different social classes and in comparison to other forms of communication.

This investigation is in part a response to Claude Fischer's cautionary remarks for scholars to avoid determinism and to concern themselves with how the telephone was

used.⁵⁰ Tracing the telephone's social and geographic diffusion in Britain in the early twentieth century is difficult. The period is too early for new oral history and although an extensive list of telephone directories exists for the period the amount of useful information to be gleaned from these sources is limited (see Appendix 1). Unlike North American directories, British telephone directories do not indicate if subscribers are residential or business subscribers. This has to be inferred. Similarly the last currently available manuscript census is that for 1891. It is therefore not possible to obtain residential subscribers' household characteristics. Similarly for occupational information local street and trade directories remain the most reliable source. These provide information on only 30 or 40% of subscribers. Nevertheless these sources allow for a partial reconstruction of the telephone's early diffusion in Hampstead.

The number of Hampstead telephone subscribers rose in the two decades from 192 in 1902-03 to 4,890 in 1912, to 7,971 in 1921.⁵¹ This represents 0.23% of the borough's population in 1902-03, 5.72% in 1912 and 9.25% in 1921.⁵² This means that by 1921 about 1 in every 11 Hampstead residents subscribed to a telephone either in their home or place of employment. Hampstead's average household was four persons in 1921 implying that approximately 37% of Hampstead's population in that year had access to a telephone at home or at their place of work.⁵³

Because British telephone directories do not classify subscribers as either residential or business subscribers, it was necessary to devise surrogate measures for these.⁵⁴ The location of a subscriber's telephone offers an important clue. This was inferred by cross-referencing telephone directory information with additional information in local trade and street directories.⁵⁵ It was thus possible to ascertain if the principal location for a subscriber's telephone was a private residence or a place of employment (for further details see Appendix 1).⁵⁶ Table 6.1 details the results of this information on the location of subscribers' telephones. For all three years, 1902-03, 1912 and 1921, between 72.4 and 78.3% of telephone subscribers had their telephones located in a place of residence; the remaining 21.7-27.6% were located in a place of employment. This suggests that the residential telephone had already become commonplace in Hampstead in the first two decades of the twentieth century. This corresponds with the patterns and chronology in North America. Pike's study of telephone diffusion in Kingston, Ontario, shows that although most phones were initially located in places of employment, between

Table 6.1 Telephone location: residence or place of employment, 1902-1921

Location	1902-03 (%)	1912 (%) (10% Sample)	1921 (%) (6.25% Sample)
Residence	139 (72.4)	382 (78.3)	368 (73.9)
Place of Employment	53 (27.6)	103 (21.1)	125 (25.1)
Unknown	nil	2 (0.6)	5 (1.0)
Totals	192 (100.0)	487 (100.0)	498 (100.0)

1901 and 1911 the pattern was reversed when the residential phone came to dominate the market.⁵⁷ The experience was similar in the United States. Between 1880 and 1893 more than two-thirds of American telephones were located in businesses.⁵⁸ Fischer suggests that in America the telephone's transformation from a business tool into a common household utility took place sometime between 1894 and World War I.⁵⁹

Table 6.2 provides detailed evidence on patterns of telephone ownership. This offers a means of assessing telephone use. Because the location of a telephone says little of what the telephone was used for, information on telephone ownership is a more reliable measure of telephone use than the information on location in Table 6.1. Table 6.2 shows for 1902, 1912 and 1921 how many of the total number of subscribers' telephones (1912 and 1921 are samples) were used exclusively as residential or business telephones. It shows in addition the number of subscribers with both a residence and a business telephone, and the number of residential subscribers with an obvious business connection. The evidence suggests that although telephones were located in residences their location was primarily to maintain contact with nearby business establishments, often in central London, or to allow subscribers to conduct business from their home. At least 51.2% of all Hampstead subscribers sampled had listed in the same telephone directory under the same family name a business with which they had some obvious connection. Sometimes a business connection is clear. For example the electrical engineer Sebastian Z de Ferranti

Table 6.2 Telephone usage: numbers and patterns of telephone ownership

	1902-03	1912 (10% Sample)	1921 (6.25% Sample)
Total subscribers with:	192	487	498
Residence phone only	28	94	103
Dual residence/ business phone ¹	20	46	17
Residence + business phone ²	93	262	256
Business phone only ³	51	85	122

¹ Phone in residence used explicitly, in whole or part, for business purposes

² Residential phone subscribers with one or more business phones under their name or family name in other location

³ Business subscribers with no evident residential connection

was listed twice in the July 1902 telephone directory, having telephones at his Hampstead residence and at his Holborn company of electricians and engineers. In other cases it is uncertain if a Hampstead residential subscriber is connected to a business with the same family name listed in the same telephone directory. This problem multiplies as the growth of London's telephone subscribers increases the average number of subscribers listed for each name. In these cases I only assumed a business connection when a residential subscriber's family name, initials and occupation closely matched a business listed in the same telephone directory. Nevertheless even with this rigid criteria the proportion of subscribers having no obvious business connection remained low, although rising over the period from approximately 14 to 20% (see Table 6.2).

Similar trends appear when pioneering subscribers are classified by economic function and occupational group (see Tables 6.3 and 6.4). The tables confirm that it was dominantly Hampstead's middle class, its traders and professionals, which figured

prominently in the first group of telephone subscribers. It was possible to obtain occupational information for 115 of the 192 pioneering telephone subscribers (1902-03).⁶⁰ Existing economic classifications did not exactly suit Hampstead's early twentieth-century socio-economic structure so a revised economic classification was constructed.⁶¹ The resulting classification is shown in Table 6.3 (see Appendix 2 for a more precise breakdown of each category). The table shows that a large majority of subscribers were in sectors providing commercial, financial and insurance services, or in services of a professional and technical kind (see Table 6.3).

**Table 6.3 Pioneering subscribers (1902-03)
by institutional/functional area**

(1) Manufacturing of all kinds	9
(2) Building and contracting services	6
(3) Public admin and defence related services	3
(4) Commercial, financial and insurance services	53
(5) Professional, technical and personal services	38
(6) Other	6
Total	115

Table 6.4. shows the relative up-take of the telephone by Hampstead's businesses and professions. The table is designed to show which occupational groups and industrial sectors were highly represented in the pioneering group of subscribers. All of Hampstead's listed merchants and manufacturers subscribed to the telephone. Hampstead's retail trades were also well represented. Nearly all the listed bakers, butchers, florists, jewellers and tailors had telephones. Chemists, estate agents, fishmongers, ironmongers were less likely to have telephones. Of the professions, dentists, engineers and solicitors were less likely to have telephones than physicians and doctors who subscribed in large numbers. Builders and associated occupations, considering their number, were relatively under-represented in this pioneering group of telephone subscribers.

Table 6.4 Diffusion of telephones among selected occupational and industrial categories, 1902-03

	No. in local directory	No. with telephones
Accountants	-	2
Bakers	1	2
Builders, Contractors, and decorators	20	4
Butchers	4	5
Chemists	3	1
Confectioners	1	1
Dental surgeons	5	1
Engineers	8	3
Estate agents, auctioneers, and surveyors	14	5
Fishmongers	4	2
Florists	2	2
Fruiterers	2	1
Hairdressers	1	2
Insurance companies	1	1
Ironmongers	8	3
Jewellers	1	1
Manufacturers	7	7
Merchants		
Retail	6	7
Wholesale	10	10
Other	-	7
Total	16	24
Physicians or Surgeons	-	21
Solicitors	8	3
Stockbrokers/jobbers	-	6
Tailors	1	2
Upholsterers	1	1

Sources: Hampstead local directories and NTC telephone directories.

Mapping Hampstead telephone subscribers for this period confirms that it was dominantly middle-class Hampstead residents and those providing services to them that first took up the telephone (see Figures 6.4-6.6). Figure 6.4 shows the geographical distribution of Hampstead's 1902-03 pioneering telephone subscribers. The central area of Hampstead village, Hampstead High Street (Hampstead's major trading area), and the Heath proper are excluded from this initial phase of diffusion. Most subscribers congregate within half a mile of the NTC exchange, along the main retail thoroughfare

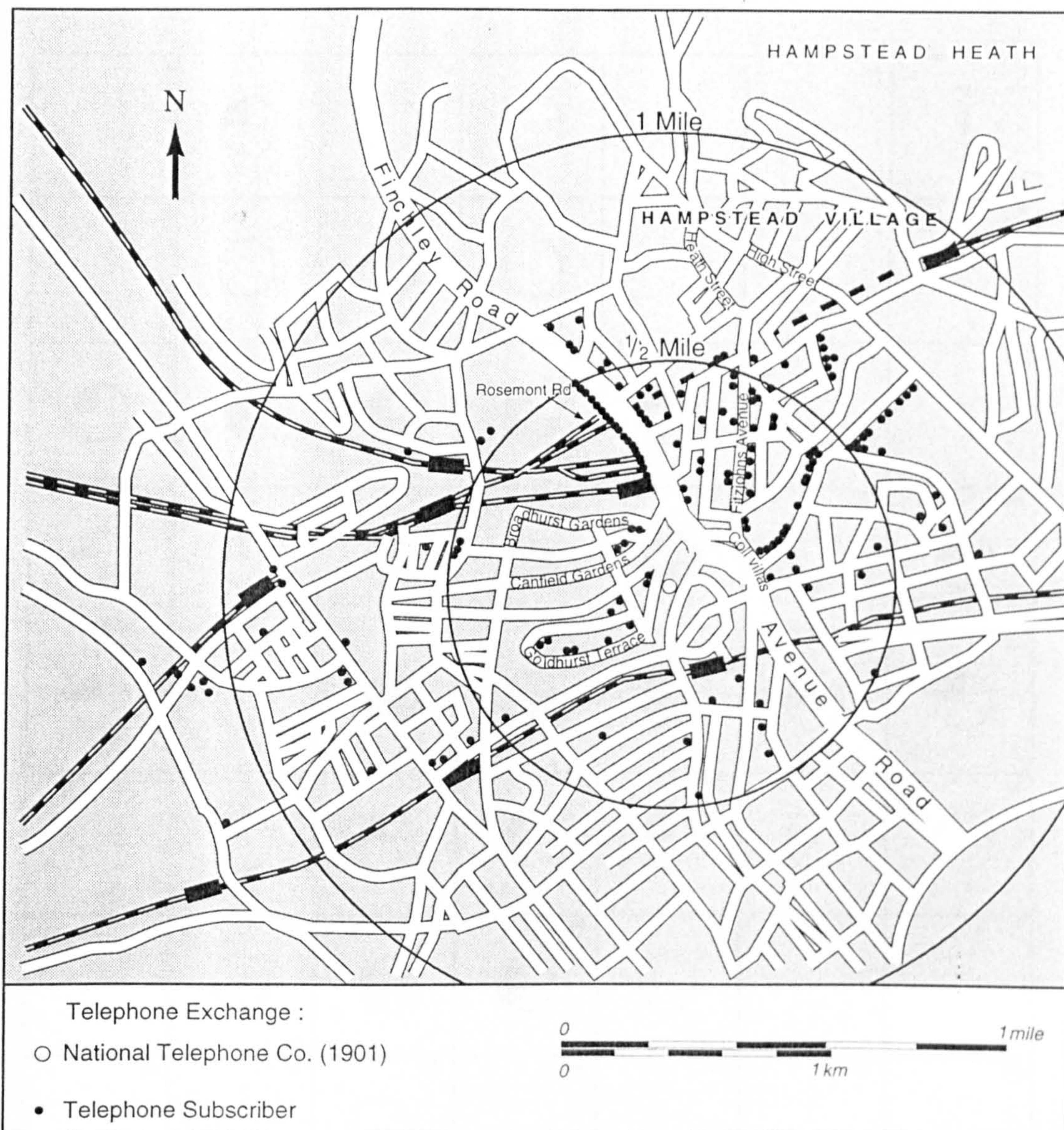
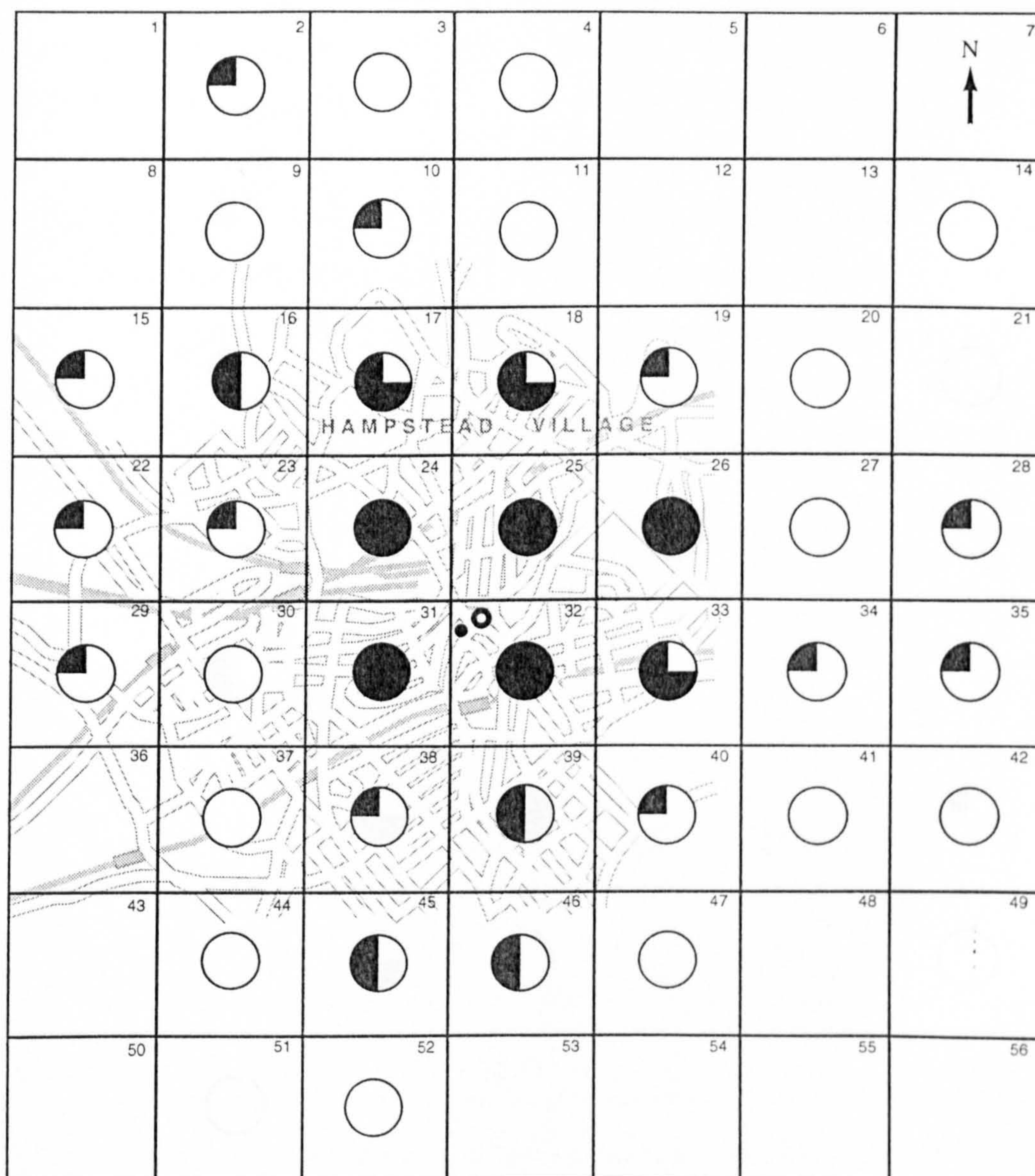


Figure 6.4 Map of Hampstead's pioneering telephone subscribers, 1902 - 03

Sources: NTC telephone directories and Hampstead local street and trade directories



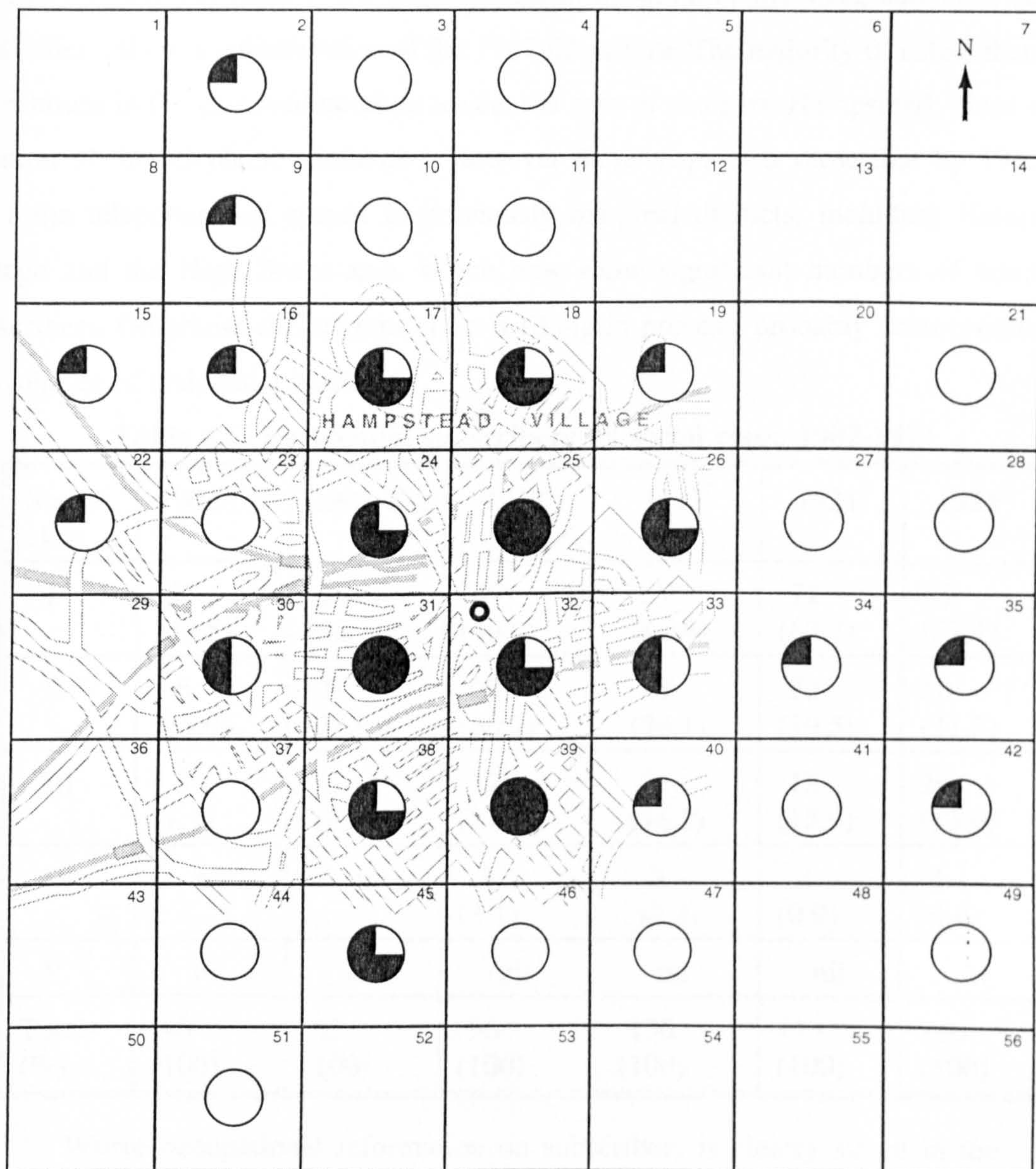
- < 5 Subscribers
- ◐ 5 - 14 Subscribers
- ◑ 15 - 24 Subscribers
- ◒ 25 - 34 Subscribers
- > 35 Subscribers



- Telephone Exchanges :
- National Telephone Co. (1901)
 - ◉ Post Office (1904)

Figure 6.5 Map of sample Hampstead telephone subscribers, 1912

Sources: Post office telephone directories and Hampstead local street and trade directories



- < 5 Subscribers
- ◐ 5 - 14 Subscribers
- ◑ 15 - 24 Subscribers
- ◒ 25 - 34 Subscribers
- > 35 Subscribers

0 1 mile
0 1 km

- Telephone Exchange :
- Post Office (1904)

Figure 6.6 Map of sample Hampstead telephone subscribers, 1921

Sources: Post office telephone directories and Hampstead local street and trade directories

of Finchley Road, and in neighbouring middle- and upper middle-class residential streets. Figures 6.5 and 6.6, plots of the geographical distribution of my 1912 and 1921 sample subscribers, show a consolidation of the 1902-03 pattern. The majority of subscribers still concentrate in the core middle-class residential area of southern Hampstead, close to the location of the telephone exchanges. However these maps also show that by 1912 and 1921 the telephone had spread to previously marginal districts, including Hampstead Village and the High Street area, which now show significant numbers of telephone subscribers. Otherwise the patterns show a filling-in process, probably corresponding to new phases of residential building.

Table 6.5 Residential subscribers by social class, 1902-1921

Social class	1902-03 ¹	1902-03 ²	1912 ¹	1912 ²	1921 ¹	1921 ²
I	31 (77.5)	36 (58.1)	47 (49.0)	59 (45.4)	72 (63.7)	85 (53.1)
II	6 (15.0)	21 (33.9)	29 (30.2)	47 (36.1)	22 (19.5)	50 (31.3)
III	3 (7.5)	5 (8.0)	17 (17.7)	21 (16.2)	18 (15.9)	24 (15.0)
IV	nil	nil	3 (3.1)	3 (2.3)	1 (0.9)	1 (0.6)
V	nil	nil	nil	nil	nil	nil
Totals (%)	40 (100)	62 (100)	96 (100)	130 (100)	113 (100)	160 (100)

¹ Where occupational information on subscribers is clearly stated in the telephone directory or local street directory (1912 and 1921 figures are samples)

² Previous column plus additional subscribers where occupational information is inferred from neighbouring entry in the telephone directory (1912 and 1921 figures are samples)

N.B. Social classes I-V correspond to the following: I - Professional occupations (company directors, clergymen, doctors, lawyers ...); II - Intermediate occupations (railway officials, brokers, proprietors and managers of retail businesses ...); III - Skilled occupations (Shop salesmen, foremen, painters and decorators ...); IV - Partly skilled occupations (Machine operators, window cleaners, and dry cleaners ...); V - Unskilled occupations (labourers ...)

**Table 6.6 Residential subscribers by occupational class,
1902-1921**

	1902-03 (%)	1912 (%)	1921 (%)
1. Upper professionals	36 (56.2)	59 (34.5)	79 (37.3)
2. Semi-professionals	1 (1.6)	16 (9.4)	8 (3.8)
3. Managers	6 (9.4)	10 (5.8)	20 (9.4)
4. Retail/wholesale trades	14 (21.9)	21 (12.3)	25 (11.8)
5. Skilled occupations	5 (7.8)	19 (11.1)	25 (11.8)
6. Semi-skilled occupations	nil	4 (2.3)	3 (1.4)
7. Unskilled occupations	nil	nil	nil
8. Independent means	2 (3.1)	42 ¹ (24.6)	51 (24.0)
9. Unknown	nil	nil	1 (0.5)
Totals	64 (100.0)	171 (100.0)	212 (100.0)

¹ Thirty-eight married women and four people with titles. One may assume that most of these married women were widows. However in some cases these women were still married, as is indicated by the inclusion of a husband's name in the street directory. One may speculate that the telephone was listed under the woman's name because telephones were mainly located in the home, and because women often managed household finances

1. Doctors, clergy, lawyers, army officers etc.
2. Professors, teachers, artists
3. Proprietors, managers or company agents, financial broker or agent
4. Essentially the petit bourgeoisie: those likely to own or run their businesses, retail or wholesale, and likely to be employers of others; other merchants
5. Builders, electrical engineers, tailors, plumbers, barbers, electricians
6. Gardeners, barmen, barmaids, porters
7. Labourers, messengers
8. Widows, married women, titled gentlemen etc.

Social class information confirms the above patterns. This shows that, as one might expect, the higher social classes were more broadly represented amongst early telephone

subscribers, although there is evidence that the telephone was filtering down the social hierarchy very gradually in the period under review here (see Tables 6.5 and 6.6). Table 6.5 classifies subscribers by social class based on occupational information derived from telephone directories and Hampstead local directories. Two columns are given for each year. The first column classifies telephone subscribers where occupational information or its equivalent (titles etc.) is clearly stated in the directories. The second column includes additional subscribers where occupation was inferred from an adjacent entry in the telephone directory, where the family name and initials were the same. Although imperfect, this second method was used because it increased the proportion of residential subscribers with occupational information from 28.8% to 44.6% of the total. Table 6.5 shows that social classes I and II comprised a minimum of 92% of subscribers in 1902-03, falling to 79.2% in 1912, and rising slightly to 83.2% in 1921. The more detailed evidence presented in Table 6.6 shows that the majority of subscribers were urban professionals, managers, merchants or had skilled occupations. In 1912, no less than 24.6% of subscribers were living off independent means, either widows, married women or titled gentlemen.

The average distance of subscribers from the exchange, 0.46 miles in 1902-03, 0.88 miles in 1912, and 0.92 miles in 1921 -- partly a product of the difficulty of obtaining wayleaves and the technical limitations of the time -- imposed an effective social limit on telephone subscription.⁶² This largely confined the possibility of telephone subscription to middle-class Hampstead. But these social delimiters were not drawn absolutely tight. Public telephones were provided -- not many of them and not on the public streets -- but in post offices, railway stations and in private establishments such as chemists and estate agents. Furthermore, as we have seen, the occasional private business or resident offered their telephone for general public use, perhaps for reasons of local status, or to attract business. This ought to remind us that use of the telephone was not dependent on ownership, and that prescribed conceptions of what the telephone ought to be used for, and who it was to be used by, were always subject to challenge.

Conclusions

The telephone crept into Hampstead. Compared with other technologies, such as motor vehicles and bicycles, the telephone was received with limited social comment. Only when

telephone poles and wires threatened to disfigure Hampstead's historic image did the telephone receive significant public and press comment. One may speculate that this was because the telephone was a private and domestic technology, and because the principle of electrical communication was by the late nineteenth century already well established and socially understood. That the telephone was socially received with relative silence contrasts with interpretations which suggest that the experience of new communications technology is often one that is shocking or disorientating. In Hampstead one is struck by the ease with which the telephone was socially embedded.

The telephone did not radically destabilise Hampstead society and space. Indeed existing social and spatial structures were probably more powerful in shaping the technology than the reverse. If this were any different there would likely have been more social commentary about the telephone's social significance during its introduction to Hampstead. Hampstead's existing pattern of land ownership shaped the telephone's development in the borough. A complex pattern of land ownership, and political obstruction from Hampstead's Vestry and Borough Council, delayed the advance of telephone wires from central London into this suburban borough. In constructing telephone systems both the NTC and the Post Office faced the individualism of private property and the political prejudice of Hampstead's elected local government.

Similarly, there was nothing inherently democratic about the way the telephone was socially embedded. The telephone filtered down Hampstead's social hierarchy. The telephone was initially adopted by Hampstead's principal administrative institutions. With the opening of exchanges, the telephone spread to the borough's trade and professional groups. For the first two decades of this century the telephone remained an item of consumption predominantly for the upper and middle classes. The evidence shows, however, that for each of the years 1902-03, 1912 and 1921, proportionately more middle-class households managed to become telephone subscribers. There were of course exceptions to this general trend. Public telephones were provided and on occasion telephones were made available by private individuals for general communal use. Similarly the visible spread of telephone poles and wires through the borough meant that the new technology was generally noticed. These points should remind us that the process of learning about a new invention is not restricted to its ownership or to its instrumental use.

Hampstead evidence shows that prior to 1920 the telephone was dominantly used for business purposes. The telephone's early adoption by Hampstead's principal institutions, including the Council offices, the hospital and the fire department, suggests that the telephone was initially mainly used for emergency and administrative purposes. Although telephones were mainly located in residences their principal function was instrumental, to conduct business from the home or to maintain contact with nearby businesses. The significant up-take of the telephone by Hampstead's trade and professional groups confirms that the telephone's principle function prior to 1920 was an instrumental one. The evidence also suggests that it was Hampstead's middle classes who in particular subscribed to the telephone with alacrity. This is a specific example which challenges general assertions that élite social groups typically avoided or were slow to adopt new innovations in late nineteenth-century England. Instead we may well ask why it was that the middle classes so readily adopted the telephone. I wish to suggest that this was because the telephone was socially shaped, primarily by entrepreneurial interests, in a period of middle class ascendancy, and thus was a technology closely suited to middle class ideals.

Notes

1. F.M.L. Thompson, Hampstead: building a borough, 1650-1964 (London, 1974) 4. Hampstead was administered by an elected vestry until 1899 at which date the vestry became one of the twenty-eight newly created Metropolitan Borough Councils. Since the boundaries did not change, for the sake of simplicity I will use the term "borough" to refer to pre- and post-1899 events
2. Charles Booth's descriptive map of London poverty 1889, Publication No. 130, London Topographical Society (London, 1984) North-western sheet
3. Thompson, Hampstead, 50-51
4. T.F.T. Baker (ed.), A history of the County of Middlesex, Vol. 9., Hampstead and Paddington parishes (Oxford, 1989) 3-8
5. BT Archives (hereafter BTA), History of exchanges, Vol. 2., Unpublished manuscript
6. Brian T. Robson, Urban growth: an approach (London, 1973) 176
7. Hampstead and Highgate Express, 19 August 1905
8. Hampstead and Highgate Express, 7 January 1899
9. R.H. Parsons, The early days of the power station industry (Cambridge, 1939) 130-34
10. Parish of St. John, Hampstead, Printed Vestry Minutes (hereafter Vestry Minutes), Vol. 37., p178, 21 April 1898
11. Hampstead and Highgate Express, 12 November 1898
12. Ibid.
13. To indicate the number of Hampstead residents subscribing to neighbouring exchanges prior to the opening of Hampstead's telephone exchanges in 1901 and 1904 I undertook a random sample of 40 pages of the National Telephone Company Directory 1902-03. Of approximately 2,000 subscribers there were only 14 with Hampstead area addresses, two connected to the Kings Cross exchange, the other twelve to Paddington. Taking into account the number of pages in the directory this would suggest that there were approximately 193 subscribers in total, on the margins of Hampstead, subscribing to neighbouring exchanges. Of the fourteen subscribers in my sample, five were businesses: a fibrous plaster joinery, a nurses' institute, a coal merchant, a piano manufacturers and a music seller. Of the private residents, two were doctors and one an auctioneer and surveyor. See BTA, The National Telephone Company Ltd. National 1902-03, Vol. 1. List of subscribers to the National Telephone Company's Metropolitan Exchange System, with which are incorporated the names of subscribers to the Post Office Exchange System., July 1902, Reel 3/5 London & Provincial
14. Hampstead and Highgate Express, 11 May 1895

15. Hampstead and Highgate Express, 7 January 1899
16. Vestry Minutes, Vol. 33., p98, 15 March 1894
17. Vestry Minutes, Vol. 34., p419, 28 November 1895
18. Vestry Minutes, Vol. 36., p34, 21 January 1897
19. Metropolitan Borough of Hampstead, Printed Council Minutes (hereafter Borough Council Minutes), Vol. 39., p667, 24 October 1901
20. Hampstead and Highgate Express, 10 January 1903
21. Borough Council Minutes, Vol. 44., p123, 5 January 1905; p443, 11 May 1905
22. Borough Council Minutes, Vol. 45., p134, 12 December 1905
23. Ibid., p135
24. Borough Council Minutes, Vol. 45., p664, 2 August 1906
25. Hampstead and Highgate Express, 5 November 1898, 7 January 1899
26. Vestry Minutes, Vol. 37., p.354, 4 August 1898
27. Hampstead and Highgate Express, 21 October 1899
28. Vestry Minutes, Vol. 33., p98, 15 March 1894, Vol. 34., p419, 28 November 1895
29. Vestry Minutes, Vol. 35., p436, 19 November 1896
30. Vestry Minutes, Vol. 36., p34, 21 January 1897
31. Vestry Minutes, Vol. 36., p490, 16 December 1897. With the opening of the Paddington exchange in 1896 the NTC decided to close the Kilburn and Edgware Road exchanges, and to absorb their subscribers on to the Paddington exchange. The reference to "two or three hundred Hampstead subscribers" on the Kilburn exchange at this time is probably an exaggeration. My sample of the 1902-03 telephone directory suggests that there was a maximum number of approximately two hundred telephone subscribers on the margins of Hampstead connected to neighbouring exchanges prior to the opening of the Hampstead telephone exchanges in 1901 and 1904 (see endnote 13)
32. Vestry Minutes, Vol. 37., p6, 6 January 1898
33. See Chapter 4, pages 132-33
34. Vestry Minutes, Vol. 37., p64, 3 February 1898
35. Vestry Minutes, Vol. 37., p354, 4 August 1898; p466, 17 November 1898; Vol. 38., p150, 6 April 1899; p370, 5 October 1899

36. Vestry Minutes, Vol. 37., p440-41, 3 November 1898
37. Vestry Minutes, Vol. 38., p78, 16 February 1899
38. Vestry Minutes, Vol. 38., p250-51, 22 June 1899
39. Vestry Minutes, Vol. 38., p370, 5 October 1899
40. Vestry Minutes, Vol. 38., p382, 19 October 1899
41. Hampstead ... Kilburn ... St. John's Wood, Local guide and almanac for 1901 (Hampstead, 1901)
42. The St. John's Wood, Kilburn, and Hampstead Advertiser, 16 May 1901
43. Hampstead ... Kilburn ... St. John's Wood, Local guide and almanac for 1901 (Hampstead, 1901)
44. This information was obtained from Taylor & Lown's advertisements in the Hampstead Advertiser, read for alternate years (1900, 1902, 1904 ...), and from the Hampstead and Child's Hill Directory for the years 1916-1928
45. Hampstead and Highgate Express, 11 May 1895
46. Hampstead and Highgate Express, 9 December 1899
47. Hampstead and Highgate Express, 7 July 1900
48. The Hampstead Record, 8 February 1902
49. Hampstead and Highgate Express, 26 March 1910
50. Claude S. Fischer, America calling: a social history of the telephone to 1940 (Berkeley, 1992) Chapter 1
51. The number of Hampstead telephone subscribers was counted from the London telephone directory corresponding to that year. In 1902-03 with relatively few Hampstead telephone subscribers they could be directly counted. For 1912 and 1921 the number of Hampstead telephone subscribers was calculated using a simple formula based on my sampling method. In 1912 Hampstead telephone subscribers were selected by systematic random sample, starting with the n th Hampstead subscriber (n being a random number between 1 and 10), and then taking every tenth Hampstead subscriber until the end of the directory. In 1921 to correspond with a 6.25% sample every sixteenth Hampstead subscriber was selected. The number of Hampstead telephone subscribers is therefore calculated as follows: total = $n + (\text{sample size} \times 100/\text{sample percentage}) + \text{remainder}$. BTA, Reel 3/5, London and provincial, The National Telephone Company Ltd., National 1902-03, Vol. 1, List of subscribers to the National Telephone Company's Metropolitan Exchange System ... July 1902; Reel 3/12, London and provincial, Post office telephone directory for Metropolitan, Midland, Southern and Western provinces, Vol. 1, national, January 1912; reel 1/3, London, List of subscribers to the Post Office London Telephone

Exchange System, October 1921

52. The census gives Hampstead's population as 81,942 in 1901, rising to 85,495 in 1911 and 86,153 in 1921. Census of England and Wales 1901, County of London, 17; Census of England and Wales, 1911, Vol. 10., 329; Census of England and Wales, 1921, County of London, 49

53. Hampstead had 21,520 households in 1921

54. The following tables are based on similar work undertaken in Canada by Robert M. Pike. See Robert M. Pike, Kingston adopts the telephone: the social diffusion and use of the telephone in urban central Canada Urban History Review 18, 1 (June 1989) 32-47

55. The convention I adopted for this was as follows. Where a subscriber's address in the telephone directory was clearly residential and the subscriber was listed in the street directory or in the list of private residents I assumed a residential location. Where the subscriber was listed only in the commercial section of the directory, or where there was clearly a business function (e.g. the subscriber was a company) I assumed the telephone was located in a place of employment. For further details see Appendix 1

56. When the telephone directory listed both an address and an occupation for a subscriber I checked in the local directory to see if the address was residential or not. In cases where the address was clearly a private residence I classified the subscriber as residential irrespective of whether the address was also being used as a place of business. Thus "ANDERSON J. Ford, M.D., 41 Belsize pk", as listed in the telephone directory, I classified as a residential subscriber. Although a physician, listed in the commercial directory as practising from this address, it is clear from the list of private residents that this was Anderson's private residence. See also Appendix 1

57. Pike, Kingston adopts, 39

58. Fischer, America calling, 42

59. Ibid., 50

60. Sometimes the telephone directory listed occupation. Additional occupational information was obtained by cross-referencing subscribers listed in the telephone directory with Hampstead local street directories

61. The economic classification chosen is based on a combination of the 1951 census summary of classified list of occupations and the classification used by Carr-Saunders, Jones and Moser to compare industrial distributions based on 1931 and 1951 census data. Carr-Saunders et al's categories were as follows: (1) agriculture, forestry, fishing; (2) mining and quarrying; (3) manufacturing of all kinds; (4) building and contracting; (5) gas, electricity and water; (6) transport and communications; (7) distributive trades; (8) insurance, banking and finance; (9) public administration and defence; (10) professional services; (11) miscellaneous services. My first three categories correspond exactly to (3), (4) and (9) in this list. My fourth category corresponds to (7) and (8) in this list and to sub-order XVIII (commercial, finance and insurance occupations excluding clerical staff)

in the 1951 classification. My fifth category corresponds to (10) in the above list and to sub-orders XIX (professional and technical occupations) and XXII (persons engaged in personal service) in the 1951 classification. See Carr-Saunders, A.M., Jones, D.C. and Moser, C.A. Survey of social conditions in England and Wales (Oxford, 1958) 92; Census 1951, Classification of occupations, 1-2

62. For details of how the average distance of subscribers from the exchange was calculated see Appendix 1

Chapter 7: Conclusions and suggestions for further research

How we learn about and adapt to new technologies is an important historical process. It is also a process that is on-going. The principal aim of this thesis -- to examine the telephone's early social diffusion and reception -- was partly an attempt to highlight the significance of this process, the social adaptation and the social embedding of new technologies. It was also an attempt to identify some of the principal means and institutions by which it occurs. My conclusions, although specific to the telephone and to late Victorian and Edwardian Britain, are deliberately intended to resonate with similar experiences concerning other contemporaneous and more recent technologies. It is also my intention to rekindle an academic interest, especially among British historical geographers, in the study of everyday technologies, and to demonstrate the possible intellectual gains to be made from such studies.

I wish at the outset to make clear the utility and contemporary relevance of historical approaches to the social reception of technology, and to make several general points concerning intellectual approaches to the study of technology. First, although in contemporary society the social adjustment to innovations is a continual and routine process, we should not assume that this has always been so historically. In short, there is a need to problematise how it is that the social diffusion and reception of technology has become routine. Secondly, we need to remember that the appraisal of new technologies is a social as well as an individual process. This has several implications. While the study of how technologies affect individuals and families is important we must also consider other scales of analysis; for example the role of national and urban institutions, and of urban neighbourhoods and social groups, in providing the demand for, and in shaping the way technologies develop. That we do appraise and shape technologies socially suggests also that the ways technologies develop and their consequences are never inevitable. Technologies are socially constructed and publicly negotiated. For this reason rather than treating technology collectively, or as having set consequences, we need perhaps to ask why different technologies develop in the way that they do, and to consider why it is that the same technology may have different consequences for different social groups in different times and places. One possible solution to such an approach is to concentrate on the social uses of technology, and to focus on the different and particular social spaces where such technologies are encountered. We must also be careful not to assume that elite

appraisals or uses of technology are the same as for general groups in the population. Thirdly, technologies, as they develop, raise a set of issues, requiring public discussion and negotiation. Close scrutiny of these social debates reveals both the social values attributed to technology and the parties involved in its shaping.

I have argued that to treat the telephone in the abstract as if it exists apart from socio-spatial relations, is to misconceive technology and the ways that we learn about and adapt to it. This obscures the fact that technology is utterly inseparable from, and embedded in the social spaces in which humans create, use and experience it. Yet different means and institutions were significant at different times and places. There is therefore an historical geography to the means and institutions that comprise the social diffusion of technology.

What was the telephone? The telephone was initially a scientific conception as well as a piece of electro-mechanical equipment. In conception, the telephone was the material application of knowledge to a practical problem. This is a common definition of technology. It was also Alexander Graham Bell's self-description of his invention: the principle that by relatively simple methods would allow for the reproduction of the human voice by electro-mechanical means and to transmit it over vast distances. It is therefore significant that the telephone was first introduced to Britain not as a practical device but as a scientific idea. This was by Lord Kelvin in his presidential address to the British Association for the Advancement of Science in Glasgow in 1876.

The telephone soon became more than an idea. The telephone was transformed into an institution, a socio-technical system, by a group of commercial men who purchased exclusive rights to utilise the principal telephone patents. The National Telephone Company, the result of the amalgamation of a set of regional telephone companies, emerged by 1892 as an organization supplying the telephone service throughout much of the territorial extent of the United Kingdom. Several of the telephone's early promoters had previous experience of the telegraph or of the railway industry. Partly a product of this legacy, the telephone was conceived as a "superior telegraph", essentially as a business machine for the commercial classes. Within the NTC structure the telephone was commoditised. The telephone was reduced to its smallest unit, the "effective call", an answered call which generated income for the company. Sales efforts and the supply of telephone equipment were all increasingly integrated, and designed to turn "ineffective"

into "effective calls".

With reference to the telephone's early diffusion, the thesis describes the continuing significance of the traditional social hierarchy, and of institutions historically entrusted with the role of introducing new inventions. These include the role of royal patronage, the urban court, the military, coal mines and hospitals, and the scientific society. These social groups and institutions both created the demand for the new invention and in demonstrating its use showed how others could emulate them. The process was not entirely top-down for lone inventors showed how to make inexpensive home-made telephones, and cheap imports and imitations proliferated, despite attempts by the telephone's promoters to prohibit their use.

In addition to these traditional means and sites of introduction there were other more modern ways by which the public gained knowledge of the telephone. The role of descriptions, demonstrations and exhibitions, always important, became increasingly so, as more people gained knowledge of the telephone through what they read or heard. The increased importance of the press, of national commercial organizations, and of mass advertising contributed to this. The telephone company's efforts to advertise the telephone were designed to promote talk about it. The physical presence of telephone equipment had an added educational role. Telephone poles and wires, the perceived dangers of these, and public concern about aesthetics, all reported in the press, implied that knowledge of the telephone was in no way restricted to its instrumental use. The NTC encouraged their staff to see that telephones and telephone signs were prominently displayed so as to generate talk about the telephone. As such, the NTC deliberately sought to use the "public sphere" to sell telephones.

Close scrutiny of the social comment surrounding the telephone's introduction reveals that the telephone's development socially and geographically was not independent of ideology. First, the Post Office's early attempt to secure control of the telephone, and the initial concern to connect the United Kingdom's principal commercial and political centres, shows the degree of importance attributed to national administrative and commercial integration. This objective was seen to be more important than other possible social goals. Different ideologies shaped the telephone's national and urban development. The NTC shaped the telephone within its entrepreneurial ideology. This was internally to commoditise the telephone. Externally this surfaced as a concerted campaign for a laissez-

faire economic environment in which to develop the telephone business. A significant element of this sustained argument was that private companies be allowed enhanced powers over urban public and private space. Often in opposition to this view were public bodies, the Post Office, social groups, such as professional engineers, and the wider public.

The national and urban debate on the "telephone question" was largely conducted in the press and concerned familiar issues such as who ought best to manage the telephone service. The debate was also about setting boundaries over access. Thus the "telephone question" was as much about management and regulation as it was about who the telephone was for. Locally, the telephone's appraisal by individuals, social groups and urban governments was influenced by, and contributed to this public debate on the "telephone question". Stories of local resistance to the telephone companies, of instances of the infringement of private property rights by telephone companies or by the post office, and of municipal experimentation with telephones, all found their way into the national press. In turn public debates on these issues influenced local opinion regarding the state of the telephone system, and local decision-making concerning the telephone's development. The complex geography of the telephone network was the result. In London, for example, the telephone's development was partly conditioned by the political prejudice of numerous local authorities, who acted collectively and individually, to try and obtain an improved and efficient telephone system appropriate for a capital and imperial city. There was little doubt about the importance to London of such a service. Several conferences of London's local authorities held between 1898 and 1904 debated the subject of the city's telephone system. Resolutions passed criticised the existing state of the telephone system, and urged the government either to provide effective competition to the private telephone companies in London, or to nationalise the telephone service and to empower local authorities to operate telephone systems. London's local authorities in 1899 even considered the establishment of a municipal telephone system for the metropolis. The debate subsided after the announcement in 1905 that the NTC's London telephone system would be nationalised in 1912. However, the telephone's spread to many parts of London, including Hampstead, was delayed by the actions of individual local authorities who, opposed to the activities of the National Telephone Company, refused it access to public space for the location of its telephone equipment. Events in London were also influenced

by a minority of towns outside of London including Glasgow, where attempts were made after 1899 to establish competing municipal telephone systems. Thus although the social reception of technology was a general process to urban places it resulted differently in different places. In the case of the telephone both the differential geography of private, state and municipal-run telephone systems, and even the physical location of the telephone equipment, were the result of a complex urban process of political and ideological negotiation.

The social debates over the "telephone question" demonstrate similarities and historical continuity with contemporary debates over the development of new technologies. Thus discussions over the telephone's early development a century ago, prefigure current debates over the management and regulation of privatised utilities, and over the policing and ethics of new technologies such as the internet; questions concerning the relative efficiency of private enterprise and state-owned corporations, over systems of measuring and charging for use, over access, and over the rights of private corporations to use public space. In addition to these specific issues surrounding the development of new technologies, it is also important, I argue, to consider the means by which these issues are publicly negotiated and resolved. I have argued for the "telephone question" that a continual theme of such discussions was the consistent use by the parties involved of rational arguments, designed to influence public opinion, through appeal to the public's reason. The importance of such means of argument was most clearly demonstrated when institutions supplying the telephone service were publicly criticised, for whenever this occurred it was essential that these organizations publicly rebut the criticisms made against them. Thus private and state organizations alike continued to be subject to the influence of public opinion. Although the way more recent technologies develop and are publicly debated may be more complex to untangle, the essential questions, the ideological arguments, and the process of public negotiation remain remarkably similar.

In particular the National Telephone Company's entrepreneurial ideology, and its spatial principles and practices, helps to explain current attempts by private telephone companies to increase their business and to sell telephones. I have argued that the NTC commoditised the telephone, reducing it to its smallest unit, the "effective call". The aim was then to place telephones in every conceivable place where they might be used, and to use the location of telephones and telephone symbols, in addition to canvassing,

advertising and other forms of publicity, to generate talk about the telephone, and hence to sell telephones, and to turn ineffective into effective calls. Such a strategy resonates with contemporary developments in telephony. Telephones are now both more visible and accessible with the greater availability of public telephones, and with the introduction of cheap mobile telephones. Similarly new innovations in telephony and current advertising by the telephone companies may be interpreted as attempts to turn ineffective into effective calls. This explains the value to the telephone companies of telephone answering machines, and of such recent services as "call waiting" and "1471". The first of these services informs a telephone user, who is in conversation, of an incoming call. The second service provides a telephone subscriber with the telephone number of a previously unanswered telephone caller. All three innovations have the effect of turning unanswered, and essentially wasted, telephone calls into answered calls which generate revenue for the telephone companies. Other attempts to encourage use of the telephone by particular social groups, to increase the telephone's range of uses, and to prolong the duration of calls, may be similarly interpreted, although these are also attempts to use up excess capacity on existing cable networks. Hence recent BT advertising campaigns designed to increase use of telephone by teenagers, to encourage social use of the telephone by men (who, compared to women, are generally recognised to use the telephone in a brief and business-like manner), and the use of the general slogan: "It's good to talk". The same principles explain the attempt by BT to change the provisions of its licence so that it may sell entertainment services down the telephone lines, and the practice of rival television cable companies to sell telephone calls.

I have argued that to assume set human consequences based on the inherent characteristics of a technology is to be deterministic. What matters and what essentially defines technology is how it is used. Considerable evidence from a variety of sources throughout the thesis shows that the telephone prior to 1920 was predominantly marketed and used as a business device. Apart from a minority of long-distance calls, the vast majority of calls were to consolidate local intra-urban communication. There is little evidence to suggest in this period that the telephone was used for its "social" as opposed to its "economic" function. There is also little sense of general unease surrounding the telephone's diffusion. There is little evidence to suggest that urban dwellers avoided the telephone because of associations with "industrialism" or because of fears of the

telephone's invasive qualities. The telephone's adoption with relative alacrity, especially by the urban middle classes, and by comparison with other technologies, with relative silence, was a more general response.

There is also a need here to say a few words about the telephone and gender, a subject that appears intermittently in this thesis but which has not been fully developed in previous chapters. The telephone, as it developed, was conceived by its promoters to be of principal utility to businessmen, and hence to subscribers who were generally assumed to be male. However the telephone was marketed for use by women from the outset, and certainly after 1900 women used the telephone in large numbers, as is demonstrated by the significant number of married women listed as telephone subscribers in pre-1921 Hampstead. When women were depicted in telephone company advertising their use of the telephone was for instrumental purposes. In other words the telephone was considered as an aid to household management, not as a device for sociability. The telephone's promoters anticipated occasional use of the telephone by women, to arrange household activities, to maintain contact with male family members, or for use in emergency situations. However, such uses were considered to be a bonus of subscription, with use of the telephone only granted to the female family members of male subscribers. In a different context, the telephone companies actively used women to market the telephone, as canvassers, as people who would be receptive to arguments about the telephone's advantages, and as an important urban social group whose own limited use of the telephone, and conversation about it, would further popularise the invention. Michèle Martin has suggested, in her study of the telephone in Canada, that it was the active and unexpected use by women of the telephone for social purposes that led the telephone industry to discover the profitability of social use of the telephone. This may well be the case, but it is tempting to speculate that this result was equally the unintended consequence of the telephone companies use of women to popularise the telephone.

Suggestions for further research

I have argued in this thesis both for more subtle and for systematic approaches to the study of technology. There is in other words a need for specific historical geographies of different kinds of technology, and for systematic studies of their urban social diffusion and reception.

Not only must we concentrate on the grand technologies, such as the telephone and the automobile, but also on more mundane innovations, such as the bicycle and the radio, and on the full range of domestic technologies that provide heat, light and power in the home. There is also considerable potential to explore the military applications of civilian technologies. Studies of these kind do exist, and in geography there is currently a growing interest in specific kinds of technology such as photography, and the significance of computers and of electronic networks in general. However, although it is common now for such studies to focus on the uses of technology, they tend not to ask how these innovations are socially embedded, and how the process of socially embedding technology has changed historically. In general, the social study of everyday innovations in Britain remains less advanced, and less institutionalised in British universities than is the case in North America. There is a need to study the full range of everyday technologies, to consider them in their institutional contexts, and to ask of them a set of specific questions: what economic, social and political factors shaped their design, pricing policies, marketing strategies, their social uses, and their differential diffusion and reception in different British cities.

We must also consider the social reception of technology at the urban scale, and its appraisal by urban governments, city institutions and urban "publics". How has the process by which technologies are socially appraised and publicly negotiated changed over time? On what basis do these organizations and social groups consider technology to be important? The thesis argues that the social appraisal of the telephone by urban institutions and social groups was not independent of political ideology. Furthermore, demands for the telephone's adoption were inseparable from attempts by city institutions and self-interested urban élites to ensure that their city remained competitive with other urban centres. This suggests that we must investigate not only the effectiveness of technology to the functioning of cities, but also its social valuation by urban institutions and city publics. One possible way to explore such questions would be to consider for one urban centre the social reception of a range of technologies during the period of the second industrial revolution (c.1870 to 1920). The aim would be to ascertain how the role of different technologies, the process of adaptation to them, and their reception and negotiation by city institutions and social groups, have changed historically.

There are also a set of questions specific to the telephone which might be usefully

considered in future research. I concentrated in this thesis on the telephone's social reception and diffusion in an early phase of the technology's diffusion in Britain. There is obvious potential both to extend the research to explore existing questions in greater detail, and to answer for a mature phase in the telephone's diffusion a new set of questions raised by the thesis but for which there was insufficient time to examine in detail. I will first discuss how existing questions could be examined further and then suggest how new questions might be explored if the research was extended forward in time.

There is a need to balance local studies of the telephone with a general overview of the telephone's development in Britain. The telephone clearly developed differently in different British cities, and in general the telephone in Europe developed differently from North America. There is a need to explain this differential historical geography. In Britain, the telephone, in its early years, was controlled by a single private monopoly, and then by the Post Office, while only six municipalities established telephone systems. In North America, while urban areas were initially dominated by Bell, a large private telephone monopoly, there also emerged between 1894 and 1914, mainly in rural areas, thousands of competing independent and mutual suppliers of telephones. Why, compared with the United States and Canada, was there limited experimentation in Britain with municipal and independent telephone systems? There is also a need to explain the specific geography in Britain of municipal involvement in telephones. In addition, there is considerable potential to explore the influence of corporate and political ideology on the internal management of the telephone service. Were there, for example, any significant differences between private, municipal and post office telephone systems in the management of operators, in the tendency to automate and to adopt new exchange technology, in pricing policies and in systems of marketing? Such studies have been undertaken in North America but comparative research in Britain would demonstrate the significance of political ideology for the diffusion and development of technology in Britain, and highlight any trans-Atlantic ideological differences.

There is clearly potential to examine the telephone's appraisal by particular city institutions, and its adoption by such organizations as urban police and fire departments. I show in this thesis that at the turn of the century the telephone was adapted for such use. Scholars suggest that the emergence of professional urban government in Europe and

North America in the mid- and late nineteenth century coincided and was associated with the development of a series of new technologies, including improvements in urban communications with the development of the telegraph and the telephone. Collectively these changes are seen to have improved the capacity of central urban governments to distribute urban services and to control the social environments of cities. But how important and effective was improved internal urban communication to such change? And in particular what were the social, economic and political conditions leading to the telephone's adoption? The specific case of the fire service allows for a consideration of the telephone's reception within an important urban institution, and provides in addition an opportunity to measure the telephone's effectiveness. One envisages here the examination of the methods and the speed of fire-fighting before and after the introduction of a system of telephonic communication. One could then assess any changes, for example in the techniques and speed of handling alarm calls or in the despatch of fire-fighting resources to the scene of a fire. Such a study would enable an assessment of the processes leading to the adoption by urban governments of electrical communication systems, and their contribution to the development of centralised systems of urban management and control.

Considerable further knowledge of the telephone's development would be gained by an examination of the telephone's social reception and diffusion for a later period. In broad terms, an extension of this research to cover the period of the 1920s to the 1950s, during which the telephone became a common item of domestic consumption, would allow for a comparison of early and mature periods in the telephone's diffusion. Further examination could then be given to the question of how exactly the telephone was transformed from an élite into a popular item of consumption. This would include consideration of the role of specific institutions and social groups in demanding the telephone, and of changing institutional policies to the telephone's management, price structure and social uses. Consideration would also be given to whether the means and institutions responsible for the telephone's diffusion were different in the two periods? The extension of the research to a later period would also allow more specific questions to be answered. When, for example, was there in Britain a shift to social use of the telephone? What were the reasons for this transition? And how did its timing compare with a similar change that occurred in the United States in the 1920s? Following Fischer,

one way to answer this question would be to sample telephone advertising imagery for select dates, probably at ten-year intervals, and then to conduct a content analysis of the themes and messages portrayed.

An extension of the research to a later period would also allow additional aspects of the telephone's development to be investigated, which for the pre-1920 period proved difficult because of empirical limitations. One possibility would be to complement my existing Hampstead study with similar analysis of two other local study areas for a later period. In addition to the kinds of analysis undertaken in Hampstead, I would want to explore new questions concerning the telephone's social uses and consequences. Two questions in particular come to mind. First, when did the telephone become commonplace? This would indicate the length of time necessary for the social adaptation to a new technology. Secondly, how did the telephone alter patterns of local sociability? For example, was the telephone in the decades after 1920 still mainly used for local communication? Did the telephone replace face-to-face social interaction? Or did the telephone, as Fischer suggests in his American study, lead to an increased volume of communication, and to the extension and maintenance of urban community life? These questions could be answered empirically through the systematic analysis of references to the telephone in local newspaper reports and advertisements, and through the use of new oral history. The aim would be to assess when the telephone was no longer a novelty, and to elicit social reflections on the telephone's introduction and social uses. Both approaches would provide evidence of changing patterns of sociability, and indicate what the telephone's consequences were for urban community life.

Appendix 1

Methods of analysis and sampling strategies for the selection of Hampstead telephone subscribers, c.1901-1921

This appendix explains the methods and sampling strategies used to select Hampstead telephone subscribers for the years 1902-03, 1912 and 1921, as presented and discussed in Chapter 6. A brief summary of this appendix was included in Chapter 2.

Similar work on the United States by Claude Fischer, and on Canada by Robert Pike, provided general methodological models for my Hampstead research.¹ However, the exact methods and kinds of sources used in North America were not always appropriate or practical in a British context. To make some comparisons I will explain the methods used in Hampstead with reference to Fischer's and Pike's North American studies.

My basic aim was to examine the socio-economic characteristics of Hampstead telephone subscribers, and to see how these characteristics changed over time. Fischer's method is to start with the census, to select 100 random households, and then to cross-reference these with the telephone directory to see if they subscribed to the telephone.² One advantage of this approach is that it provides subscribers' household characteristics. This method proved inappropriate in a British context for two reasons. First, the telephone's gradual early diffusion in Britain, relative to North America, implies that for any local area there will be low absolute numbers of telephone subscribers. In Hampstead, for example, to select 100 random households from the census in 1901 or 1911 would result in negligible numbers of telephone subscribers. The basic procedure adopted therefore was to select Hampstead telephone subscribers directly from telephone directories. Second, because 1891 is the last currently available manuscript census in Britain, it is not possible to obtain individual household characteristics from census data after this date. It is however possible to obtain information on subscribers' occupation and gender, either direct from the telephone directory, or from local suburban trade and street directories.

An additional aim was to provide some measure of geographic access to the telephone. Fischer uses the simple dichotomy of whether subscribers were located in the town centre or elsewhere, and then codes subscribers as either "centre" or "periphery".³ In the context of a London borough, such as Hampstead, notions of "centre" and "periphery" are meaningless. For this reason I decided simply to note subscribers' addresses and to calculate their location relative to the telephone exchange. This provided a crude measure of social and geographic access to the telephone.

Sources and sampling c.1901-1921

Hampstead telephone subscribers were selected from London and national telephone directories for the years 1902-03, 1912 and 1921. These dates were chosen to cover the period after the opening of telephone exchanges in Hampstead in 1901 and 1904, and to correspond as closely as possible with census years, so that published aggregate census data could be used.

For 1902-03 it was possible to select all Hampstead telephone subscribers as their absolute number in the telephone directory was small (only 192 subscribers). For 1912 and 1921 it was necessary to take a sample of Hampstead telephone subscribers. I adopted a systematic random sample, selecting every *n*th Hampstead subscriber, as listed in the

telephone directory, by setting n to the value needed to yield about 500 subscribers in each year and selecting a starting point at random.⁴ This yielded samples of 487 and 498 Hampstead subscribers for 1912 and 1921 respectively. Although most early twentieth-century North American telephone directories provide a clear distinction between residential and business subscribers, this is not the case for British directories of the same period. Thus in the process of sampling no distinction was made between business and residential telephone subscribers.

Classifying telephone subscribers as "business" or "residential"

For reasons already stated this is difficult to do using early British telephone directories. Instead business or residential subscription has to be inferred. The location of a subscriber's telephone provided a crude measure of residential or business subscription. The method is crude because the location of a telephone reveals little about how the telephone is being used. I classified subscribers as "residential" or "business" depending on whether their telephone was placed in a private residence or a place of employment.⁵ Where there was clearly a residential address in the telephone directory and in the suburban directory the subscriber was listed in the street directory or in the list of private residents I assumed a residential location. Where the subscriber was listed in the commercial section of the suburban directory, and not in the list of private residents, or where there was clearly a business function (for example, the subscriber was a company) I assumed the subscriber's telephone was located in a place of employment.

To illustrate this method and to show the kind of information contained in early British telephone directories I include on the next page a section of a page from the 1902-03 London telephone directory. The telephone directory, as the sample section shows, often intimates if the name listed is a business or a residential subscriber. Thus in the case of ABBOTT, J. Pope & Co., listed in the telephone directory as "builders", we can assume that the telephone is located in a place of employment, and that this is primarily a business telephone. In the case of private residents it is necessary to check in local trade and street directories to confirm that the address is indeed residential. For example without such cross-referencing it is impossible to know for certain if the telephones listed below for the solicitor, Frederick James ABBOTT, and the doctor, Horace M ABEL, are located in their residences or in their place of employment. The street directory usually makes this clear. Thus in the case of ANDERSON J. Ford, M.D. of 41 Belsize pk., who was clearly a physician, and possibly practising from this address, the list of private residents in the suburban directory makes it clear that this address was Anderson's private residence.⁶ I therefore classified this subscriber as "residential".

The telephone directory provided some clue as to a subscriber's occupation or economic function in approximately 40% of cases.⁷ Additional information on occupation/economic function was determined from suburban trade and street directories, or by inferring from neighbouring entries in the telephone directory (see Chapter 6).

Subscribers' location relative to the telephone exchange

It is possible to obtain extremely precise information on the location of telephone subscribers. This is achieved by cross-referencing the address of subscribers, as given in the telephone directory, with the streets section of the suburban directory. The latter provides fairly accurate information as to where along a street the subscriber is located.

Sample page section from 1902-03 London telephone directory:

Name of Exchange.

Gerrard ...	3285	ABBOTT, Frederick James, Solicitor, 3 Long acre W.C.
Hampstead	1029	ABBOTT, J. Pope & Co...Builders, 248 Belsize Rd, Klbn
East	167	ABBOTT M & Co., Coal and Coke Mchts, St. Anne's whf Burdett rd
King's Cross	472	ABBOTT M & Co., Coal and Coke Mchts, 161 Pancras rd. NW
Wanstead	1	ABBOTT M.H & Co. Mornington Rd E
Hop	1474	ABBOTT, Miles & Co ... Cement, Lime Merchants, Sunderland Wharf, Peckham
Hop	1475	ABBOTT, Miles & Co ... Slate, Brick Merchants, Warner Rd Camberwell
Holborn ...	4658	ABBOTT Walter & Sons, Bootmakers, 60 Ludgate Hill
Paddington	346	ABBOTT William 1 Hanover ter
Central ...	2946	ABBOTT William ... Newspaper and Advertising Agent, 32 Eastcheap
London Wall	1889	ABBOTT Wm & Co., Chrt'd Acctnts, &c, 24 Coleman St
East	60	ABBOTT & Co. Ltd .. Hay Merchants, 6 Broad st Ratcliff
Dalston ...	63	ABBOTT & Sons ... Milk Contractors, Digby rd Homrtn
Gerrard ...	2800	ABC Railway Guide 328 Strand
Avenue	653	ABDULLA & Co. Ltd., Cgrtte Spclsts, 34 Lime st E.C.
Kensington	344	ABECASSIS M 16 Bramham gdns
Central ...	2521	ABEL Horace M Doctor, 7 Nicholas la

Source: BTA, Reel 3/5 London & Provincial. The National Telephone Company Ltd. National 1902-03 Vol. 1., List of subscribers to the National Telephone Company's Metropolitan Exchange System ..., July 1902, p. 43

This is, however, an extremely laborious task. The map of 1902-03 pioneering telephone subscribers (see Figure 6.4) was plotted using this method.

To calculate the average distance from the telephone exchange the following method was used. For 1902-03 precise locational information existed for all telephone subscribers. Locational co-ordinates were entered into Quattro Pro, along with the co-ordinates of the telephone exchanges, and the average distance of subscribers from the telephone exchange computed. For 1912 and 1921 the total number of sample subscribers made this method impractical. Instead subscribers were assigned to boxes in a grid, each corresponding to a quarter-mile square section of Hampstead (see Figures 6.5 and 6.6). Subscribers were assigned the co-ordinates corresponding to the centre point of the box in which they were located. These co-ordinates, along with the exchange co-ordinates, were entered into Quattro Pro, and the average distance from the exchange calculated as above.

Notes

1. Claude S. Fischer, America calling: a social history of the telephone to 1940 (Berkeley, 1992); Robert M. Pike, Kingston adopts the telephone in urban central Canada, 1876 to 1914 Urban History Review 24 1 (June 1989) 32-47
2. Fischer, America calling, Appendix F, 299
3. Ibid., 307-08
4. Early twentieth-century telephone directories list subscribers alphabetically but include the exchange to which subscribers are connected. Telephone subscribers were selected only if the directory stated they subscribed to either the Post Office or National Telephone Company Hampstead exchange. Subscribers with Hampstead addresses but connected to neighbouring exchanges were excluded. The number of these, however, was small. A random sample of 40 pages of the 1902-03 directory revealed only 14 subscribers with Hampstead addresses connected to neighbouring exchanges
5. I followed a similar method used by Pike. See Pike, Kingston adopts, Table 4, 39
6. This subscriber was listed on another page of the 1902-03 London telephone directory
7. The figure is less for residential subscribers. The telephone directories for 1902-03, 1912 and 1921 listed occupational information for 28.8% of private residents. The proportion drops in later years as the telephone directory becomes less a source of general social and economic information and more a specialised functional directory

Appendix 2

Hampstead's pioneering telephone subscribers: occupational information

This appendix provides details of the 115 pioneering subscribers (out of a total of 192) who maintained a phone in a place of business or residence in Hampstead in 1902, and for whom it was possible to obtain occupational information. The subscribers are divided into five broad institutional and functional areas as outlined in the text.

1) Manufacturing of all kinds. This included four subscribers who maintained some economic connection with a manufacturing institution elsewhere in London: a wholesale cabinet manufacturer, a wholesale furniture manufacturer, a china manufacturer and a mantle manufacturer. In addition, this category included a piano manufacturer, two upholsterers, a firm of cardmakers and a costume manufacturer.

2) Building and contracting services. As well as a residential subscriber self-described as a "builder" this category included three building firms, an "Estate agents, Builders" and a "Builder's Ironmongers".

3) Public administration and defence related industries. This included three Hampstead institutions: Hampstead Borough Council, the Borough of Hampstead's electricity works, and the offices of the Willesden Board of Guardians.

4) Commercial, financial and insurance services. This was by far the largest category (53). Except for the Hampstead branch of the Norwich Union Life Insurance Society and six stockbrokers the bulk of the subscribers were traders. Twenty-two subscribers were self-described as merchants of various kinds, and there was also a coal factor and precious stone broker. The remainder were largely in retailing: fishmongers (2), florists (2), butchers (5), bakers (2), fruiterer (1), chemist (1), tailors (2), ironmongers (2), jewellers (1) and a confectioner (1). The category also included a banker (1), an importer/exporter (1) and a music warehouse (1).

5) Professional and technical services. Physicians and surgeons were the largest single category in this group (21). The category also included a dentist (1), solicitors (2), solicitors' firms (3), chartered accountants (2), electrical engineers (2), a consulting engineer (1), auctioneering and surveyors' firms (4), a Member of Parliament (1), a motor repair firm (1), and two court hairdressers (2).

6) Other. This category comprised ship-owners (2), a firm of dairy farmers (1), the Hampstead Electric Supply Company (1), a theatre owner and manager (1), and a company called "Super-aeration (1901 Ltd.)" about which I was able to find nothing further.

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