

Michele Javary and [Robin Mansell](#)
**Emerging internet oligopolies: a political
economy analysis**

Book section

Original citation:

Originally published in Mansell, Robin and Javary, Michele (2002) *Emerging internet oligopolies: a political economy analysis*. In: Miller, Edythe S. and Samuels, Warren J., (eds.) *An Institutionalist Approach to Public Utilities Regulation*. [Michigan State University Press](#), East Lansing, Michigan, pp. 162-201. ISBN 9780870136245

© 2002 [Michigan State University Press](#)

This version available at: <http://eprints.lse.ac.uk/10442/>

Available in LSE Research Online: August 2014

LSE has developed LSE Research Online so that users may access research output of the School. Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Users may download and/or print one copy of any article(s) in LSE Research Online to facilitate their private study or for non-commercial research. You may not engage in further distribution of the material or use it for any profit-making activities or any commercial gain. You may freely distribute the URL (<http://eprints.lse.ac.uk>) of the LSE Research Online website.

This document is the author's submitted version of the book section. There may be differences between this version and the published version. You are advised to consult the publisher's version if you wish to cite from it.

**Emerging Internet Oligopolies:
A Political Economy Analysis**

by

Michele Javary and Robin Mansell *

SPRU - Science and Technology Policy Research
University of Sussex,
Falmer, Brighton, East Sussex BN1 9RF, UK
Email: m.javary@sussex.ac.uk; r.e.mansell@sussex.ac.uk

First Draft - Not for citation or distribution without the authors' permission

Chapter prepared for a volume of essays honoring Harry M Trebing, edited by Warren J
Samuels and Edythe Miller, forthcoming Michigan State University Press, 2000.

29 November 1999

1. Introduction

Public utility regulation has been charged historically with protecting the public's interest. The behavior of monopoly or dominant incumbent suppliers in the telecommunication industry that may be consistent with the public interest has long been subject to controversy as has the issue of whether public intervention is needed to protect that interest. Viewpoints have varied between two poles. On the one hand, a "light touch" regulatory apparatus has been championed to promote the free play of market forces. On the other, regulatory intervention has been deemed essential to provide the discipline of the market and to protect the public interest in the development of infrastructure and services (Horowitz, 1989). Debates about the need for regulatory oversight and the impact of regulatory intervention in the United States have been continuous and often acrimonious.¹ With the establishment of a formal regulatory apparatus in the United Kingdom in 1984 there have been varying degrees of controversy over how best to ensure that the behavior of incumbent firms and the new entrants in the telecommunication industry is consistent with the public interest.²

The issues of whether, and in what form, regulation should be applied to the rapidly changing telecommunication infrastructure and related information and communication services markets are now considerably more complicated than they were in the monopoly era of telecommunication. From the mid-1990s, in the United States and Europe, the spread of the Internet as a platform for service applications for citizens and for the commercial sector has been challenging the incumbency of traditional telecommunication operators. Internet developments have provoked questions about whether new forms of regulation are needed to ensure that the evolutionary forces in the market for Internet access and related services produce outcomes that are in line with the public's interest in high quality, low cost services. Is there a case for regulatory intervention to protect the public's interest in the deployment of services that use the Internet as a platform?

For some analysts, such as Jason Oxman of the Federal Communications Commission (FCC) Office of Plans and Policy, the answer to this question is negative.³

Fundamental lessons learned from the Commission's thirty year deregulatory approach towards data networks include: do not automatically impose legacy regulations on new technologies when Internet-based services replace traditional legacy services, begin to deregulate the old instead of regulate the new; and maintain a watchful eye to ensure that anticompetitive behavior does not develop, do not regulate based on the perception of potential future bottlenecks, and be careful that any regulatory responses are the minimum necessary and outweigh the costs of regulation (Oxman, 1999: 3).

Given the nascent development of electronic commerce and the relatively immature Internet Service Provider (ISP) market, Oxman argues that there is no basis for regulatory intervention at present because of the large number of entrants into this market. In contrast, Bar et al. (1999: 3) argue that the FCC's support for "unregulation" of Internet developments "constitutes a fundamental policy reversal". They suggest that sustained policy intervention is needed to encourage the continuing evolution of an open network infrastructure and services.

As an observer of successive generations of technological innovation and their deployment in the telecommunication industry, Harry Trebing has brought substantial evidence to bear on the implications of changes in the structure of the industry, and the performance and conduct of both incumbents and new entrants. He has detected flaws in the "de" or "un" regulationists' reliance upon market forces by demonstrating empirically that market developments, in many instances, have been inconsistent with an adequate standard of protection of the public interest. With William G. Shepherd (1995) he has argued that market entry is rarely free and without limit and he has demonstrated that new entrants are often unable to establish themselves without fear of retaliatory moves on the part of incumbents

(Trebing, 1995: 404). He has suggested that, “the network is a form of commons and the societal goal should be to permit the greater participation of everyone in this facility ... The danger is that the discretion inherent in tight oligopoly will make the design and planning of the network more responsive to the monopsony power of the large user, or to the strategy of the incumbent firm as it seeks to enter new markets” (Trebing, 1995: 409). A principal consideration in determining the need for regulation and other forms of policy intervention is whether the benefits and opportunities associated with technological innovation are likely to “... be distributed on the basis of carrier discretion” (Trebing and Estabrooks, 1995: 543). Insofar as this is so, then the outcome “undoubtedly will be influenced more strongly by relative demand elasticities than by social values” (Trebing and Estabrooks, 1995: 543).

In the face of a new generation of technological innovations embodied within the Internet, and its rapid diffusion, there is a growing need for independent assessment of the “proper role for government surveillance and intervention” (Trebing and Wilsey, 1993: 274). We begin our assessment with the observation that competition is best understood as an evolving process, rather than as an end-state.⁴ Thus, firms should not be regarded as “... powerless economic agents adjusting passively to parametrically given techniques, prices and quantities but as agents actively seeking the reorganization of production and market activities in the context of rival’s possible reactions” (Corsi, 1991: 124). The competitive process that is engaging the firms in the ISP market may give rise to positive economic and social outcomes. Alternatively, it may contribute to the persistence of “monopoly focal points” and the emergence of an intensely oligopolistic industry structure (Trebing, 1998: 62). This is the issue we assess in this paper.

The phenomenal growth of companies providing access to the Internet in the United States and in the United Kingdom has suggested to some observers that rapid technological change and innovation are producing Schumpeterian (1961) “creative gales of destruction” that have sufficient strength to eliminate monopoly focal points thereby removing any

grounds for regulatory intervention to protect the public interest. Trebing has treated such conclusions with considerable suspicion. In fact, the dynamics of technological change may even strengthen the market power for key players in the industry (Trebing, 1998: 61). Our analysis in this chapter of the dynamics of the Internet industry focuses on the implications of the interplay between technological change and the control and co-ordination of emerging knowledge bases and capital flows within the industry. We conclude that there are strong signals that the processes of “creative destruction” are leading not to the erosion of market power, but to its reconstitution.

The outcome of the reconstitution of an oligopolistic industry is inconsistent with the public’s interest in the evolution of a network “commons”. We also conclude that it will be extremely difficult to address these developments within the confines of traditional industry-specific regulation. We acknowledge that digitalization and major changes in the cost/performance characteristics and architectures of the technological infrastructure for information and communication services are central features of the turmoil in the ISP industry and that there is considerable scope for new entry. Our examination of the investment strategies of key players in the ISP market in the United Kingdom illustrates that strategies are being implemented to effectively monopolize the co-ordination and control of the complex knowledge bases that are necessary for the supply of new services. The creation of new “monopoly focal points” is achieving more than a redefinition of control over the scale of market power on a spatial basis, i.e. the extension of control from national to global markets. It is also achieving a reconfiguration of the *scope* for market power, i.e. its extension into the control of new combinations of technological, knowledge and financial lock-ins as a means of securing the generation and appropriation of economic rents.

We develop this argument through an analysis of the financial linkages that underpin the evolution of the ISP market in the United Kingdom. A survey of consolidations, alliances and merger activity during 1999 provides a basis for our analysis of the various forms of lock-

ins that are occurring within the emergent ISP industry. In section 2 some of the insights arising from recent research on the relationships between the innovative technological architecture of the Internet and its market dynamics are highlighted. In section 3 a description of the networks of investors in the ISP market in the United Kingdom is provided as a basis for our analysis of the evolutionary pathways for the further development of the ISP market, which is presented in section 4. In the concluding section we reflect on the implications of recent developments for policy and regulation aimed at the protection of the public interest in the evolution of Internet-related services.

2. Researching Internet Market Dynamics

The focus of our analysis is on the evolving structure of markets for the supply of Internet access and the provision of Internet-related services by ISPs. The Internet has been defined as "...an international network of interconnected computers enabling millions of people to communicate with one another and to access vast amounts of information from around the world" [footnote omitted] (Federal Communications Commission, 1999: 3). An ISP "is an entity that provides its customers the ability to obtain on-line information through the Internet" (Federal Communications Commission, 1999: 3). Multiple ISPs may be involved in the transmission of Internet traffic from its origin to its destination as shown in Figure 1.⁵

Insert Figure 1 about here

The Internet emerged as a network to support defense-related scientific research. As Leiner suggests, however, economic issues have become increasingly salient as the network has become accessible to users outside the scientific community (Leiner et al., 1998). The Internet differs from earlier networks because the choice of any individual technology is not dictated by a particular network architecture. Instead, technologies can be selected by a

provider and made to “interwork” with other networks through a meta-level “Interworking Architecture”. The open architecture of the Internet means that networks can be “separately designed and developed and each may have its own unique interface which it may offer to users and/or other providers, including other Internet providers. Each network can be designed in accordance with the specific environment and user requirements of that network” (Leiner et al., 1998: 4).

The distinctive characteristics of the Interworking Architecture have been offered in support of the view that the evolutionary pathway is such that suppliers do not face barriers to market entry or exit. With the growth of the Internet to an estimated 56 million hosts by July 1999 and some 7 million World Wide Web sites by August 1999 (Zakon, 1999), commercial exploitation has been accompanied by fierce price competition in some segments of the markets served by ISPs. Huston (1999: 1) argues, however, that,

underneath the veneer of a highly competitive Internet service market is a somewhat different environment, in which every Internet Service Provider (ISP) network must interoperate with neighboring Internet networks in order to produce a delivered service outcome of comprehensive connectivity and end-to-end services, and therefore, every ISP must not only coexist with other ISPs but also must operate in cooperation with other ISPs.

Internet carriage service, i.e. traffic distribution, has become a commodity service that provides little opportunity for product differentiation. In the traffic wholesale business there are opportunities only for a relatively low rate of financial return. Most ISPs, therefore, are seeking to participate in service retail markets where there are opportunities for differentiating products and the potential for increasing profit margins.

The interdependencies between ISPs mean that there is a hierarchy within the Internet structure. For example, there is a small number of global ISP transit operators, a second tier of national ISP operators and a third tier of local ISPs. At each tier, the ISPs are clients of the tier above as shown in Figure 2. However, because there is a strong incentive to reduce costs and maximize revenues, ISPs often seek to establish direct interconnections that bypass this hierarchical relationship to their advantage. The aggregation of ISPs provides a basis for exploiting economies of scale and scope and for strengthening market position.

Insert Figure 2 about here

Huston (1999: 2) envisages two different trajectories for the evolution of the ISP market. On the one hand, a trajectory may emerge where quality of service differentiation and end-to-end tariffs are introduced in the Internet together with financial settlement arrangements between ISPs resembling those for telephony interconnections. On the other, the current Internet “uniform best effort environment”, which offers no basis for a uniform approach to revenue distribution, may prevail. In this case, incentives for the continuing consolidation of ISPs would remain strong. Huston (1999: 23) suggests that, “the Internet market is not a sustainable open competitive market. Under such circumstances there is no natural market outcome other than aggregation of providers, leading to the establishment of monopoly positions in the Internet provider space”. This evolutionary trajectory suggests that the competitive process will lead to variety reduction through increasing concentration in the industry and to the emergence of new “monopoly focal points”.

In the United States, the FCC appears to support the first trajectory as the more likely evolutionary pathway. On this basis it decided that there was no need for regulatory intervention, at least at present (Federal Communications Commission, 1999). The FCC relied on its interpretation of the competitive process, which has enabled many small ISPs to populate the market often serving the same geographical or “local” customer base. In 1998,

for example, more than 92 per cent of the population in the United States had access to a competitive local ISP market (Downes and Greenstein, 1998). However, Downes and Greenstein caution against drawing conclusions on the basis of this evidence about the presence or absence of barriers to market entry. They point to the relatively high start-up and running costs associated with developing viable ISP businesses and they allude to the knowledge bases that are likely to be essential for the provision of added value and differentiated services.

As an economic matter, starting and operating a node for a dial-up ISP involves many strategic considerations [references omitted]. Higher quality components cost money and may not be necessary for some customers. High speed connections to the backbone are expensive, as are fast modems. Facilities need to be monitored, either remotely or in person. Additional services, such as web-hosting and network maintenance for businesses are also quite costly, as they must be properly assembled, maintained, and marketed. Providing added value may, however, be essential for retaining or attracting a customer base. (Downes and Greenstein, 1998: 6)

From a public interest point of view, Downes and Greenstein (1998: 21) suggest that “Many issues will remain unresolved [for universal access] until future research on access analyzes the *precise determinants of firm entry and expansion strategies*” [emphasis added].

Further evidence in support of the second evolutionary trajectory for the ISP market is offered by Srinagesh (1997: 152) who suggests that the ISP market is one in which, “... prices have not lined up neatly with costs. ... Competition among firms with sunk costs can be problematic, especially when there is excess capacity ... Owners of physical networks may decide to avoid potentially ruinous price competition by *integrating vertically and differentiating their services*”. [emphasis added] (Srinagesh, 1997: 152). Srinagesh also highlights the importance of the knowledge bases that are important components of ISP

services such as customer support, information content, and methods of improving the reliability and quality of services. Both Srinagesh and Lehr and Weiss (1996) argue that these knowledge-related activities provide the basis for product differentiation and for adding value to Internet businesses. If substantial economic returns are to be generated, it is likely that ISPs will need to establish new “monopoly focal points”, not necessarily over access to the Internet, but over the information and content and the knowledge bases that are essential for product differentiation.

The economic viability of alternative business models for Internet-based content provision also have been subjects for investigation. For example, MacKie-Mason *et al.* (1996) suggest that the structure of the Internet architecture affects content provision in different ways depending upon whether the network is designed to be “application-aware” or “content-aware”. In the former case, ISPs can identify the general type of applications that are being invoked by users, e.g. e-mail, audio playback, or interactive video. In the latter case, the network can also be used to monitor and control the content that is transported. They argue that “network architecture can have important implications for the nature of information goods” (MacKie-Mason *et al.*, 1996: 205) and that ISPs can play an editorial role in selecting the content made available to consumers. These features mean that ISPs are likely to have strong incentives to consolidate their control over the knowledge bases that permit this “editorial role” to be performed.

ISPs are focusing on retailing a host of information products and services under a variety of business models and they have the potential to become significant intermediaries between citizens or customers and information creators (Eliasson, 1999). Their potential for growth depends upon whether they can “lock-in” their customers in a way that establishes a foundation for growth. This requires more than the achievement of traditional forms of “lock-in” that have characterized the carriage business in the telecommunication industry or the content business in the broadcasting and cable industries. It also requires the sealing of

supplier-client relationships with respect to information and content and it requires money. As Eliasson (1999: 6) suggests, the ISPs link communication transport infrastructures with the “syndication of electronic content”. Consolidation of this linkage requires the combination of capabilities for knowledge generation that are required for innovation and the creation of new value added products and services. This is similar to developments in other high technology industries where business success depends upon a match “between the development and deployment of bodies of technological knowledge, on the one hand, and commercially successful (or useful) working artifacts, on the other” (Pavitt, 1997: 11). The innovative performance of the ISP firms is likely to be dependent upon cognitive mechanisms that affect the boundaries of the knowledge base that firms are capable of exploiting; upon the specific types of co-ordination mechanisms that are used to support learning and innovation; and upon the control mechanisms that are in place for allocating resources between the divisions and business units of a firm.

In order to assess which of the two alternative trajectories for ISP market development is likely to prevail, it is essential to consider several dimensions of the competitive process in addition to those that are highlighted in this section. It is necessary to examine the transformations in financial markets that are influencing the capacity of ISPs to exploit new technological opportunities. To achieve a sustainable linkage between the carriage of “bits” and the provision of information services, new sets of financial flows must be organized and controlled and the institutional conditions must be put in place to secure strong economic returns. In the next section, we focus on developments in the ISP market in the United Kingdom. We hypothesize that the mergers and acquisitions in the ISP market will display a pattern whereby economic rents are being extracted by financial institutions in ways that: 1) bypass barriers to entry in existing markets; 2) reconfigure the market so as to reduce the high costs of learning associated with knowledge creation and the time needed to achieve customer lock-in; and 3) protect and control financial returns for investors.

The predominant viewpoint among policy makers in both the United States and the United Kingdom is that it is too early to employ regulation in the ISP market because this would threaten its growth potential. Another viewpoint is that “the broader consequences of oligopoly will be to adversely affect the infrastructure as a platform for supporting productivity growth throughout the economy” (Trebing, 1998: 65). The industrial dynamics of the ISP market are important because its prospects are intertwined with major shifts in economic activity within industrialized economies and with the distribution of employment opportunities and income.⁶ Insofar as the trajectory for Internet evolution implies new bifurcations in the market and the potential for lock-in, there may be a strong case for regulation to protect the social or public interest in Internet developments.

3. The Evolving Internet Service Provider Market in the United Kingdom ⁷

The ISP market in the United Kingdom is rapidly developing and, because of its smaller scale compared to the United States, it provides an interesting basis for analysis of the features of investment and their implications. The ISPs in Britain fall into three categories: 1) national Internet access providers serving mainly British companies using reciprocal or peering arrangements with overseas firms to provide international service; 2) international Internet access providers including companies that own, or are building, world-wide networks; and 3) private network providers, including the majority of national and international data networking service firms that use private network infrastructures and management, such as the large telecommunication companies, computing service companies and a number of small private network operators (Durlacher, 1997). In the first quarter of 1997, nearly all the ISP activity in the United Kingdom was in the first category. The market showed signs of becoming bifurcated between the dial-up access market and the access and related services market for corporate users where efforts were underway to achieve product differentiation and there were expectations for market consolidation (Durlacher, 1997).

By July 1999, there were about 5.8 million dial-up users of ISP services (including subscription-free services) in the United Kingdom and the first non-metered usage ISP services were expected in the fourth quarter of the year (Durlacher, 1999a). The number of ISPs providing high-speed leased line access services was growing rapidly. It was estimated that close to 99 per cent of large organizations were connected to the Internet and that as many as 95.6 per cent of British-owned companies were outsourcing some services, including web hosting, remote access, web design and consulting (Durlacher, 1999b). By 1999 in the dial-up market, efforts were underway to secure a basis for further growth. Our analysis focuses on this market because the target customers are mainly citizens, consumers and smaller firms. Tables 1 and 2 show the estimated market shares held by the subscription free and subscription based segments of this market as of July 1999.

Insert Tables 1 and 2 about here

The ISP market in the United Kingdom differs considerably from that in the United States in a major respect in addition to its relatively smaller size. In Britain, end users pay charges for local dial-up connections to the ISP in contrast to the flat rate pricing of local service in most places in the United States. In the United Kingdom, ISPs may offer a flat rate for monthly service and by the middle of 1999 they had started to offer “free” services. In addition, leased lines required by ISPs in the United Kingdom are more costly than in the United States. Our analysis is based on investor and supplier activity at the end of August 1999. We map the patterns of ownership and control that link investors and the large ISPs in this market in considerable detail in the following section to provide a basis for examining two closely related processes of consolidation. The first involves the large firms that emerged following the wave of market liberalization, which affected the former public utility operators. The second involves a new tidal wave of American investors in the United Kingdom and continental European markets.⁸

3.1 The Giants' Trail: Growth and Transformation

There was rapid growth in the numbers of British companies offering Internet access and services in the first half of the 1990s. This early phase in ISP development was marked by the growth of new entrants, some of which achieved a relatively strong leadership position. In July 1999, for example, Demon Internet was ranked second to America OnLine/CompuServe in terms of market share in the subscription dial-up market, and Global Internet (a subsidiary of ITG - Internet Technology Group) was ranked fourth (Durlacher, 1999a). Other fast growing new entrants have maintained a high profile during the consolidation of the ISP industry. For example, Internet Network Services was ranked fifth in terms of market share in the subscription dial-up market in March 1997 (Durlacher, 1997). We use these estimates of market position as benchmarks of the significance of the new entrants' remarkable growth and of their efforts to sustain their positions in a rapidly changing market.

It is not just the fast growing entrepreneurial ventures that have been securing their positions in the ISP market in the United Kingdom. The incumbents that emerged from the privatization of the public utilities, including electricity and telecommunication as well as the broadcasting authorities, have been assessing the scale and scope of these markets. Since the mid-1990s, the incumbents have been intensifying their strategies for entry into the ISP market and strengthening their positions in the market segments related to services for consumers and small businesses as well as those aimed at the large corporate users. By the end of the 1990s, following a wave of mergers and acquisitions, the incumbents had acquired many of the most successful early entrants. They also had forged global partnerships and/or merged their operations with American-owned companies. In the following, we depict some of these developments for the largest ISPs and we map some of the alterations in their ownership and control structures. Figure 3 provides an outline of the landscape of the consolidation of the ISP market in the United Kingdom.

Insert Figure 3 about here

We begin with the trail established by entrepreneur, Cliff Stanford, who launched Demon Internet in 1992 with a personal investment of £20,000. The history of the phenomenal growth of Demon Internet as an ISP focused mainly on corporate clients is instructive. Demon reached a turning point in May 1998 when, after six years of development of a customer base from zero to 180,000, the company was acquired by Scottish Telecom. Stanford made a personal fortune of £66 million and went on to create a new venture, Redbus, a consultancy company for innovators, entrepreneurs, and business start up. Demon became a wholly-owned subsidiary of Scottish Telecom. The trail does not end here, however. Scottish Power plc, Scottish Telecom's parent, was formed following the privatization of the electricity supply industry in 1990 and the break-up and flotation of the Central Electricity Generating Board (CEGB). It has followed a global strategy for growth like most of the privatized off-spring of the former publicly-owned utilities.

In December 1998, the same year as the acquisition of Demon, Scottish Power announced a merger with PacifiCorp, an electric utility in the United States. As a result of this merger, PacifiCorp became a wholly-owned subsidiary of ScottishPower, the agreed name for the newly integrated company, and ScottishPower expected to enhance the potential for global expansion. Similarly, Energis, the telecommunication network operator and spin-off from The National Grid, the transmission branch of the former CEGB, has consolidated its competitive position in the market vis-à-vis the largest incumbent, British Telecommunications plc., or BT. BT, the former monopoly telecommunication operator, continues to controls some 80 per cent of the revenues generated by domestic telephone services in the United Kingdom. One aspect of the competitive response by Energis and Scottish Telecom has been to establish a network capacity sharing agreement.

Like Scottish Telecom, Energis has sought to strengthen its position in the information services market by acquiring Planet Online in August 1998. Planet Online is a successful new entrant in the Internet access and service provider market. Formed in July 1995 in Leeds with the financial backing of the Yorkshire property tycoon, Paul Sykes, Planet Online was launched in September of the same year. Focusing on providing high performance Internet and Intranet solutions for the corporate business market, the company enjoyed substantial growth and achieved a turnover of £24.7 million in March 1998. Paul Sykes realized a £41 million capital gain from the sale of Planet. Energis, having consolidated its position in the corporate market,⁹ was instrumental in the launch of Freeserve. This is the largest subscription-free ISP in the consumer segment of the market and the company is a wholly-owned subsidiary of Dixons Group plc.

Freeserve's launch followed in the innovative footsteps of a small new entrant, X-Stream. This company had started a subscription-free ISP service funded by advertising revenues early in 1998. Dixons Group plc, Freeserve's parent, in contrast to X-Stream, had substantial assets and a strong position in the consumer retail market, which has provided the venture with considerable "launching" as well as "staying power". With nearly 33 per cent of its shares held by four of the most prominent financial institutions in the City of London,¹⁰ Dixons Group, which is the largest retail outlet for electrical appliances in Britain, provided Freeserve with a secure financial base and a large potential customer base. This backing helped to take Freeserve to a leadership position in the consumer market in the record time of four months. Through a partnership with Energis, Freeserve obtained access to the necessary infrastructure and used the Dixons Group's extensive distribution network of 350 stores to offer Microsoft's free Internet Explorer software.¹¹ BT's quasi-monopoly position in the domestic market means that the majority of dial-up calls destined for Freeserve, and which are carried over the Energis network, originate on BT's facilities. Nevertheless, Freeserve and Energis have reaped the benefit of their partnership. Freeserve has been able to generate revenues by taking a share of the revenues generated from the telecommunication usage

tariffs charged by BT to end-users for carrying traffic over its network, a percentage of which are rebated to Freeserve's carrier, Energis.

The subscription-free dial-up ISPs are generally developing a thriving market. However, there is one important reservation. Since January 1999, there has been an increase of 50 per cent in the average number of failed dial-up calls (Murphy, 1999). The growth of the new entrants in the subscription-free dial-up market is being accompanied by the rapidly increasing presence of large media companies. News Corporation and Rupert Murdoch's Sun Newspaper, for example, launched a successful ISP named CurrenBun in 1998.¹² By harnessing the advertising power of its owners, CurrenBun was able to achieve third position in this segment of the market by July 1999. LineOne, a joint venture between BT, News International (a News Corporation subsidiary), and United News and Media,¹³ was in fifth position in 1999 (Durlacher, 1999a). To meet the competition, BT also launched a subscription-free dial-up ISP named BTClickfree. Freeserve continued to dominate the subscription-free segment of the market with an estimated 32 per cent market share in July 1999 and some 1.32 million active registered accounts as of June 1999. To consolidate their partnership, Energis acquired 5 per cent of Freeserve's ordinary shares in June 1999 (Computerwire Inc., 1999) and, as a result of Freeserve's initial success, Dixons' share price has doubled (Murphy, 1999).

The growth of the subscription-free dial-up market has led to numerous disputes and protests between the competitors. For example, American Online (AOL) UK has claimed that ISPs that are linked to telecommunication network operators are putting the ISPs that are independent at an unfair disadvantage (Computergram International, 1999). Although there are concerns about the viability of the small "free" ISPs which provide services for charitable or education organizations, this issue is not likely to be the concern of AOL UK. In the consumer market targeted by ISPs, attention is focusing on the potential for loss of revenues further along the value added chain. It is also focusing on the use of subscription-free dial-up

ISPs as a potentially loss making marketing tool to achieve customer lock-in to virtual mazes of carefully designed electronic commerce galleries. Advertising provides an uncertain foundation for future revenue growth and it will be necessary for these ISPs to devise ways of creating new opportunities for sustained growth. As we discuss below, American Online Corporation, based in the United States, entered the British subscription-free dial-up ISP market with the launch of Netscape Online in the autumn of 1999.

National Grid plc,¹⁴ the parent company of Energis, like its counterpart ScottishPower, has been forging partnerships and consolidating its market overseas.¹⁵ National Grid plc is to acquire the New England Electric System (NEES) and, subsequently, Eastern Utilities Associates (EUA) after approval of the merger by the state authorities.¹⁶ Changes in the National Grid's corporate structure have been agreed by its shareholders. By the autumn of 1999, approximately 15 per cent of the company's stock was held by two prominent financial institutions, HSBC Investment Bank and a subsidiary of The Prudential Corporation plc. The Prudential Corporation also holds a significant 6.03 per cent share of Scottish Power plc. Scottish Power's strong growth rate is underlined by its substantial increase in dividend payments averaging 12.7 per cent per annum (Scottish Power plc, 1999).

The merger of Scottish Power with the American electricity supply company, PacifiCorp, was strongly recommended to PacifiCorp's shareholders with a full guarantee of the value of their shares. Under this agreement, the premium for PacifiCorp's shareholders was guaranteed at 26 per cent above the market price of the company's common stock. The conversion of PacifiCorp shares into American Depository Shares or ScottishPower ordinary shares was guaranteed on a tax free basis, and fractional shares were to be paid in cash. For its part, The National Grid announced exceptional dividend payments of 44.7 pence per share in 1998. This means of improving capital efficiency was achieved by returning "excess capital" to shareholders. BT's failed attempt at a merger with MCI was replaced by partnership

agreements with AT&T, while, at the time of writing, MCI-WorldCom was planning a merger with SPRINT, another of the large telecommunication network operators in the United States.

Developments in the ISP market in the United Kingdom have been characterized by the convergence of the ISPs with the telecommunication network operators. This has taken place against a backdrop of the changes since privatization in both the telecommunication and electricity sectors in the 1980s and 1990s. In the former case, these changes have been characterized by the slow erosion of BT's monopoly position. In the latter, they have been characterized by the entry of the incumbents into related technological fields. For example, some of the electricity companies have diversified from transmission into the telecommunication sector.

Other developments in the ISP and the telecommunication market in the United Kingdom have provided the source for a different process of convergence in the knowledge base which supports the emerging industry. They have also contributed to a process of re-definition and consolidation of the economic and corporate governance of associated markets. These developments are related to transformations in the cable television industry, which follow, in part, from the privatization of the Independent Broadcasting Authority. This process of transformation is illustrated by the experience of National Transcommunications Limited Inc. (NTL Inc.) and the corporate restructuring of Cable & Wireless Communications plc. (CWC), a subsidiary of Cable & Wireless plc. This restructuring involved the division and reintegration of CWC, and its acquisition of the ISP, Internet Network Services (INS), a new entrant in the British market.

NTL Inc. was established in 1997 as a result of the acquisition of the privatized transmission network of the former Independent Broadcasting Authority (IBA), National Transcommunications Ltd. The former engineering arm and network backbone of the IBA was acquired by a small entrepreneurial cellular telephone company that had entered the cable

and telecommunication industry under the name of International CableTel (NTL Inc., 1998). The new company, NTL, resulted in the merging of state-of-the-art engineering capabilities for the development and management of terrestrial and satellite networks and fiber optic technologies. NTL's consolidation of its technological assets and capabilities and its positioning in related segments of the market have produced a blazing trail of acquisitions. For example, in the year following its formation, NTL signed contracts with the telecommunication carrier, Energis, and the (indirect) wholly-owned subsidiary of the FMR Corporation (the Fidelity Management and Research Company/Fidelity Group), Colt Telecom, which had been operating in the United Kingdom market.¹⁷ By 1999, NTL had acquired ComTel (including Telecental Communications), all the cable television and telecommunication outstanding stock of ComCast UK Cable Partners Ltd. via its subsidiary NTL Bermuda Ltd. as well as Diamond Cable. To consolidate its regional networks, NTL had also acquired Eastern Group Telecoms (in the United Kingdom), and, respectively, 40 and 30 per cent of the outstanding stock of CableTel Newport with cable television and telecommunication franchises in South Wales. It also acquired Cable Enterprise Inc., the owner of cable television and telecommunication franchises in the northern suburbs of London. These consolidations were compounded by the purchase of the largest Irish cable television provider, Cablelink Ltd. All these companies became wholly-owned subsidiaries of NTL.

Parallel to these acquisitions, NTL had developed a base of 200,000 customers in the Internet market. With a strong partnership as backbone provider and as part-owner of the subscription-free dial up ISP, Virgin Net,¹⁸ NTL added the entrepreneur, Richard Branson's brand name to its market assets. In 1999, NTL Inc. declared that it had become 'the largest broadband telecommunications provider in the UK and Ireland as measured by number of customers' (NTL Inc., 1999). The competitive challenge mounted by NTL appears to have heightened the pressure on the incumbent telecommunication operators in the local services market. BT felt the pressure when NTL acquired BT Cable Services in July 1999, but the

main competitive threat has been to Cable & Wireless Communications plc. Trends in the further consolidation of the ISP market are suggested by the developments that led to the restructuring of Cable & Wireless Communications plc (CWC) and which produced a turning point in the expansion of NTL Inc. The restructuring of CWC took place against the background of a transaction between Cable & Wireless Communications and NTL that occurred at about the same time as the acquisition by NTL of BT Cable Services . The details of this transaction provide a glimpse into the process of re-defining the market scale and scope for NTL and Cable & Wireless. It also affected Telewest Communications, another competitor in the British cable market.¹⁹

The transaction between NTL and CWC marked out a framework for the reorganization of the two companies' core market, extended their geographical coverage, and defined new boundaries for their operational domains of expertise as well as their future development. These developments provide a foundation for future 'lock-in' of the customer base that are likely to influence the co-ordination and control of capital flows. Cable & Wireless Communications (CWC) plc., a 53 per cent owned subsidiary of Cable & Wireless plc., was created as the result of a merger between NYNEX Cablecomms, Bell Cablemedia, Videotron and Mercury Communications in April 1997 (Cable & Wireless Communications plc, 1999). With this merger, CWC took the lead in the consolidation of the cable industry and became the first British cable operator to offer digital television. As a result in 1998 CWC was the largest provider of integrated telecommunication and television services measured by revenue. It had a broad range of facilities and provided local, national and international voice, data and Internet services. It was among the largest British carriers of wholesale telecommunication traffic and the ninth largest carrier of international telecommunication traffic. In July 1999, Cable & Wireless plc, Cable & Wireless Communications plc (CWC) and NTL Inc. made a joint announcement regarding the restructuring of CWC and the subsequent separation of the company's business into two branches: CWC DataCo with its corporate, business, international and wholesale operations, and CWC Consumer Co,

comprising the consumer cable telephone, Internet and television operations. While Cable & Wireless plc acquired complete control over CWC DataCo, the ownership of CWC Consumer Co was transferred to NTL Inc. The acquisition of CWC Consumer Co put NTL in the lead position in the United Kingdom as the largest cable television company, ahead of Telewest Communications. NTL's consolidated cable network covers over half of British households passed by cable. With full control over DataCo, Cable & Wireless plc set out to integrate its corporate and business activities in the global market and shifted its focus towards rapid growth of the corporate data and Internet markets. The restructuring was designed to enable the company to consolidate and rationalize its operations to compete more effectively in the international end-to-end business services market.

The transformation of the NTL and Cable & Wireless businesses was accompanied by settlements that resulted in the reorganization of capital flows. The acquisition of CWC Consumer Co. and BT Cable Services by NTL was backed by financing from France Telecom. An agreement with France Telecom enabled NTL to recover the cash paid to CWC shareholders and gave France Telecom a 25 per cent stake in NTL. The transaction between CWC and NTL also resulted in CWC's receiving approximately 10 per cent of NTL's common shares.²⁰ Microsoft Corporation contributed to NTL's refinancing by investing US\$ 500 million in NTL convertible preferential shares as part of an agreement to support the deployment of high-speed voice, video and data services. This was intended to boost NTL's capacity to develop innovative services and to implement new technologies (NTL Inc., 1999). As a result Microsoft holds about 5.25 per cent of NTL stock. The consolidation of CWC and the acquisition of the remaining shares in CWC DataCo, involved a redistribution of shares from the new company.²¹ At the Cable & Wireless plc. Annual General Meeting in July 1999, the Chairman, Sir Ralph Robins, presented the company's plan for a world-wide strategic repositioning with a concentration on the development of the data and Internet businesses. The earlier acquisition of MCI's Internet business in the United States in September 1998 was

consistent with this announcement as was the acquisition of Internet Network Services (INS) in the United Kingdom.

Internet Network Services (INS) (Holdings) Ltd. was created in 1995 by three entrepreneurs. Tim Chanellor, founder and managing director, had considerable experience in the computer industry. His entrepreneurial record had been achieved following the launch of a business that manufactured and distributed IBM PC compatible machines in Taiwan. After selling this business to investors he worked as an independent consultant. He entered the Internet business in 1990 by designing, building and selling dial-up systems to corporate customers and education establishments. Nina Steel was experienced in marketing and Richard Almeida was responsible for the design, construction and operation of TCP/IP routers that were used to support the backbone of the early university networks in the United Kingdom.

INS was supported by two key investors: Baring Communications Equity and Spectrum Equity Investors LP. By 1997, INS was ranked fifth among the Internet access and service providers in the United Kingdom (Durlacher, 1997: 2). INS achieved a 150 per cent growth rate between 1996 and 1997 and a phenomenal 550 per cent growth rate in 1997-1998 prior to its acquisition by Cable & Wireless. In 1998, before it was acquired by Cable & Wireless plc, INS purchased Wisper Bandwidth plc., a company founded in 1996 with the ambition of becoming a global Internet backbone provider. The acquisition of Wisper gave INS an increased European presence and direct connectivity with several major European business centers. INS was highly regarded for the quality of the service it provided to corporate users by offering customized solutions, such as filtered Internet connectivity, web hosting, managed co-location services, Virtual Private Networks, and Extranets and Intranets. INS fitted in well with the profile needed to accomplish the Cable & Wireless strategic repositioning (Cable & Wireless Communications Plc, 1999).

Telewest Communications plc, a major competitor to NTL and a strong potential competitor of Cable & Wireless in the global data and Internet services market, consolidated its position in 1998. Telewest Communications' major shareholders are Microsoft Corporation and Libert Media, a subsidiary of AT&T, with 29.9 and 21.6 per cent of its stock, respectively. Telewest set out to expand its activities in the corporate segment of the ISP market in the United Kingdom with the development of Cable Internet, a data and Internet service provider launched in 1995. Following NTL's acquisition of CWC Consumer Co, Telewest's prospects for market expansion in the United Kingdom were constrained and it now ranks as the second largest cable operator in the market.

Developments in the market in Britain also have been affected by a transaction between the two giants, MCI-WorldCom and American OnLine Corporation (AOL). In the last quarter of 1997 and in early 1998, MCI-WorldCom and AOL in the United States agreed to a bilateral sale and purchase of assets involving ANS Communications Inc. and CompuServe, the respectively wholly-owned subsidiaries of AOL and MCI-WorldCom. CompuServe provides Internet access connections and innovative customized applications. It has a large world-wide subscriber base. ANS Communications Inc. is a managed network service company that provides Internet connections, remote dial-up access, and security solutions. The company claims to manage one of the largest and fastest Internet services in the world and it is expanding.

As a result of the agreement between AOL and MCI-WorldCom, MCI-WorldCom transferred the CompuServe business to AOL together with a cash transaction of US\$ 147 million, and ANS Communications Inc. was transferred to MCI-WorldCom. The transactions were complemented by a settlement of US\$ 75 million from the German publishing company, Bertelmann AG, resulting in a 50 per cent interest in the newly created joint venture involving CompuServe Corporation. AOL generated US\$ 207 million as a result of these transactions and consolidated the "material conditions" for a strategic agreement with MCI-WorldCom.

This agreement sealed an important collaborative relationship aimed at the development of high capacity networks within and outside the United States. However, the foundation of the settlement and the relationship between AOL and MCI-WorldCom is multifaceted and runs much more deeply than this. AOL's entry into the ISP market in the United Kingdom highlights several other aspects of the momentum achieved as a result of the consolidation of corporate, financial, and knowledge networks and the contribution of the latter to the design and implementation of corporate strategies. These developments have contributed to the leading position that AOL has achieved in the United Kingdom market in approximately three years. Figure 4 shows the corporate network surrounding AOL, MCI-WorldCom and Verio Inc. This figure highlights developments that have shaped the ISP market in the United Kingdom.

Insert figure 4 approximately here

Three elements are particularly important in this set of network relationships. The first relates to the co-ordination and control of financial flows and the recurring presence of at least one common investor with a significant financial stake in three of the major players in the network. In this instance, FMR Corporation, also known as the Fidelity Group, has significant holdings in AOL, Verio Inc. and MCI-WorldCom. Its significant position in the network is compounded by the fact that it is related to two other players in the United Kingdom telecommunication and ISP market. One of these is Colt Telecom, an indirect wholly-owned subsidiary of FMR Corp.. Colt Telecom is also a partner of NTL alongside Energis as we saw in the earlier discussion and the parent of Colt Internet, which was launched in 1993 in the United Kingdom. The other is Concentric Networks of the United States, which was in the process of acquiring a partner, Internet Technology Group (ITG), in the summer of 1999. ITG is the parent of Global Internet, which was ranked fifth in the

subscription-based dial-up market behind AOL, CompuServe, Demon Internet and BT Internet in July 1999 (Durlacher, 1999a).

The second element that comes to light from this analysis of these networks of relationships is that another significant investor in Verio Inc. is Brooks Fiber Property, a wholly-owned subsidiary of MCI-WorldCom since January 1998.²² This means that 28 per cent of Verio Inc. stock is held in the hands of two of the prominent players in the network that we are considering here. The third element relates to the co-ordination and control of knowledge flows within this network of organizations. This aspect can be illustrated by examining the shared directorships between AOL and MCI-WorldCom and between MCI-WorldCom and Verio Inc., as well as within a partnership between AOL and Verio Inc.

AOL's Chairman and Chief Executive, Stephen Case, is a member of the board of MCI-WorldCom. He is also a member of the Board of Directors of the New York Stock Exchange. MCI-WorldCom's Director, James C. Allen, is a member of the Board of Verio Inc. MCI-WorldCom gained a presence in the United Kingdom ISP market through a merger with UUNET in 1998, a leader in the market with an estimated 33 per cent share in 1997 (Durlacher, 1997). AOL's partnership with Verio Inc. was forged in the United States and was an essential element in the strategic development of AOL/CompuServe's leadership position in the United Kingdom after the company's launch in January 1996. AOL has an exclusive agreement with Verio Inc., a large Web-hosting company and business-oriented ISP in the British market, which has targeted small and medium-sized businesses. A survey of 1,100 companies in July 1999 estimated that Internet penetration among small and medium-sized enterprises in the United Kingdom had increased by 37 per cent over the preceding 12 months to reach 77 per cent. However, this growth was accounted for mainly by the uptake of subscription-free services and it was estimated that only one per cent of these companies was making full use of the Internet's potential (Durlacher, 1999a). Verio Inc. launched Verio UK in 1997. Verio UK consolidated its position in June 1999 by acquiring a domain name

registration company called Rapidsite UK, which had been launched in 1997. The parent company, Verio Inc., is also a substantial investor in VIA NET.Works which owns two British entrants in the ISP market, I-way and U-NET UK, launched respectively in 1995 and 1994.

On the strength of these financial and strategic partnerships, AOL started an aggressive campaign to build market share in the British market in both the consumer and business segments, which are the core competence domains of CompuServe. By the summer of 1999 AOL, together with CompuServe, had achieved a one million strong subscriber base in the British market. AOL's acquisition of Netscape Communications Corporation, which was consolidated by a stock-for-stock transaction valued at US\$ 4.2 billion, gave AOL control of the most popular web portal in the British market, thereby reinforcing the potential of electronic commerce for both companies. This strategic merger was further consolidated with the appointment of the entrepreneur and Netscape co-founder, Marc Andreessen, as Chief Technology Officer of AOL in the United States (America OnLine, 1999b). Building on the strength of the acquisition of this portal, AOL launched a new venture, Netscape Online, in the subscription-free ISP market in the United Kingdom through a retail distribution agreement with Kingfisher plc. in September 1999. Earlier in the same month, Netscape Online software was co-branded with Woolworths for distribution in the United Kingdom (America OnLine, 1999a).

In 1998, AOL had begun consolidating its core businesses in the United States by acquiring companies that were active in various segments of the interactive Internet service markets.²³ These acquisitions equipped AOL with the necessary tools for the provision of highly customized services. The business strategy is aimed at encouraging users of the services to invest their time in tailoring services to match their preferences. Once they have invested their time, it is expected that users will perceive the "switching" costs of exiting AOL services as being relatively more significant, thus strengthening the company's capacity

to lock-in customers and build market share. This strategy is illustrated in the following quotation.

Personalization and Control Features-Members can personalize their [the member's] experience on the AOL service through a number of features and tools, including a reminder service that sends e-mail in advance of important events, stock portfolios that automatically update market prices, Mail Controls, which allow members to limit who may send them e-mail and to block certain types of e-mail, Favorite Places, which allows members to mark a particular Web site or AOL areas, and Portfolio direct and News Profiles, which send stories of particular interest to members. The AOL service offers Parental Control to help parents form their children's online experience, including tools that limit access to particular AOL areas or Web sites or to certain features (for example, the AOL Instant Messenger service or receiving files attached to e-mail or embedded pictures in e-mail, or access to premium services). The Marketing Preferences feature enables members to elect not to receive certain marketing offers. (America OnLine, 1999c: 4)

Within the United States, AOL has been reorganized into three components: the Interactive Service Group, the Interactive Properties Group and the AOL International Group which oversees AOL and CompuServe services outside the United States. This restructuring appears to have created the conditions for achieving technological and information "lock-in" in a variety of areas that may help to secure the company's development with respect to both market scale and scope.

3.2 Summary

The changes in the ISP market in the United Kingdom are reminiscent of the reconfiguration and emergence of "monopoly focal points" in earlier phases of the evolution

of network related industries. Our analysis of the technological, financial and knowledge networks that support the growth of the Internet-based information and communication services market in the United Kingdom suggests the way in which the emerging focal points are shaping the new segment of the industry. Recent transformations have begun to produce service differentiation through various forms of market control. This process is marked by a bifurcation between the subscription-free dial-up ISP market, which mainly targets consumers and small firms, and the subscription-based dial-up ISP market, which increasingly is targeting corporate customers. In the British market, emerging corporate linkages are characterized by the convergence of the ISPs with telecommunication network operators. These developments are taking place against the backdrop of the erosion of BT's monopoly position in the domestic market and the entry of large incumbents from the electricity industry and the former public broadcast distribution sector. These changes have been accompanied by joint ventures and partnerships between the ISPs and the media, information technology and software firms.

The large British-owned incumbent firms have been establishing a strong presence in global markets, but they have met fierce competition in their domestic market from American-owned firms. The British-owned incumbents have been seeking to strengthen their positions through acquisitions or mergers with American-owned companies, while the American-owned companies have been consolidating their positions in their own domestic market as in the case of AOL. On the strength of their alliances in the American domestic market, American-owned firms such as AOL/CompuServe have enjoyed a swift and initially successful launch in the British domestic market and they have been expanding into the continental European market. Continental European telecommunication network operators, such as France Telecom, have also increased their presence in British market.

4. The Race for the Self-fulfilling Prophecy

We suggested at the beginning of this chapter that the emergence of new “monopoly focal points” in the ISP market involves more than a redefinition of the scale of the market power accruing to companies that are participating in markets associated with the development of the Internet. The analysis in the preceding section suggests that the emergence of the new focal points involves a reconfiguration of control over key knowledge bases. This process appears to be the result of an innovative combination of technological, financial and knowledge networks in ways that achieve effective customer lock-in. Insofar as this strategy is successful within the domestic market, there is a case for national governments to intervene to ensure that the market evolves in a way that is consistent with the interests of citizens, consumers and small firms.

One conception of the Internet that has found widespread acceptance is that its open architecture supports an information and communication “commons” where social, cultural and economic aspirations of all kinds are valued. An alternative conception envisages the emergence of a bifurcated networking environment. In this view, and in the particular case of the United Kingdom market, the provision of sophisticated Intranet and Extranet services for large business users is consistent with the circulation and accumulation of financial capital in the interest of very large (mainly foreign) firms. This development will have profound public interest implications if it occurs in parallel with long term under-investment in the Internet infrastructure and the information and content of services that are accessible and affordable for citizens, consumers and small firms. Indeed, it is this development trajectory that appears to be emerging in the market in the United Kingdom.

4.1 Interpreting the Trail: Consolidating Financial and Technological Control

Building a new industry in an uncertain technological and commercial environment requires massive investment. The process of building the ISP market can be expected to give rise to new predominant forms of corporate relationships and these must be expected to

influence the market dynamics and trajectories within both the new industrial segment and related existing market segments. The implications of linkages between sources of finance and control over the strategic behavior of enterprises are a central theme in the literature on the determinants of corporate organization and industrial structure. The problems of financing large-scale operations are described in this literature as being central to the implications of a separation of corporate ownership and control.

For example, when the concentration of economic activities forced the breakdown of family “tenure” and the increasing importance of capital raised on the stock exchange, liberal managerial theorists argued that decision-making power over the co-ordination and control of corporate assets would be entrusted to corporate managers (Berle and Means, 1932). Marxist analysts, in contrast, tended to highlight the greater significance of the development of finance capital for the emerging joint-stock corporation. Menshikov (1969), for instance, regarded the joint-stock company as an indicator of the growing power of financiers over corporate affairs. While the former expected the development of the joint-stock company to give rise to managerial autonomy, the latter suggested that “property” would remain a central determinant of the power structure influencing the behavior and performance of corporations.

In the 1980s research by Scott (1985; 1986) and Mintz and Schwartz (1985) has revisited debates about the role of finance and corporate control. Drawing on Mintz and Schwartz’s work, Scott (1993) argues that while decision-making may be insulated from direct intervention by shareholders, the shareholders’ control derives from property relationships and the legal rights conferred by share ownership. Share owners have rights over the disposition of income and they have voting powers with respect to corporate affairs. In questioning the polarized views of the liberal management and Marxist theorists, Scott (1993: 295) argues that control should not be considered in terms of a *simple* relationship between ownership and managerial powers of decision-making. Instead, issues of control should be considered within the context of the “institutional constraint” that is exercised by shareholders

over decision-making processes. This constraint is embedded in the dynamics of a given share ownership structure. Thus, he argues that, “it is now the strategic actions of the financial intermediaries in Britain and in the United States which are most influential in determining the constraints under which enterprises act” (Scott, 1993: 295). Scott’s view of the implications of linkages between sources of corporate finance and control over the strategic behavior of enterprises transcends the positions of the liberal managerial and Marxist theorists. For Scott, issues of ownership and control must be considered in the light of relations of power and the constraint created through networks of inter-corporate relationships (Scott, 1993: 294).

The development of the British ISP market illustrates how networks of inter-corporate relations have been sealed through shareholder arrangements that bind sets of (multinational) financial organizations and firms. In some instances, these relationships are reinforced by interlocking directorships. We have underlined the significant presence of a small number of large financial institutions as shareholders that are at the heart of the emerging ISP corporate networks in the United Kingdom. These institutions include The Prudential Corporation, HSBC Investment Bank, Mercury Assets Management, Merrill Lynch & Co. in the United Kingdom, and the FMR Corporation in the United States. We have also highlighted the inter-corporate direct and indirect shareholdings between companies, such as Microsoft and AT&T’s investments in Telewest Communications, or MCI-WorldCom’s indirect holding in Verio Inc. via its subsidiary Brooks Fiber Properties. Our map of developments in the ISP market in the United Kingdom appears to corroborate Scott’s assessment of the significance of institutional shareholders within networks of corporations.

However, the institutional constraint highlighted in Scott’s work is also expressed through the conditions created by ownership relations for the co-ordination and control of capital flows (Mintz and Schwartz, 1985). These, in turn, influence the conditions for the production of goods and services. (Keynes, 1936) identified the significance of these “new”

property relations for the dynamics of industrial growth that emerged alongside the development of joint-stock companies. He argued that these dynamics would constrain capital flows and that they would overcome the “pragmatically” grounded expectations of entrepreneurs. For example,

With the separation between management and ownership which prevails to-day and with the development of organised investment markets, a new factor of great importance has entered in, which sometimes facilitates investments but sometimes adds greatly to the instability of the system. ... But the stock exchange revalues many investments every day and the revaluations give a frequent opportunity to the individual ... to revise his commitments. It is as though a farmer, having tapped his barometer after breakfast, could decide to remove his capital from the farming business between 10 and 11 in the morning and reconsider whether he should return to it later in the week. ... Thus certain classes of investments are governed by the average expectation of those who deal on the Stock Exchange as revealed in the price of shares, rather than by the genuine expectations of the professional entrepreneur [footnote omitted]. (Keynes, 1936: 150-1)

The ISP “constellation” in the United Kingdom appears to be subject to the increasing pressure of large institutional shareholder expectations and the accompanying set of institutional norms that constrain the co-ordination and control of capital flows in the emerging market. The predominant expectations are for an increasingly rapid turnover time of capital and rapid growth in profits. These expectations are punctuating strategic decision-making within the ISP firms. While this is significant for the potential for financial lock-in, the evidence of the “trail” of investment suggests further implications for the evolution of this market. To highlight these, it is necessary to consider the processes of technical change and innovation in this industry and their implications for service production.

The dynamics of technical change and innovation are largely unexplored in the literature we refer to above. Yet, speculation as to the significant growth potential of the ISP market is substantially dependent on the exploitation of new information and communication technologies and the deployment of new products and services. New technological opportunities often give rise to a period of transition during which the new technologies and services are diffused and implemented. This requires not only *sustained* large scale capital investment but also substantial learning time, especially in the case of complex technological systems like the Internet. The deployment of high bandwidth infrastructures is creating the conditions for the delivery of a large (capacity) throughput for new information and communication services and there is growing excess capacity in some parts of the infrastructure. However, the capital invested in the infrastructure has an engineering life-cycle spanning several decades and this is creating intense pressures for the realization of short term expectations for a return on capital. In the highly competitive ISP market, the risk for investors is substantial. As a result, there is increased tension between the financial expectations of investors and the constraints created by the technological system in terms of both time and learning opportunities. This tension is being resolved under present market conditions through strategies that promote a rapid scaling up of the use of available infrastructure capacity. In the ISP market, the predominant strategies appear to be aimed at creating opportunities to exploit scale economies in infrastructure provision through consolidation between ISPs and network facility providers, and achieving economies of time through intensification of the development and marketing of increasingly higher value added services.

The ISPs' strategies for achieving rapid returns on their financial backers' investments differ from those that characterized the formerly separate telecommunication carriage and content industries. The major players in the ISP market appear to be devising strategies aimed at achieving quasi-monopoly positions in newly differentiated segments of the market. Their redefinition of the *scope* of the ISP market seems to be aimed at increasing their capacity to

integrate and systematize learning to support production and distribution in new market areas.²⁴ To the extent that this is achieved, it creates the conditions for optimizing their use of network capacity and securing a return on capital at a pace that may meet the expectations of financial institutions and other firms in their networks that are providing financial resources.

Recent developments in the ISP market in the United Kingdom have been marked by a wave of acquisitions of small new entrants by large British-owned incumbents and by American-owned firms. These acquisitions may be playing an important role by reducing the time needed to learn and experiment in the new market and the time needed to build market presence. By acquiring the new entrants, the acquiring firms draw in the capabilities needed to develop new value chains that have scope for future development. At the same time, these acquisitions and mergers offer potential opportunities to increase control over the revenues generated by the expansion of network capacity use and the sale of higher value added goods and services.

The lesson from the restructuring of Cable & Wireless Communications and the development of NTL is that the realization of technological, financial and knowledge lock-ins is dependent upon strategic repositioning aimed at streamlining the scale *and* scope of the large ISPs' markets. The present round of repositioning is occurring alongside substantial capitalization. As the cases of NTL and Cable & Wireless Communications, and AOL and MCI-WorldCom indicate, quasi asset "swaps" are not uncommon. These asset exchanges are generating substantial revenues for large shareholders and creating positive feedback that, in turn, gives rise to higher expectations and further speculation.

For the entrepreneurs who invest in the ISP business, exit represents an opportunity to capitalize on intangible assets embodied in learning and technological innovation. Acquisition of the small start-ups offers a way for these companies to access bandwidth and generates funds for business expansion. Some new entrant ISPs have managed to sustain their growth

through partnership agreements. For example, the subscription-free dial-up ISP, X-Stream, has a partnership agreement with Level 3 Communications of the United States (X-Stream, 1999). This strategy also was initially chosen by the Internet Technology Group (ITG), one of the new entrants in the subscription segment of the ISP market. However, in this case, ITG is being acquired by its partner, Concentric Networks.

Our analysis of the linkages between the players in the top layer of the ISP market for dial-up access in the United Kingdom illustrates that despite the nascent characteristics of this market and the appearance of multiple new entrants, the trail of financial capital suggests that the further evolution of the ISP market will not necessarily be consistent with a broad interpretation of the public interest of citizens, consumers and small firms. The processes of creative destruction and the flurry of new entry in the ISP market do not appear to be delivering a very high quality of service for citizens, consumers and small firms. The subscription-free dial-up ISPs are engaged in a frenzy of competition, which is accompanied by their failure to sustain high quality services for the end user. For example, the rate of dial-up failure has increased by 50 per cent in the last year and some companies are offering technical support for their customers at premium telephone tariffs ranging from fifty pence to £ 1.00 per minute. Waiting times on technical support lines managed by automatic answering services can be up to 10 minutes.²⁵

The competitive process in the nascent ISP market in the United Kingdom is generating opportunities for British-owned small new entrants that are championed by entrepreneurs. Some have realized large capital gains through timely exit strategies. For the firms that have acquired the early start-ups and/or extended their services from the United States into the United Kingdom, there is evidence of consolidation and of the formation of tightly woven webs or networks of control. However, the stability of these firms is uncertain. Their high levels of capitalization are associated with the valuation of intangible assets, i.e., of their technological capabilities and competencies. The wave of investment in the United Kingdom

is the result of a “propensity to speculate” on technological and market potential rather than on the potential of tangible assets.

Speculative trends are not simply directed to existing tangible assets but to the potential benefits that might be lost if the assets supporting innovation are not controlled or acquired (Langlois and Robertson, 1995: 133-4). As such, speculative activity on tangible assets becomes the manifestation of the future expectations of financial (and corporate) investors. It does not rely on or estimate the *present* value of productive assets (i.e. these assets are depreciating and are being ‘consumed’). In the face of uncertainty and a highly competitive environment, investors anticipate the productive and innovative capacity of the future. The resulting financial value put on assets is directed to the potential benefits of intangible assets (expected developments in technology, learning, innovative products and services) and the competencies for future production and therefore the realisation of future income.²⁶

For these firms a critical issue is time. Stock market investors could curtail the ISP boom if the speculative future fails to materialize. In order to sustain a high level of capitalization, the major players in the dial-up ISP market must learn how to transform prophesy into reality. They must overcome the hurdles of uncertain trends in technological development, the uneven deployment of infrastructure capacity, and skill deficits for service production and within potential user communities. They also face the challenge of integrating new sets of capabilities for both carriage and content creation and marketing within their organizations and build strong relationships with their customers.

5. Conclusion

On the basis of the empirical evidence we have presented in this chapter, it appears likely that the predominant interest of investors who own the most significant ISPs in the United Kingdom market is in promoting attractive conditions for short term revenue growth and the maintenance of high levels of capitalization. The development of the British ISP

market suggests a trend toward the emergence of an oligopolistic industry that is inconsistent with the evolution of a network “commons” which will be responsive to social values. The analysis presented in this chapter exposes the networks of control that are emerging through a reconstitution of market power in the ISP market. This analysis demonstrates trends that seem to favor: 1) the consolidation of the market in the hands of financial investors whose primary interests are in the rapid turnover time of capital rather than in the long-term development of services targeted at citizens, consumers and smaller firms; 2) a race between a small number of large players to consolidate the knowledge base (competencies and capabilities) needed to succeed in the new markets; and 3) increasing barriers to entry for small players that confront constraints on their capacity to expand and to offer financially viable services as alternatives to those provided by the large players. The combination of these trends is likely to produce pressure for the reduction of variety, an outcome that runs counter to the view that the Internet’s open architecture encourages diversity in the supply of content and information services.

In the light of these observations, it seems unlikely that American style “unregulation” will be appropriate for the governance of Internet-related markets in the United Kingdom. In the absence of market intervention, the market terrain seems likely to be left to multinational players. This will marginalize small regional players within niche markets with limited scope for growth. The large ISPs have strong incentives to lock-in users to secure future revenues and to maintain high rates of capitalization. The strategies for achieving lock-in have expanded beyond those that were characteristic of the formerly segmented carriage and content industries. Liberalization has opened up new opportunities for competitive entry, but the privatization of the incumbents within the domestic market has altered the dynamics of the new markets. As Mintz and Schwartz (1985: 252) have argued with respect to transformations within the United States economy, “collective decision making within the business world directs capital flows that commit the resources of the country as a whole to the projects selected by the financial institutions”. In the case of the ISP

market in the United Kingdom, the networks of inter-corporate relations that are forming around a few core financial institutions and the top ISPs do appear to be “committing” the United Kingdom to trajectories for the evolution of Internet services that favor the large business users.

In the light of these developments, it will be important to investigate the emergence and exercise of “market power” in the ISP market in a way that exposes the interdependencies between technical change, innovation and the role of finance in the process of competition. The current trajectory for ISP development is consistent with the interests of large corporations and expectations for strong revenue growth and rapid capitalization. In the light of the bifurcation of the ISP market and these incentives, opportunities for safeguarding the public interest are likely to come to light only through a more systematic analysis of the interplay between these factors and the socio-political conditions in which they are embedded.

The two poles that we highlighted in the introduction to this chapter treated regulation as a means of promoting the free play of market forces, on the one hand; and as a necessary means of restoring the discipline of the market where monopoly or substantial market power are present, on the other. Both these poles of the regulatory spectrum are predicated upon the assumption that market forces can deliver economically and socially desirable outcomes. We acknowledge that regulation of some aspects of the carriage and content industries will continue to be needed to address the problems created by conventional “monopoly focal points”. However, our analysis suggests that traditional forms of industry specific regulation will not provide a satisfactory means of protecting the public interest. The newly articulated “focal points” of power in the ISP market will need to be tackled through new forms of regulation and governance. These will need to be formulated in the light of a better understanding of the evolutionary sources of market power and their implications for social, economic, and technological outcomes.

References

- America OnLine. "Press Release". America OnLine, at
<http://www.aol.co.uk/press/releases/1999/pr990824b.htm> accessed on 27.9.1999,
1999a.
- America OnLine. "Press Release". America OnLine, at
<http://www.aol.co.uk/press/releases/1999/> dated 17.2.1999, 1999b.
- America OnLine. "Securities Exchange Commission (SEC) Filings, Form 10-K". Securities
Exchange Commission (SEC), 30 June, Washington, DC, 1999c.
- Bar, F., Cohen, S., Cowhey, P., DeLong, B., Kleeman, M. and Zysman, J. "Defending the
Internet Revolution in the Broadband Era: When Doing Nothing is Doing Harm".
Berkeley Roundtable on the International Economy (BRIE), University of California
at Berkeley, E-conomy Working Paper No. 12, August, Berkeley CA, 1999.
- Berle, A. A. and Means, G. C. *The Modern Corporation and Private Property, Revised
Edition 1968*. New York: Harcourt Brace, 1932.
- Brooks Fiber Properties Inc. "Securities and Exchange Commission (SEC) Filings,
Submission 10K-405". Securities and Exchange Commission, 29 January,
Washington, DC, 1998.
- Cable & Wireless Communications Plc. "CWC Annual Report 1999". Cable & Wireless
Communications Plc, London, 1999, at
<http://www.cwcom.co.uk/investorsmainpages/annual99/> accessed 29.10.1999.
- Cable & Wireless Plc. "Press Releases". Cable & Wireless Plc., at //206.142.4.70/press/1999,
London, 1999.
- Clark, J. M. *Competition as a Dynamic Process*. New York: The Brookings Institution, 1961.

- Collins, R. and Murrone, C. *New Media, New Policies: Media and Communications Strategies for the Future*. Cambridge: Polity Press, 1996.
- Computergram International “OfTel Recommends Price Competition in Free ISP Market”, *Computerwire Inc*, 11 March 1999.
- Computerwire Inc. “Energis to Buy into Freeserve, Network Briefing”, *Computerwire Inc*, 25 June 1999.
- Corsi, M. *Division of Labour, Technical Change and Economic Growth*. Aldershot: Avebury, 1991.
- Department of Commerce. “The Emerging Digital Economy II”. US Department of Commerce, Washington DC, June 1999.
- Department of Trade and Industry. “Our Competitive Future: Building the Knowledge Driven Economy, The 1998 Competitiveness White Paper”. Department of Trade and Industry, London, December 1998
- Downes, T. A. and Greenstein, S. M. “Do Commercial ISPs Provide Universal Access?” Tufts University and Northwestern University, paper prepared for the Telecommunication Policy Research 1998 Conference., Medford MA and Evanston IL, 1998, 2 December at <http://skew2.kellogg.nwu.edu/~greenste/research/> accessed 27 August 1999.
- Durlacher. “The Durlacher Quarterly Internet Report”. Durlacher, Corporate Edition, London, 1997, Q1 1997 at http://195.224.46.246/internet_report/article2.htm accessed 29 September 1999.
- Durlacher. “High Speed Internet Access Market Represents £320 m Opportunity for Disenchanted UK ISPs”. Durlacher, News Release, London, 18 May, 1999 <http://www.durlacher.com/news/newsdetail.cfm?ID=3> accessed 29 September 1999b.

- Durlacher. "Free Access Providers Bring Subscription Dial-up Market to a Standstill".
Durlacher, News Release, London, 26 July, 1999
<http://www.durlacher.com/news/newsdetail.cfm?ID=8> accessed 29 September 1999a.
- Eliasson, G. "The Internet, Electronic Business and the EURO - On Information Products, Market Transparency and Internet Economics". Royal Institute of Technology, Stockholm mimeo, 2 February 1999.
- European Commission High Level Group of Experts. "Building the European Information Society For Us All: Final policy report of the high-level expert group, D.G. for Employment, Industrial Relations and Social Affairs". Office for Official Publications of the European Communities, Luxembourg, 1997.
- Federal Communications Commission. "In the Matter of Implementation of Local Competition Provisions in the Telecommunications Act of 1996, Inter-Carrier Compensation for ISPP-Bound Traffic, Declaratory Ruling in CC Docket No. 96-98 and Notice of Proposed Rulemaking in CC Docket No. 99-68". Federal Communications Commission, Washington DC, 25 February 1999.
- Horowitz, R. *The Irony of Regulatory Reform: The Deregulation of American Telecommunications*. Oxford: Oxford University Press, 1989.
- Huston, G. "Interconnection, Peering and Settlements". Based in part on G Huston, ISP Survival Guide, John Wiley & Sons, 1998,
<http://www.telstra.net/gih/peerdocs/peer.html> accessed 25 September 1999, New York, 1999.
- Keynes, J. M. *The General Theory of Employment, Interest and Money*. London and Basingstoke: Macmillan Cambridge University Press for the Royal Economic Society, 1973 Edition reprinted in 1993, 1936.

Langlois, R.N. and Robertson, P.L. *Firms, Markets and Economic Change*. London and New York: Routledge, 1995.

Lehr, W. H. and Weiss, M. B. H. "The Political Economy of Congestion Charges and Settlements in Packet Networks". *Telecommunications Policy*, 20(3 1996): 219-31.

Leiner, B. M., Cerf, V. G., Clark, D. D., Kahn, R. E., Kleinrock, L., Lynch, D., Postel, J., Roberts, L. G. and Wolff, S. *A Brief History of the Internet*.

<http://www.iso.org/internet-history>: 20 February, accessed 16 August 1999, 1998.

MacKie-Mason, J., Shenker, S. and Varian, H. R. "Service Architecture and Content Provision: The Network Provider as Editor". *Telecommunications Policy*, 20(3 1996): 203-18.

Melody, W. H. "Telecommunication - Policy Directions for the Technology and Information Services". *Oxford Surveys in Information Technology*, 3(1986): 77-106.

Menshikov, S. *Millionaires and Managers*. Moscow: Progress Publishers, 1969.

Mintz, B. and Schwartz, M. *The Power Structure of American Business*. Chicago and London: University of Chicago Press, 1985.

Murphy, K. "UK-Internet - How Free Can an ISP Be?, Network Briefing", *Computerwire Inc.*, 3 May 1999.

NTL Inc. "NTL Annual Report and Accounts". NTL Inc., London, 1998, at <http://www.ntl.com/investors/> accessed 22.10.1999.

NTL Inc. "NTL First Quarter 1999 Financial Results". NTL Inc., London, 1999, Available at <http://www.ntl.com/investors/quarterly/1st-1999> accessed 11.8.1999.

Oxman, J. "The FCC and the Unregulation of the Internet". Federal Communications Commission, Office of Plans and Policy Working Paper No. 31, July, Washington

DC, 1999.

Pavitt, K. "Technologies, Products and Organisation in the Innovating Firm: What Adam Smith Tells Us and Joseph Schumpeter Doesn't". SPRU University of Sussex, CoPS Working Paper No. 40, September, Brighton, 1997.

Schumpeter, J. A. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*. Oxford: Oxford University Press, 1961.

Scott, J. *Corporations, Classes and Capitalism, Second Revised Edition*. London: Hutchinson, 1985.

Scott, J. *Capitalist Property and Financial Power: A Comparative Study of Britain, the United States and Japan*. Brighton: Wheatsheaf Books, 1986.

Scott, J. "Corporate Groups and Network Structure", in J. McCahery, S. Picciotto and C. Scott (Eds) *Corporate Control and Accountability: Changing Structures and the Dynamics of Regulation*. Oxford: Clarendon Press, 1993, pp. 291-304.

Scottish Power plc. "Annual Report 1998-99". Scottish Power Plc, (1999)
<http://www.scottishpower.plc.uk/ara99/>.

Shepherd, W. G. "Contestability vs. Competition - Once More". *Land Economics*, 71(Aug 1995): 299-309.

Smith, A. *The Wealth of Nations, Books I, II, III*. London: Penguin Books, reprinted 1997, 1776.

Srinagesh, P. "Internet Cost Structures and Interconnection Agreements", in L. McKnight and J. Bailey (Eds) *Internet Economics*. Cambridge MA: MIT Press, 1997, pp. 121-54.

Trebing, H. M. "Structural Change and the Future of Regulation". *Land Economics*, 71(3 1995): 401-14.

Trebing, H. M. "Market Concentration and the Sustainability of Market Power in Public Utility Industries". *National Regulatory Research Institute Quarterly Bulletin*, 19(1 1998): 61-7.

Trebing, H. M. and Estabrooks, M. "The Globalization of Telecommunications: A Study in the Struggle to Control Markets and Technology". *Journal of Economic Issues*, XXIX(2 1995): 535-44.

Trebing, H. M. and Wilsey, M. F. "The limitations of deregulation - An Overview". *Utilities Policy*, 3(4 1993): 274.

X-Stream. "Press Releases". X-Stream, at <http://www.x-stream.com/uk/flash/1024res.html>, 18.10.1999, accessed on 19.11.1999, London, 1999.

Zakon, R. H. "Hobbes' Internet Timeline v4.2". August, Internet Society <http://infor.isoc.org/guest/zakon/Internet/History/HIT.html>, accessed 19 September 1999.

Notes

* Dr Michele Javary is a researcher and Professor Robin Mansell is Research Director at SPRU - Science and Technology Policy Research, University of Sussex, United Kingdom where she also co-directs the SPRU Information, Networks & Knowledge (INK) research centre.

¹ This has been so since the establishment of the Interstate Commerce Commission (ICC) in 1887. The ICC was created to stem turmoil in the railway industry. It was abolished in 1995 with the creation of the Surface Transportation Board. The Federal Communications Commission (FCC) was established by the Communications Act of 1934 and is charged with regulating interstate and international communications by radio, television, wire, satellite and cable.

² British Telecom became a public limited company on 1 August 1984 and 51 per cent of the company's shares were sold to the public in November of the same year. The company faced competition from Mercury when it launched services initially in the

City of London in 1993 and from cellular radio network service licensees granted to Cellnet and Vodafone. A Director General of Telecommunications was appointed and the Office of Telecommunications was established in 1984.

³ Oxman cites evidence of the low barriers to entry for Internet service suppliers in support of his argument in favor of “unregulation”; “Over 6,000 Internet Service Providers (ISPs) today offer dial-up service to the Internet, and over 95% of Americans have access to at least four local ISPs [footnote omitted]. Although America OnLine, with over 18 million world-wide members, dominates the ISP field, millions of Americans rely on small one POP [Point of Presence] [footnote omitted] or medium-sized ISPs for their service, ISPs that may serve several hundred or fewer customers” (Oxman, 1999: 17).

⁴ This view is closely aligned with the depiction of competition by Clark (1961) and is deeply embedded in Melody’s (1986) analysis of developments in telecommunication markets. More generally, we take a classical approach, which analyses competition “not as a state of affairs, but as a dynamic process linking technical change with market behaviour” (Corsi, 1991: 113) and which links processes of division of labor through technical change with the evolution of market structure.

⁵ The technical definition of the Internet was agreed by the Federal Networking Council (FNC) in October 1995 (Leiner et al., 1998) and see also (Zakon, 1999). The National Science Foundation lifted restrictions on the commercial use of the Internet in the United States in 1991 and by 1995 the Internet backbone network was entirely operated by private network operators. In the United Kingdom, the start of the JANET service using the TCP/IP began in 1991.

⁶ See (Department of Commerce, 1999; Department of Trade and Industry, 1998; European Commission High Level Group of Experts, 1997).

⁷ This section draws extensively on evidence from company annual reports and accounts, information obtained from company web sites and press releases, newspaper articles, etc., the details of which are available from the authors of this chapter. Substantial information was obtained from US Securities and Exchange Commission (SEC) Filings, particularly schedules 13D and 13G. The “Guide to Corporate Filings” can be accessed at <http://www.sec.gov>. Detailed references to all documentation can be obtained by contacting the authors of this chapter.

⁸ A first wave of inward foreign investment occurred in the early phase of liberalization in the cable and telecommunication industry in the mid-1980s. There was a substantial inflow of investment into the cable television industry by American-owned firms. This was followed by a period of disappointing cable (and later

telephony) market development and consolidation of ownership. A recent flurry of investment as cable companies position themselves in the Internet access market (Collins and Murrone, 1996).

⁹ Energis also acquired Unisource Carrier Services (UCS) from Unisource NV a well-established Telecom network Provider, with Internet Access and Services.

¹⁰ Dixons Group plc's major shareholders are Merrill Lynch & Co Inc. with 11.95 per cent of common stock, Mercury Asset Management Ltd with 10.94 per cent, Capital Group Companies Inc. with 7.03 per cent, and the Prudential Corporation Group of companies with 4.02 per cent.

¹¹ The British Labour Party distributed Freeserve's software as part of an advertising campaign with *Labour Inside*, Vol. 1 in October 1999.

¹² In October 1999, CurrantBun was expected to be re-launched with a new name at a marketing cost of £4 million.

¹³ LineOne was a subscription fee ISP. The company moved into the subscription-free segment of the ISP market as a result of the growing strength of competitors in the consumer segment of the market.

¹⁴ The National Grid plc. was formed in March 1990 as part of the privatization of the electricity supply industry in England and Wales. It was owned jointly by 12 regional electricity companies until it was floated on 11 December 1995 on the London Stock Exchange. Energis was formed in 1993 as a telecommunication spin-off of the National Grid's electricity transmission activities.

¹⁵ The National Grid formed a consortium with SPRINT and France Telecom and won the license to operate new national and international telecommunication services in Brazil.

¹⁶ The Massachusetts Department of Telecommunication and Energy must approve the merger. The National Grid plc. made financial provisions for the acquisition of EUA in its agreement for the acquisition of NEES.

¹⁷ Colt Telecom launched an ISP in the United Kingdom, Colt Internet, in 1993. Colt Telecom has also selected NTL to terminate its switched traffic outside London and provide leased digital private circuits between London and major cities in the United Kingdom.

¹⁸ NTL Inc. owns just under 50% of Virgin Net's common stock.

¹⁹ It is important to note that Telewest is a subsidiary of Microsoft and Libert Media, and Libert Media is a subsidiary of AT&T. Microsoft and Libert Media hold respectively 29.9% and 21.6% of Telewest's stock. NTL, Cable & Wireless, and Telewest have been in competition in the market in the United Kingdom.

²⁰ As a result of the transaction, “Existing CWC Shareholders will receive 3.6301 shares of new NTL Common Stock and 190.18 pounds in cash for every 100 CWC Shares held (and so on in proportion to their holdings, assuming no adjustment is made). CWC Shareholders’ entitlements to fractions of new NTL Common Stock will be aggregated and sold in the market and the net proceeds paid to the relevant CWC Shareholders” (Cable & Wireless Plc., 1999).

²¹ At an exchange rate of 46.250 for 100 (former) CWC shares.

²² “Effective at 11.58pm on 29 January 1998, WorldCom Inc. *** (“WorldCom”) acquired the company pursuant to the merger (The “merger”) of BV Acquisition Inc., a wholly-owned subsidiary of WorldCom, with and into Brooks. Upon consummation of the merger, the company became a wholly-owned subsidiary of WorldCom” (Brooks Fiber Properties Inc., 1998: 3).

²³ These acquisitions included MovieFone Inc., a major movie guide and ticketing interactive service; Spinner Networks Inc. which provides music over the Internet; When Inc., offering a personalized event directory and calendar services; At Wet Inc. and Personal Logic Inc.

²⁴ The benefits of the division of labor and specialization have long been the subject of the analysis of changing industrial structure. Adam Smith argued that the division of labor, technical change and specialization is essential to saving production and circulation time and to the ability to increase capacity throughput*** (Smith, 1776: 7).

²⁵ Calls were made by the first author to premium rate technical support lines. X-Stream responded in just under ten minutes and the call was charged at a rate of 50 pence per minute. These costs in time and money must be added to those paid by the customer for use of online services.

²⁶ “Money, in its significant attribute is, above all, a subtle device for linking the present to the future” (Keynes, *The General Theory of Employment, Interest and Money*, pp. 293-4).