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GOVERNING THE 'NEW ECONOMY': A 3-PHASE HISTORICAL MODEL OF CUMULATIVE GALES OF CREATIVE DESTRUCTION OF THE UNITED KINGDOM INTERNET SERVICE PROVIDERS' MARKET

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Introduction

In the United States, there are diverging views on the need for intervention in the Internet Service Provider (ISP) market. Oxman (1999), representing the Federal Communications Commission (FCC) argues that, given the nascent development of the relatively immature ISP market, there is no basis for intervention because of the larger number of entrants to this market. In contrast, Bar et al. (1999) suggest that sustained intervention in the market is needed to encourage the evolution of an open internetworking environment that is consistent with economic and social policy. One close observer of the evolution of the communication industry in the United States, Harry Trebing (1995, 1998) has demonstrated that many market developments in recent years have been inconsistent with an inadequate standard of protection of the public interest. He argues that the emergence of tight oligopolies may mean that societal goals for greater participation in using networks are not met (Trebing 1995; Trebing and Eastabrooks 1995).

In the United Kingdom, a parallel discussion of the case for public intervention in the emergent ISP sector has been underway. The phenomenal growth in the number of firms providing access to the Internet (Durlacher 1999) suggests that rapid technological innovation was producing 'creative gales of destruction' (Schumpeter, [1942] 1962) with sufficient strength to reduce barriers to market entry and to counteract any tendencies toward the formation or exploitation of oligopolistic market power. A recent study by Javary and Mansell (2002) analyzed the development of ten firms in the United Kingdom ISP market in the late summer of 1999. The results suggested that while the Internet appears to offer prospects of free entry and open competition, private sector efforts to secure market shares might raise new forms of entry barriers to competitive services.

A number of writers have characterized the Internet as a 'spontaneous order'. Others have heralded its exotic urban cultures and communities (Castells 2001). This article argues that the rise of the Internet as a mass infrastructure has to be viewed as an *industrial and business experience*. While the Internet may be 'breaking' up the established ways of the 'old telecommunications' and offering the opportunity for an open internetworking

environment, the consolidation of the Internet access market as the central infrastructure of the 'information society' and the 'new economy' requires a transition in the sector's existing market, corporate and institutional governance structures. It requires a shift in the development and deployment of the sector's network technologies and services and a change to the organization of the powers of control over its business processes.

The United Kingdom Internet Service Provider (ISP) dial-up market is a highly dynamic market, easily qualified as a very competitive market at the retail end of the delivery of Internet access products and services to domestic (and small business) users. This market has grown substantially over recent years, experiencing its fastest growth to date from subscribers from lower income groups in the year 2000-2001.[1] The turnover of market players is exemplary of its present intense evolutionary and 'revolutionary' momentum. Successive waves of new entrants, disputes between larger as well as between larger and smaller players, arbitration, consultation and directives issued by the regulator, mergers and acquisitions and bankruptcies are all included in the daily market, corporate and institutional activities. However, despite these rapid changes this article aims to show that market developments are characterized by powerful tensions between the pace of change and the forces of contrivance upon change. Institutional, corporate, strategic and technological tensions unfold within and between this novel market's expansionist thrust and the forces pulling towards 'contraction' and consolidation.

This article documents the industrial dynamics and the innovation processes inherent in the fast emerging dial-up Internet access segment of the new telecommunication sector in the United Kingdom for the period between 1992 and 2002. It shows that evolving market structures and related product and service innovations in the wholesale and retail branches of the ISP market have to be understood in the context of: a) an entrepreneurial thrust that seizes the advantage of a glut of finance accumulated from the privatization of the utilities; b) the evolution of the relationship between the United Kingdom voice and data transfer markets after the privatization of British Telecommunications (BT) and the strategic development of its 'intelligent network'; c) the related network technologies and services available for deployment at the start of the implementation of the Internet as a

mass infrastructure; d) BT's quasi-monopoly in call origination; and finally e) the wider evolutionary industrial dynamics, i.e. a cumulative process of conjectures and feedback loops of market power, strategic management and transformation in corporate and institutional governance following the market's expansion and the transition from metered to unmetered dial up Internet access (Javary 2002).[2]

The first section gives the historical background to and outline of an overlapping 3-phase historical model (1992/Nov.1999; April1999/Feb.2001, April 2000/2002) of the emergence of unmetered dial-up Internet access inspired by Joseph Schumpeter's work (Schumpeter [1934] 1955; [1939] 1982; [1942] 1962). The model depicts the three different phases of "creative gales of destruction" (Schumpeter [1942] 1962: 83) highlighting the emergence of the dial-up Internet access mass market and the transition from metered to unmetered dial-up access for domestic consumers . These phases are characterized in terms of the technological, organizational and institutional innovation processes taking place in the United Kingdom ISP and the 'new telecommunications' markets. The model shows how each phase merges into a path dependency of continuities, discontinuities and feedback loops (Myrdal 1944) that are imputed to the cumulative effects and conjectures of the dynamics of the technological and social processes driving change.

The second section looks at the first phase of the development of the United Kingdom dial-up Internet access market. It shows how two successive waves of entrepreneurial ventures shifted market dynamics by encroaching upon BT's market share in the (wholesale) call termination segment of the dial-up Internet mass market. These first two waves of entrepreneurial activity caused a substantial growth in demand/traffic flow and created a feedback loop which a) stimulated an increased revenue share for BT's competitors from termination; and b) exerted a downward pressure on the cost of interconnection and conveyance related to the network and business platforms for value-added voice telephony services originally deployed to support the emergence of the dial-up Internet access services. Hence rapid demand growth led to a lowering of barriers to

entry and provided conditions for a reorganization of the market out of which the next phase of entrepreneurship and market expansion arose.

The third section looks at the second phase of the expansion of the United Kingdom dial-up Internet access market. It associates an intensification of competition with a third wave of new entrants fuelled by still abundant and enthusiastic venture capital. New Internet entrepreneurs are closely coupled with regional operators that have been relatively successful in capturing market share in the termination segment of the market in the previous phase. This new wave of entrepreneurs launches the first 'unmetered' dial-up Internet access packages using BT's Freefone 0800 service on a wholesale network and services platform for which interconnection and conveyance costs are still metered by the minute. However, an unexpected cataclysmic surge in customer demand sabotages the technological and business rationale of the 'economics of 0800' packages that is based on an estimated volume and duration of calls. Network, support services and financial 'bottlenecks' multiply leaving customers with interrupted and/or deteriorating quality of services and both network service providers and customers with substantial financial losses. WorldCom and BT enter into a dispute arbitrated by the regulator. This dispute becomes central to negotiations between BT and Other Licensed Operators (OLOs)/ISPs that are aiming to settle terms and conditions for the creation of a viable network/service platform for 'unmetered' access. This platform becomes known as Flat Rate Internet Access Call Origination (FRIACO). However, BT resists change on the grounds of inadequate network capacity. A transitory solution is sought in the form of FRIACO Hybrid. The first FRIACO platform delays the deployment of a wholesale platform for unmetered access and requires new negotiations with the Office of Telecommunications (Oftel). The downturn in the stock market in 2000 compounds the mounting debt burden and a rise in bankruptcies increasing instability for all market players. This signals the onset of a period of contraction by acquisitions.

The fourth section considers the last phase in the ISP market's development from the point of downturn in financial markets to entry into a maturing phase in April 2002. This section documents BT's strategic response to: a) the alarming destabilization of the

market; b) its loss of market share in call termination; and c) significant competition from OLOs and larger ISPs in connectivity. BT's response is twofold. First, BT introduces an 'unmetered' service (SurfTime) at the retail end of the voice telephony market, available for resale by all ISPs, just ahead of the deployment of the FRIACO platform. After initial turbulence and despite its higher costs compared to alternatives on the market, Surftime provides a relatively safe option for customers. SurfTime's launch triggers a new wave of entrants, virtual ISPs (resellers of SurfTime). These new market players gravitate around a few intermediary ISPs that guarantee to provide connectivity and support for the BT product. SurfTime enables BT to regain ground in termination. Secondly, during this third phase of market development, BT designs a new wholesale product portfolio (FRIACO and non-FRIACO) that set up a combination of synergies in wholesale segments, - origination, termination and connectivity - , across the five products included in the portfolio. We argue that BT gains first mover advantage from the delayed implementation of the FRIACO platform, while product synergies strengthen BT's leverage and competitiveness in wholesale markets at the onset of the maturing phase and ahead of the launch of broadband on the mass market.

A 3-Phase Historical Model of Cumulative Gales of Creative Destruction: Background to the development of the UK Dial-up Internet Access Market.

The model (see Figure 1) is based on a characterization of the different phases and successive entrepreneurial/innovative waves (waves E 1 to E 5) punctuating the emergence of the dial-up market and its transition from metered to unmetered Internet access for United Kingdom domestic consumers.

[Insert Figure 1 approximately here]

The model covers the period 1992-2002. 1992 marks the first year of the opening of the United Kingdom telecommunication market to competing service providers and OLOs and the first wave of entrepreneurial activity in telecommunication service provision leading to the development of the dial-up mass market. 2002 is a more artificial cut off

point imposed by the timing of the research. However, it also marks a turning point i.e. the beginning of the rapid transition to a maturing phase for the dial-up market and the start of a fourth phase in the deployment of the Internet as the central mass infrastructure of the 'information society'. In February 2002, BT announces that it is halving the wholesale price of broadband and intending to launch the first broadband packages on to the mass market at the beginning of April 2002.

The 'cumulative path' of technological, organizational and institutional continuities and discontinuities depicted in the model of the development of the United Kingdom ISP market must be viewed in the context of the historical development of the United Kingdom's telecommunication network infrastructure and services. To this end we must first refer to the key historical and strategic position held by the incumbent British Telecommunications Plc (BT).

At privatization in 1984, BT inherited a network of over 6,700 exchanges (electro-mechanical technology) some developed almost a hundred years earlier. Therefore, at the dawn of the United Kingdom's vast liberalization venture, BT was given quasi-monopoly control over an aging network with a long tradition of metered voice telephony[3]. This tradition continued to prevail in BT's strategy and the steps it took to intensify network modernization[4] and the rapid deployment of digital technologies to create the foundations for its new 'intelligent' network and services. By the mid-eighties, the thrust underpinning the implementation and configuration of BT's Integrated Services Digital Network (ISDN) gave a prominent place to the development and management of core voice telephony services. Most of all, during almost seven 'interim years' (1984-1991) prior to extending the introduction of competition in the United Kingdom telecommunication market, BT was given a breathing space to get its modernization programme underway and consolidate the 'in-built' strategic market position of its 'Intelligent Network'.

As part of the 1984 network legacy, BT was awarded sole ownership of the local loop. Up to 2002, BT has had a quasi-monopoly on call origination, with nearly 80% of all

domestic calls originating on its network. Metered voice telephony, therefore, took on a leading role in BT's innovation management strategy for the configuration and control of its voice and data transfer network. It played a central part in the organization and timing of investment and the design and delivery of the network products and management services that secured its revenue flows.

Shortly after privatization, BT launched a large investment programme for the development of its trunk and exchange network. The implementation of the System X and AXE10 (System Y) in exchanges and the establishment of its network and services management control system enabled the rapid deployment as well as the coordination and control of new voice telephony services. In 1988, BT's trunk network was fully digitized and by 1990 BT had spent more than £15bn on innovation in its mainstream voice telephony services. [5] From 1985 to the late 90s, on the basis of this innovation programme, BT introduced and developed an extensive range of services/discount schemes for (metered) voice telephony, for both business and residential customers.[6]

In 1985 BT tested its first ISDN with the introduction of the Linkline service (0800, 0345 number ranges).[7] These services, later marketed as *Freefone* and *Lo-call* (0800, 0844 number ranges) took their place among other (voice) services based on non-geographic numbering.

[Insert Table 1 approximately here]

Also referred to as Number Translation System (NTS), non-geographic numbers and their related network management services (including 0845 for Special Local Call rate) are significant in all phases of the development of the emerging network and business platform options in the wholesale and retail dial-up Internet access market.

In February 1991, just before the issue in March of the government White Paper 'Competition and Choice: Telecommunications Policy for the 1990s', BT launched its Integrated Services Digital Network 2 (ISDN2). The White Paper put an end to the

duopoly enjoyed by BT and Mercury since 1983. Competition in telecommunications services increased as customers were allowed to acquire telecommunication services from competing providers using a variety of technologies. Independent companies were now permitted to bulk-buy telecommunication capacity and sell it in packages to business and domestic users. As competition intensified and a growing number of service providers and OLOs (including regional operators) entered the telecommunication market, NTS services became central to BT's network management control. The NTS platform supported delivery of the growing supply and demand for services, in particular telemarketing services. A NTS (financial) regime was developed in consultation with the regulator (Oftel) to establish levels of interconnection and conveyance costs for BT's provision of the network technology/services (e.g. call origination and conveyance) on the one hand, and a system of revenue sharing for the provision of value-added services by BT and/or service providers and OLOs (Oftel, January 1996) on the other.[8] The latter are sometimes referred to as 'terminating operators' since the vast majority of calls originate on BT's network and the OLOs and service providers generate revenue from a share of the call termination segment.

As figure 1 illustrates, BT's network and management structures for voice telephony services and wholesale (applying to OLOs and/or service providers) and retail (applying to domestic consumers) discount schemes are playing a changing but always significant role in the cumulative phases of design and delivery of dial-up Internet access (data transfer) network platform/services for the domestic and very small business users. The Special Local Call rate predominates in the first phase of development of the UK dial-up market, namely 'The Economics of 0845' or 'Pay-as-you-go' with fee-paying Internet access packages for network/connectivity costs (Figure 1, entrepreneurial wave E1). It plays a key role in the second phase with the emergence of non fee-paying access (i.e. connectivity is financed largely by advertising banners – Figure 1, entrepreneurial wave E2) alongside fee-paying access packages. The services and pricing structure of this original 'best practice' still figures significantly in later dial-up product designs for light domestic consumers - and this well after the introduction of unmetered Internet access packages based on the FRIACO wholesale platform. In the third phase, the call share

revenue system of the NTS regime continues to be central to the pricing and revenue sharing systems associated with BT's wholesale technology/service platforms for dial-up Internet access, i.e. WebPort Flex, Elite and SurfPort in 2001/2 (Figure 1, entrepreneurial waves E4 & E5). Therefore, the legacy of BT's network configuration and voice service offerings plays a central role in the 'innovative' thrust of the first and second waves of new entrants and a lesser role in the declining but still significant 'niche market' strategy to capture, accommodate and manage with greater precision the varying demand requirements of domestic users as the ISP dial-up market expands and 'matures'.

The use of *Freefone* services - 'The Economics of 0800' - marks a significant turning point, the emergence of a second phase in the development of the UK dial-up market with the start of a third wave of innovation in the Spring of 1999 (Figure 1, entrepreneurial wave E3). *Freefone* network services are central to the innovative strategy of entrepreneurial ventures entering and 'leading' the race for 'unmetered' access.

Phase 1: The Economics of 0845 – The 'Pay-as-you-go' Model

At the onset of the period of dial-up Internet access in 1992 - 1995, market entrants (Internet Service Provider entrepreneurs – E 1) primarily targeted a technological opportunity either related to their prior technological knowledge or their expertise in the management of new technologies. Entrepreneurial ventures (e.g. Demon 1992, Internet Network Services (INS) 1995, Xara Networks 1994 (see note 11) started up mainly focusing on the corporate market providing bandwidth, network services and applications. Their growth was driven by venture capital and the establishment of strategic partnerships.[9] The latter were instrumental in extending technological capabilities and developing network reach and capacity by providing the platforms to increase the points of interconnection/presence required to deliver end-to-end networks and services to corporate users. These new entrants managed their own terminating equipment (servers, modem racks) either in-house or within partnerships. In 1992, for example, Demon Internet's network provision was through UUNET-PIPEX (WorldCom) who provided the main network/service infrastructure run via a 2 Mbits leased line.[10]

Mass market dial-up access was not the main commercial focus for these companies although it was one part of their product portfolio. These companies concentrated on the corporate sector. In this very early stage of the dial-up access market, packages for the domestic user or small business user included two distinct charging components. One to cover the service provider's network provision and management charges, directly billed by the ISP to the domestic customer, and the other metered call charges for time spent on line, billed by BT directly via the customer's ordinary phone bill at a Special Local Call charge.

These entrepreneurs (E 1) were successful first movers in an almost untouched connectivity market. They fuelled the rapid thrust of ISP market expansion in the United Kingdom extending the network infrastructure and service provision that underpinned the establishment of the technology platforms for the next wave of innovators (E 2) to launch their products/services for the dial-up Internet access mass market. New ISPs in the second wave began allying 'new combinations' in the industrial process with a process of asset building (networked technology platforms, services and customer bases). These fast acquired substantial value on the market for corporate assets in the face of the rapidly changing liberalized United Kingdom economy and growing competitive tensions in the race for the converging global telecommunication markets.

In the first half of the '90s, the privatization and liberalization of the electric utilities and British Broadcasting Corporation fed into a new powerful undercurrent of competition between the larger players and strategic repositioning in converging telecommunication markets. By the mid-'90s the ISP market and its new entrants experienced a first significant spell of contraction via mergers and acquisitions. Successful new entrants were swiftly acquired by larger UK-based or foreign 'predators'[11] contracting (in terms of control) and expanding technology platforms (in technological and business terms) while starting to 'globalize' the competitive thrust of the United Kingdom ISP market (Javary and Mansell 2002)[12].

[Insert Figure 2 approximately here]

For example, the network and connectivity service capabilities of the most successful pioneers, such as Demon Internet, Planet Online, Internet Network Services (INS) were swiftly absorbed by the new major competing operators, namely Scottish Telecom (later rebranded as 'Thus'), Energis and Cable & Wireless. The fast growing new entrant, Internet Technology Group (ITG), was later acquired by its US partner, Concentric Networks (Javary and Mansell 2002).

By 1998, a new set of entrepreneurs (E 2) was forging ahead riding on the consolidation and experience of the original pioneers. These entrepreneurs grasped the *commercial* opportunity to launch ventures specifically aimed at the development of a mass dial-up Internet access market (e.g. X-Stream). Funding their new enterprises through collaborations with venture capitalists and the use of advertising to cover network costs, this new wave of entrepreneurs marked the beginning of an accelerated period of market development, namely free Internet access at special local call rates. Market competition entered a period of frenzy that peaked with the launch of the first dial up Internet access packages and the 'economics of 0800' in the spring of 1999.

This opportunity was immediately imitated and exploited by large commercial and branded interests (e.g. Freeserve/Dixons launched in September 1998 supported by Energis; LineOne the BT and News International joint-venture; Currant Bun from United News and Media). In 1999, for a brief period, the mass dial-up Internet access sector was 'balanced' in a two-strand consolidated market (fee and non-fee paying Internet access) which gravitated around a few major players. Market developments were pointing to an emerging oligopolistic structure (Javary and Mansell 2002). The initiators of the 1998 entrepreneurial wave were not profitable. These businesses were not generating 'productive value' in the conventional sense of the term, but they were, however, starting to build up an important part of the dial-up infrastructure: its commercial, content service layer with its (virtual) mass customer bases, the 'land' of the 'new economy'. Entrepreneurship in the mass dial-up Internet access sector was rapidly creating and shaping the source of a fundamental informational input and corporate asset value:

customer bases. Customer bases constituted one of the most valuable assets traded (on the secondary financial markets) in the consolidation of Internet access. During acquisition, transfer of customer bases enabled purchasers to achieve economies of scale and provided a workable medium for informational resources for product/service innovation in other content and new media related areas of the ISP market (Mansell and Javary 2003, forthcoming).

As the dial-up Internet access market was riding the rising tide of the stock market's 'irrational exuberance' (Schiller 2000) and 'the economics of 0845', increased demand stimulated a rapid rise in the use of non-geographic numbers platforms and services. Oftel confirmed that sharp increases in Special Local Call (0845) and Freefone (0800) calls were reflecting the sudden growth in the Internet Access dial-up market.

[Insert Table 2 approximately here].

The significant rise in the use of NTS also coincided with the phenomenal growth in Internet Access services, and is particularly noticeable in 1999, 2000 and 2001, and the OLOs encroachment upon BT's termination segment share. Oftel concluded that the "figures given by BT indicate the number of OLOs terminating NTS calls originating on the BT network rose by over 33 per cent (from 61 to 94 per cent) between March 1999 and December 2000" (Oftel September 2000). This sudden surge in the development of this telecommunication market segment triggered a cumulative feedback effect that caused a revision and decrease in NTS service prices, lowering barriers to entry.

The lowering of barriers to entry (in the form of cheaper NTS services) stimulated market developments as service providers were able to take advantage of the opportunity offered by call termination. Market leverage of UK regional operators as well as the larger OLOs and service providers was enhanced as they captured a greater share of the termination market and its revenues. Despite its strong strategic market position (quasi-monopoly in call origination) and strategic network and service control (in the Local Digital Exchanges (DLEs) and tandem switches (DMSUs)), the incumbent – BT – was facing

mounting competitive pressures in terms of relative loss of share in the call termination segment. At the retail end of the market, BT was also forced to price its own dial-up Internet access package, BT Internet, more competitively.[13]

Phase 2: The 'economics of 0800' and the race for 'unmetered Internet access'

By the late spring of 1999, a new set of entrants was stepping up the competitive pressure. In collaboration with regional telcos which had seen their revenue and leverage grow in the call termination segment, two ISPs, - Screaming.net in association with LocalTel and GreatXscape in association with Telnet -, launched off-peak, evening and weekend toll-free Internet access packages (no call charges) alongside the original 'pay-as-you-go' model. These offerings were conditional on customers switching from BT's voice telephony services to the telco's own (indirect dial) voice services. The original offerings for off-peak toll-free access were quickly followed by offers of flat fee monthly unmetered packages.[14] Using the 'freefone 0800', BT's number translation system product and 'cross-subsidizing' their voice and data transfer business, these providers were leading the innovative attempts to provide a network and service platform for unmetered Internet access. The '0800 model' was based on estimated demand that included an estimated number of calls made by users and an estimated time spent on line. As early as September 1999, 08004u launched one of the first unlimited dial-up Internet access package for a flat monthly fee of £49.99.

These initiatives spawned a new wave of entrants (Figure 1, E3) and a migration amongst existing large players to new dial-up package offerings with an increasing number providing unlimited, unmetered off-peak evenings and weekend access, i.e. at no call charges. However, the motivations of the first and second sets of entrepreneurs in this particular wave were different. The first few entrants believed they had identified a new 'business model' capable of creating 'productive value'. They targeted an expected growth in revenue from the call termination market by trying to combine an engineered growth in their core telephony services through the development of dial-up Internet access services. Their followers' motivation was more 'opportunistic'. Their motive was

short-term and purely pecuniary. It was not driven by an immediate wish to create growth by 'productive value'. It was intended to lead to a market position that would yield fast and large financial rewards from the sale of corporate assets floated on an over-inflated stock market.

Shortly after start-up, however, the pioneers of this new phase of development, encountered unexpected competitive, technological and management 'bottlenecks'. Screaming.net and LocalTel found themselves in a dispute with BT regarding BTs' mismanagement of the transition of customers who had requested to sign up with LocalTel's voice telephony services.[15] Also, the technology platform 'improvised' by the new entrants was not able to sustain and control the capacity required by the sudden unexpected surge in demand. ISPs such as 08004u, did not have the technological capabilities (for example, an operational radius server) to identify callers seeking access to their network.[16] This had dire consequences, provoking network failure and often bankruptcy for the providers receiving the bill for the full metered cost of the calls dialed for access to their network via the 'freefone 0800' service. In early November 1999, only a couple of months after the service had been launched, 08004u folded.

AOL and its outfit, WorldCom, had been holding off entry into the race for unmetered. Larger players had exposed the risks associated with the '0800' venture, aware that no suitable technology and business platform existed due to BT's stranglehold over network resources and the metered voice telephony services, which regulated the interconnection cost in the call origination segment of the domestic market and the conveyance of calls from BT's to their networks. By Christmas 1999, following the difficulties encountered by new ISP ventures, WorldCom requested provision of a wholesale call origination product for Internet access from BT. This product defined as Single Tandem Flat Rate Internet Access Call Origination (ST FRIACO)[17] was to enable operators and service providers to launch unmetered dial-up Internet access packages on a competitive basis with BT. It offered an opportunity for stabilizing the network cost component for service providers by 'fixing' the financial risks of metered origination calls and conveyance charges. FRIACO was a solution to tariff and volume management of traffic on an

unmetered basis from the consumer's home to the network of a competing operator without incurring *metered* call origination and conveyance charges. However, BT declined to provide the service at the tandem switch level (DMSU) arguing that allowing further unmetered interconnection would lead to exceeding the planned network capacity for 2001. This, BT argued, would cause 'bottlenecks' in a Public Switch Telephone Network (PSTN) already overstretched by the phenomenal growth in dial-up Internet access demand. The dispute went to arbitration. In his 26th May 2000 directive (Oftel 2000), the regulator ruled that BT should make FRIACO available at the level of the DLEs while enquiries by an appointed panel of experts continued to determine the impact of dial-up Internet demand on BT's network.

FRIACO Hybrid, as it came to be known in the summer of 2000, provided unmetered call origination from the consumer to the DLE but was conveyed by a metered trunk (with metered charges) between the DLE and the tandem switch at which most of BT's competitors had points of connection. Therefore, the new network and business platform for Internet access did not provide a complete (end-to-end) unmetered solution and offered only a partial remedy for the risks and uncertainties weathered by new entrants and competing operators supplying network services to Internet access providers.

Rulings on these matters were delayed until Oftel had gathered sufficient evidence to proceed with a new directive and recommendations for implementation in mid-February 2001 (see Table 3).

[Insert Table 3 approximately here].

Thus, despite the introduction of FRIACO Hybrid as the 'new' technology and business platform for 'unmetered' dial-up Internet access packages, the ambiguity of the realities of 'unmetered' did not disappear. Every 'unmetered' dial-up Internet access product sold to end-users continued to have an underlying metered call charge for conveyance. Inability to provide a suitable platform for unmetered access was a major hurdle. In an intensely competitive market, the 'minute risk' threatened the stability and performance

of even the most successful companies. In August 2000, one of the leading ISPs, Freeserve, experienced serious bottlenecks due to the flooding of subscribers onto their services from the popular ISP LineOne and CallNet after they had declared that they could no longer support the economics of 0800 access.[18] This occurred at a time when Freeserve, like all other ISPs, was facing heightened pressures from its own technology and business management to upgrade facilities to meet increasing demand. Consequently, the demise of LineOne and CallNet had a serious impact on Freeserve's own capacity to maintain services.[19] This tumultuous phase culminated in a new wave of acquisitions typified by the swift if rather late market entry of the Italian telecommunication operator, Tiscali, and its blazing trail of acquisitions of fragmented and troubled ISPs. These were regrouped under the Tiscali brand (see Figure 3). Tiscali quickly rose to become one of the six largest players in the United Kingdom ISP market alongside AOL, Freeserve, BT Internet and the cable companies NTL and Telewest (see also Table 6).

[Insert Figure 3 approximately here].

France Telecom's Internet Service Provider, Wanadoo, acquired Dixon's share of Freeserve boosting its already substantial presence in the United Kingdom with a 22% share in the cable operator NTL (Javary and Mansell 2002).

During this period, numerous user forums witnessed the customers' tribulations through the informational maze of fast and unpredictably changing market conditions and the rise and fall of their service providers. Many customers lost money and experienced serious service disruptions. However, they discovered no legal means to obtain compensation for the inconvenience or disruption to service that they had suffered as a result of the instability of the market and/or quite simply outright market abuse by charlatans.[20]

Phase 3: The 'last mile' to unmetered dial-up Internet access

BT's response to pressure of competition and its dispute with WorldCom came in the form of an innovative unmetered Internet Access package. In April 2000, just ahead of the regulator's May 2000 directive for the provision of FRIACO at the DLEs, BT announced the launch of a new unmetered product, BT SurfTime. The product was available to any ISP wishing to 'resell' unmetered dial-up Internet access to end-users. BT SurfTime is a flat rate Internet access service conceived at the 'retail end' of BT's telephony business. It provided a flat rate for an estimated level and duration of (voice telephony) calls made by the consumer over a monthly period to access the Internet at designated number ranges (0844 04). At launch, SurfTime comprised two options: a flat rate for evening (after 6 pm) and weekend calls of £5.99 per month, and a rate for heavier users giving unlimited any time of £19.99/month. To be eligible for the service, the customer had to incur two additional costs: a) the BT line rental for their voice telephony services (i.e. they must be a BT customer) and b) the connectivity cost of an accredited ISP to provide connectivity for SurfTime.

The launching of BT SurfTime triggered the generation of a new wave of entrepreneurial activities (Figure 1, E4). New entrants set up ISPs motivated by marketing and branding ventures, in other words they set up Internet Portals, reselling SurfTime and creating virtual Internet Service Providers' (vISP) hubs around other entrants such as the swiftly rising Affinity Internet Holdings Plc, or Plusnet that guaranteed to provide connectivity for the BT SurfTime product options.

The stock market slump in spring 2000 dampened the exuberance of venture capitalists. The investment boom that had followed the rapid financial gains realized in secondary markets in the aftermath of privatization and liberalization of the utilities vanished. Debts began to accumulate dramatically. Risk-averse financiers became slow to respond to would-be Internet pioneers. In this bleak financial climate, the new branded Internet Portals were attractive ventures. They substantially reduced the individual entrepreneur's financial risks by leaving all the uncertainties and vagaries of network and business management to a third party. The new Internet entrepreneurs received revenue from reselling BT SurfTime options. This activity required limited investment in computing

equipment and premises. The new entrants concentrated their activities on advertising and content. The new ISPs that began to emerge were more community focused. Some concentrated on educational content (e.g. Chalkface.net on Affinity's platform). Some represented the interests of subsections of the UK population such as the black Caribbean and Asian community and their leisure and business networks (e.g. AsianBiz.net and BlackBritain.net also Affinity's vISPs). Others provided specialized sites for environmental information or even set up local government authority portals.

For customers seeking unmetered Internet access, BT SurfTime was never rated as a commercial success. Given existing rules of interconnection and conveyance, Surftime's price appeared realistic but it was more costly than many of the other competing unmetered initiatives. In April 2000, WorldOnline (medium sized Telco and ISP formerly known as LocalTel & Screaming.net) was trying to hold on to its competitive edge over growing market shares in call termination in the expectation of the launch of BT FRIACO and the restructuring of its own network and service platform. It provided two low-cost dial-up options: 'Freedom Lite' offered 50 hours of access for an all inclusive £2.99/month and 'Freedom 24', 100 hours of Internet access for £14.99/month. WorldOnline's packages were based on a line rental, Internet access and a £20 one-off subscription fee. Line rental with WorldOnline for voice telephony allowed the customer to take advantage of discounted (metered voice) telephone calls. In September 2000, WorldOnline declared that customers would be moved on to a new pricing structure in October 2000, due to delays in BT's delivery of FRIACO. As time elapsed, WorldOnline's competitive position became untenable. Fast growth made it increasingly difficult to predict fluctuations in the volume and duration of calls. The conveyance cost element of the packages became too unpredictable. An increase was implemented in the line rental element of the packages' pricing. WorldOnline's Freedom Lite rose to £12.95/month while Freedom 24 cost £24.25/month.

From a strategic management perspective BT's introduction of SurfTime was a viably timed 'devolved' entry into the retail end of the 'unmetered' Internet access market. While SurfTime provided some stability for the United Kingdom dial-up mass market, it

also reinforced BT's position vis-à-vis the fierce competitive onslaught and setbacks it had suffered in the call termination segment of the market during the recent period of frenzy. As a result, BT reasserted its position as a dominant player and pacer of the development of the United Kingdom dial-up mass market from the restructuring of the wholesale markets for Internet access (origination, termination and connectivity), i.e. ahead of the introduction of the new FRIACO platform (see Tables 4 and 5 below).

Delays in the expected provision of the FRIACO platform constituted a time bomb for many ISPs and the effects continued to be felt well into 2001. Failure in information flows between network operators and ISPs and often the ISPs' incapacity to estimate, control and manage the demand that commanded the variable underlying cost components of their network capacity requirements led to further bankruptcies. Ezesurf, the temporarily resurged 08004u, crashed in debt to Energis for £2m and with a dispute with the direction of Energis' subsidiary Planet Online which Ezesurf argued had compounded the debt situation by its failure to provide accurate and timely billing for network usage. At its business 'closure', the popular ISP Breathe.com left the small telco Opal Telecom with a £1.5m debt. These were not isolated incidents. Unfolding events fuelled a culture of asset 'scavengers' amongst those who hoped to reinforce their new found market positions (such as Affinity Internet) and others who sought to take advantage of the downturn, gambling on their (financial) position and capacity to ride out the storm of falling stock market value and eventually capitalize on corporate assets from failed companies that held a significant market share. This is illustrated by the case of the new entrant Brightview Ltd. [21]

In February 2001 (Oftel 2001), BT finally released (see Table 3 above) the long awaited FRIACO technology and service platforms for unmetered access. BT launched a new set of wholesale FRIACO and non-FRIACO Dial IP technology/service platforms classified in two groups of products: WebPort and SurfPort.

The launch of the WebPort and SurfPort product portfolio marked a departure from former wholesale Dial IP network and service platforms by providing two core FRIACO

products Webport24 and SurfPort24. The portfolio maintained continuity with previous BT wholesale offerings as non-FRIACO options are still available to cater for the call share revenue interconnection and conveyance system that had emerged from the NTS platform. Two of these network/service platforms were re-branded WebPort Elite and WebPort Flex. The 'basic' SurfPort product supporting the number ranges 0845, 0800, 0844 04 (BT SurfTime) continued to be available (see Table 4 and 5).

[Insert Table 4 and 5 approximately here]

BT's new FRIACO product Webport24 was designed for small and medium sized ISPs that wished to outsource the technological risks and investment involved in the connection of end-users to the Internet. The product consisted of a quarterly port rental. It offered an end-to-end solution requiring a minimum capacity entry of 10 ports provided with a standard lead time of 10 days for orders below 100 ports. The price covered charges for call origination (call charges included) and IP termination on the World Wide Web, in other words, it covered all three segments of the wholesale market for Internet access, origination, termination and connectivity. As part of the package, BT allocated dial access numbers (range 08089933xxx), the quantity depending on the number of ports contracted. BT also offered options for authentification via a radius server while ports could be subdivided to support a number of separate virtual ISPs, each offering a different quality of service if required. The SurfPort24 option is also an end-to-end Dial IP solution tailored for larger ISPs and OLOs. It includes end-to-end delivery of Dial IP traffic to the customer's host site by combining FRIACO (call origination) with BT dial ports services. Onward transmission (connectivity) was the responsibility of the ISP or the OLO. Like WebPort24, Surfport24 was a 'scaleable' solution, i.e. the product was priced to allow financial benefits to accrue depending on scale starting with a minimum order of 1,500 ports (as compared to 10 ports for WebPort24) and the duration of contracts ratified (i.e. over 1, 2 or 3 years).

Just before the launch of the new FRIACO based product SurfPort24 at the end of January 2001, a small/medium ISP Cloud Nine Communications Ltd lodged a complaint

with the regulator accusing BT of anti-competitive behavior. Cloud Nine argued that the rescaling of contracted port requirements from the previous minimum order limit of 100 ports (for equivalent FRIACO Hybrid platform – Dial IP) to 1,500 ports for the SurfPort24 product prevented small and medium ISPs from subscribing to the product. Cloud Nine added that the scale benefits favored the cost structure of the larger ISPs enabling them to grow at the expense of small and medium ISPs. BT denied the accusations arguing that the original lower port requirements in previous contracts were ratified on the expectation that ISPs would grow and their orders would increase. BT argued that in many cases this did not happen and, as a result, it had not been in a position to recover its sunken network costs. Hence, its current decision to increase the minimum volume capacity to be contracted with SurfPort24 was a necessity given that the costs of deployment of low volume (100 ports) orders had proven to be uneconomic. Additionally, low volume orders require disproportionately higher operational and support costs. In response to the complaint, Oftel ruled that BT had seen a decline in its share of the call termination segment of the market and, therefore, it should not be seen as posing a significant anti-competitive threat to OLOs nor could it be concluded that BT was intending to distort the competition between ISPs. Finally, Oftel noted that BT was providing a new product WebPort24 that would offer lower volume port orders for smaller and growing businesses.

Oftel's response was not considered satisfactory by the smaller ISPs already operational in the market. They had invested in their own network provision for connectivity - some through partnerships with similar small/medium businesses that had grown with the developments of the ISP market[22] or OLOs (BT's competitors). They had technological and financial commitments. Both WebPort solutions included connectivity. For ISPs like Cloud Nine, the migration to a new platform would substantially alter their existing network configurations and service contracts. After a period of turbulence, this was coming at a time and a cost that even the healthiest small ISP business could barely afford. They saw their narrow competitive edge disappear. Later in 2001 Cloud Nine chose to shut down its service while it was still ahead.[23] Existing small and medium sized ISPs were about to face a new wave of (small) entrants (Figure 1, E5). Taking the

opportunity of the low technology, low financial risks offered by BT's new WebPort and WebPort24 products either directly contracted from BT or from the fast growing hubs such as Affinity that were ready (in February 2001) to subcontract BT's wholesale product portfolio, a new set of entrepreneurs entered the dial-up market. These new entrants were effectively virtual ISPs some offering pyramid reseller agreements designed to reap some economies of scale from the sale of their Internet access products.

Early in 2002, Affinity began migrating its hub of smaller ISPs from SurfTime to WebPort and WebPort24 products, altering the scope of its retail Internet Access products. Therefore, ISPs like Affinity were instrumental in shifting the temporary leverage SurfTime had created for BT at the retail end of the market to more deeply seated market power in termination and connectivity in Internet access wholesale markets. BT's new wholesale portfolio stated its existing predominance in call origination and re-established a position of greater control over termination and connectivity where market stabilization provided grounds for growth, securing a high level of competitiveness in connectivity and termination whilst conforming to regulatory pressures. BT created strategic synergies that were translated into market control, as well as 'pockets of vertical integration' through product design. WebPort24 covered the three wholesale market segments, while the WebPort product had similar market effects since BT still held a quasi monopoly in call origination.

In the transition from the second to the third phase of development of the UK ISP market, 'contraction' or market concentration was not achieved just by acquisitions but by the emergence and consolidation of a few ISP hubs gravitating around a reduced number of players. Affinity Internet (for example) acquired Breathe.com, Blue Carrots and Sonnet Internet. However, while acquisitions were a notable part of market consolidation, a migration process in technology platform and retail product structures was an equally important ingredient in market contraction and the market's re-opening for expansion. In Affinity's case, this migration took place as the company shifted from its earlier strategic positioning as a SurfTime reseller and connectivity provider to a BT Dial IP wholesale product and service provider. Affinity was a first mover in this instance beginning

delivery and support of BT dial IP platforms as soon as the WebPort and SurfPort product portfolio was launched. This strategic market repositioning mediated conditions for new market expansion and the deployment of revised access package offerings. These included a variety of options covering different usage levels, time of the day and quality of service. In early 2002, Affinity began to migrate all previous vISP resellers of SurfTime to these new (retail) dial-up Internet access products and services.

Conclusion

The Internet entrepreneur in the United Kingdom ISP market has been defiantly driving an established albeit rapidly changing telecommunication industry in two ways. In so far as the Internet constitutes a technological opportunity and a 'fundamental impulse that sets and keeps the capitalist engine in motion' (Schumpeter [1942] 1962, 83), the Internet entrepreneur has furthered the gales of 'creative destruction' bringing about the transformation of telecommunications networks. It has been an actor and a catalyst of the transformation of the sector's technologies, services, organizations and institutions. Early entrants took the initiative of 'pushing' unmetered access onto the market. However, the case of the United Kingdom shows that the Internet entrepreneur differs quite significantly from Schumpeter's rather general notion of entrepreneurship (Schumpeter [1939] 1982, 102-5). In the dial-up ISP market, different waves of entrepreneurship emerge alongside the transformation of market conditions and the feedback loops pertaining to dynamically changing technological (network), financial and commercial opportunities. The entrepreneur, therefore, is shown to have a proactive as well as a responsive role in shaping a cumulative path and process of transformation (Myrdal 1944, 1065-7), which influences the evolution of the technological and institutional trajectories underpinning evolving market structures from metered to unmetered dial-up. Different 'styles' of entrepreneurship are 'conjectural' (discontinuous) and cumulative (continuous), and they emerge as the market progressively evolves, contracts and 're-opens' to present market conditions and the new state of play for a new phase of expansion.

While dial-up connections continue to dominate the total number of subscriptions, permanent connections have increased their market share to 15% (UK National Statistics, June 2003). Overall, dial-up connections have been decreasing with a year on year growth to April 2003 of - 5.6%. After a turbulent decade, table 6 shows that the United Kingdom dial-up Internet access market is entering a maturing phase where a few major players have consolidated their market share.

[Insert Table 6 approximately here]

The case of the United Kingdom dial-up Internet access market corroborates Bar et al.'s (1999) suggestion and indicates that sustained intervention is necessary in order to encourage development of wholesale technology and business platforms as well as retail products that are suitable for supporting an environment adequate for sustained growth on the one hand, and companies capable of delivering quality of service at competitive prices for the domestic mass market on the other.

Oftel' strategy is to promote competition and to match an adequate level of regulation to the level of competition. After consultation, Oftel judged that competition in the connectivity market was sufficient not to warrant intervention at the retail end of the market. However, the United Kingdom dial-up Internet Access market shows that the current regulatory rationale undermines the possible adverse effects of 'unfettered competition' in an environment where allocation and control over resources are already highly unequally distributed given pre-existing embedded patterns of a) ownership and/or control over technology and the design of services, and b) the dynamics of market power such as management maneuvers for strategic positioning to maintain or achieve leverage and greater market share.

European directives (EC, 1997, 1998) advising on the unbundling of the Local Loop require incumbents to offer shared access (line sharing) to OLOs. However, Oftel has failed to tackle BT's dominance in origination speedily and effectively enough and this despite numerous protests from OLOs (Wakefield 2000). As early as November 1999,

Oftel set out the decision that BT must make the Local Loop available to OLOs at cost-based price (Oftel, 1999). However, late 2000, the Trade and Industry Select Committee noted that Oftel was being too distant from the process. It also criticized Oftel for 'not having enough technical knowledge to push things forward' (Wakefield 2001, 2). Oftel it was argued had too little hands-on experience of the practicalities of Local Loop Unbundling (LLU). Delays in enforcing the EC Directives and Oftel's leniency vis-à-vis the incumbent were significant in mapping the trajectory of change.

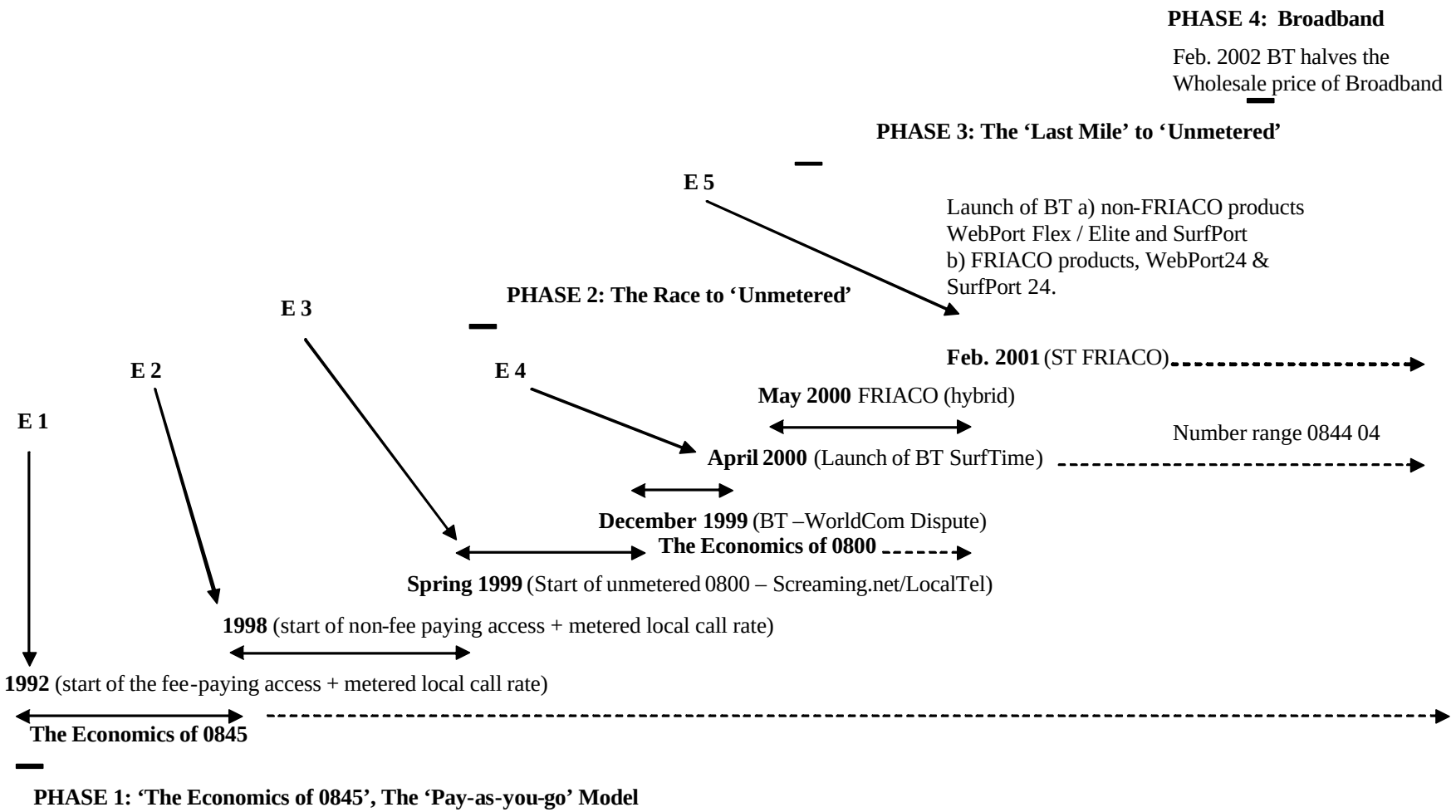
BT's previous trajectory of network development, its quasi-monopoly in call origination and its delay in introducing a wholesale unmetered platform for the delivery of Internet access products and services, made it extremely difficult for OLOs to compete and create a wholesale platform for 'unmetered' for the mass market. Additionally, we will argue that BT's failure to comply with EC directives in an appropriate and timely manner, made it difficult for competing operators to launch broadband packages onto the mass market at an earlier stage of this market's development. It was quasi-impossible for OLOs to offer new entrants the wholesale and network conditions required to sustain innovation and growth. Barriers to entry may not appear substantial but 'barriers to growth' have proved numerous under conditions of fierce competition stimulated by stock market frenzy at the retail end of the market and 'laggard' regulation in tackling BT's dominance over network technology and services. Smaller ISP players have a narrow scope for strategic maneuvering and little leverage in disputes. They have limited financial resources and their survival depends on a crucial narrow time line for the rescaling and migration of their existing technology and service platforms. For many this compounds the debt burden and few make the transition 'to scale up' their operations.

From a position of follower responding to the onslaught of a myriad of new entrants in the first and earlier part of the second phase of the market's expansion, BT reasserted itself as a market 'pacer' reconsolidating its dominant position across segments of the wholesale markets and locking in substantial market share in the retail end (see Table 6). This BT achieved by restructuring its (wholesale) network and service platform for dial-

up Internet access and by creating strategic synergies in product design that enabled partial if not full vertical re-integration of the ISP wholesale market segments.

In February 2002, as the dial-up ISP market entered its maturing phase, BT announced that it was halving the wholesale price of broadband and intended to launch the first broadband packages on the United Kingdom domestic market in April 2002. In the dial-up market, however, quality of service is still a major concern with numerous providers suffering chronic disruptions to service and very low download speed. Price competitiveness has been translated into a ‘hierarchy’ of quality of service.

FIGURE 1: A 3-Phase Model of 'Cumulative Gales of Creative Destruction' of the UK Dial-up ISP Market



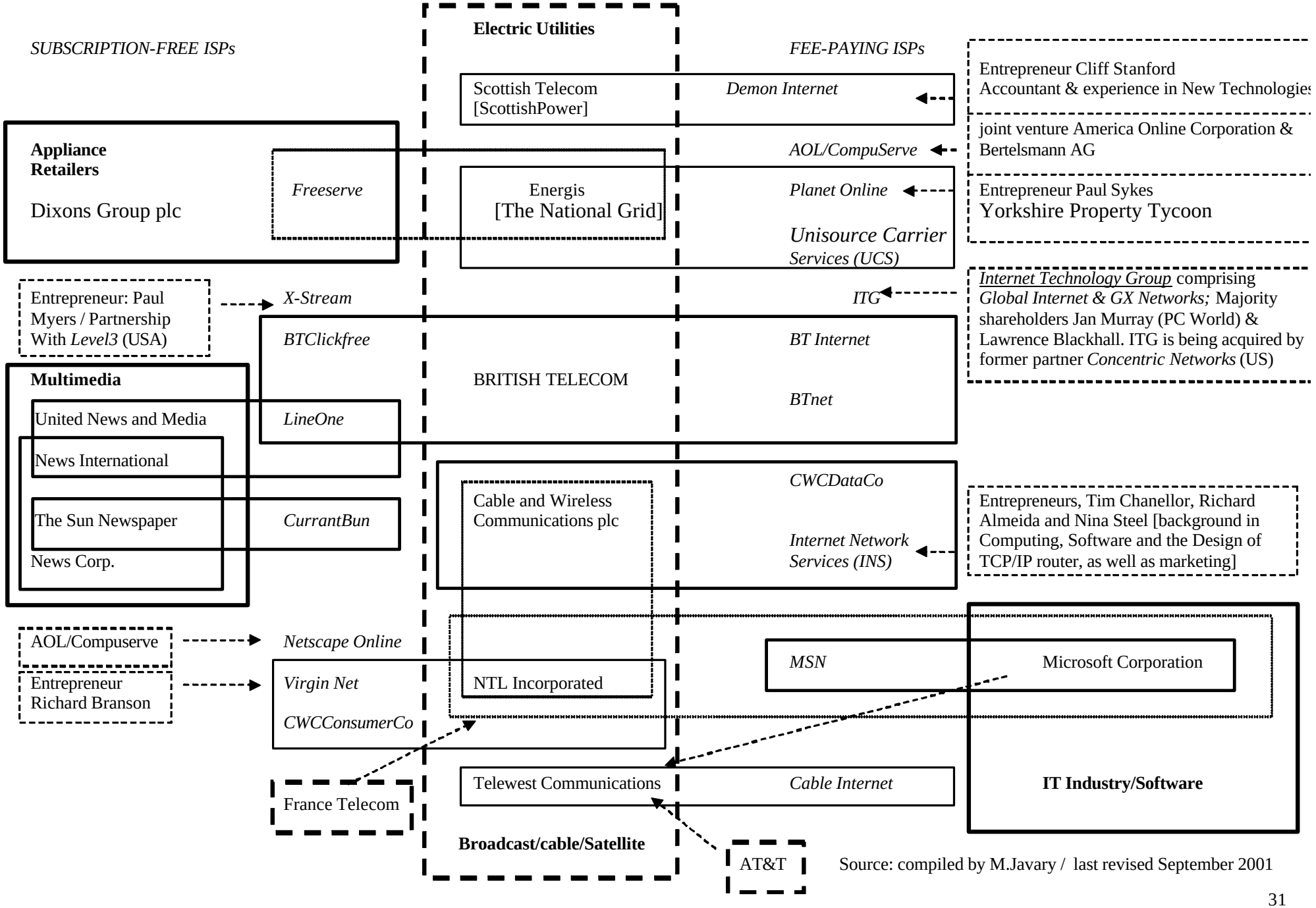
Source: Compiled by author. Phase 4 not included in analysis. Broadband packages are starting to be commercialised to the mass market in April 2002

TABLE 1: BT Number Translation Services, 'NTS Products'

Name of product	Example of Number range	Product Description
Freefone	080,xx, 0500	Toll-free service which enables customers (which means organizations to which the calls are made to be called) free of charge from anywhere in the UK. The customer (the called party) pays the full cost of the call
Local rate Lo-Call	0845, 0844	Customers can be called from anywhere in the UK at a local rate. The caller pays local rate. The customers (called party) pays the balance
National Call	0870	Customers can be called from anywhere in the UK at the national rate. The caller pays the full standard national rate and the customers (called party) pay nothing. BT may make a call payment to customers (called party.
Premium Rate Services (PRS)	09xx	Caller pays for call together with variable charge for content of the call. Customers(called party) earn revenue from the call

Source: M. Javary (2002) Table compiled from information in Oftel documents, *Effective Competition Review of Number Translation Services* (September 2001; Annex II) and *Effective Competition Review of Number Translation Services*, 27 March 2002.

FIGURE 2: PHASE 1 - THE CONSOLIDATION OF MAJOR INCUMBENTS IN UK INDUSTRY (OWNERSHIP LINKAGES)



Source: compiled by M.Javary / last revised September 2001

TABLE 2: FIXED LINE CALLS USING NON-GEOGRAPHIC NUMBERS (‘000)

PRODUCT /SERVICE NAME	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01
Freephone Calls	757	1, 325	2.090	2,305	6,776	34,043
Special Local Rate	547	1,219	6,978	20,262	42,799	66,376
Special National Rate	132	492	784	1,410	2,615	3,494
Calls to Premium Rate Services	429	407	460	888	958	667

Note: Paragraph 2.13 of the *Effective Competition Review of Number Translation Services* (September 2000). The period from 1999 to 2000 coincides with the uptake of unmetered Internet access via 0800 services as well as the first attempts at managing FRIACO with a metered component between the DLE and the tandem. This increase in the number of Suppliers of NTS between March 1999 and December 2000 is also noted in the summary of the same Oftel September 2001 document. (p.1). additionally the growth shown in BT’s figure can be reinforced by the fact that 70 per cent of NTS calls originated on BT’s network.

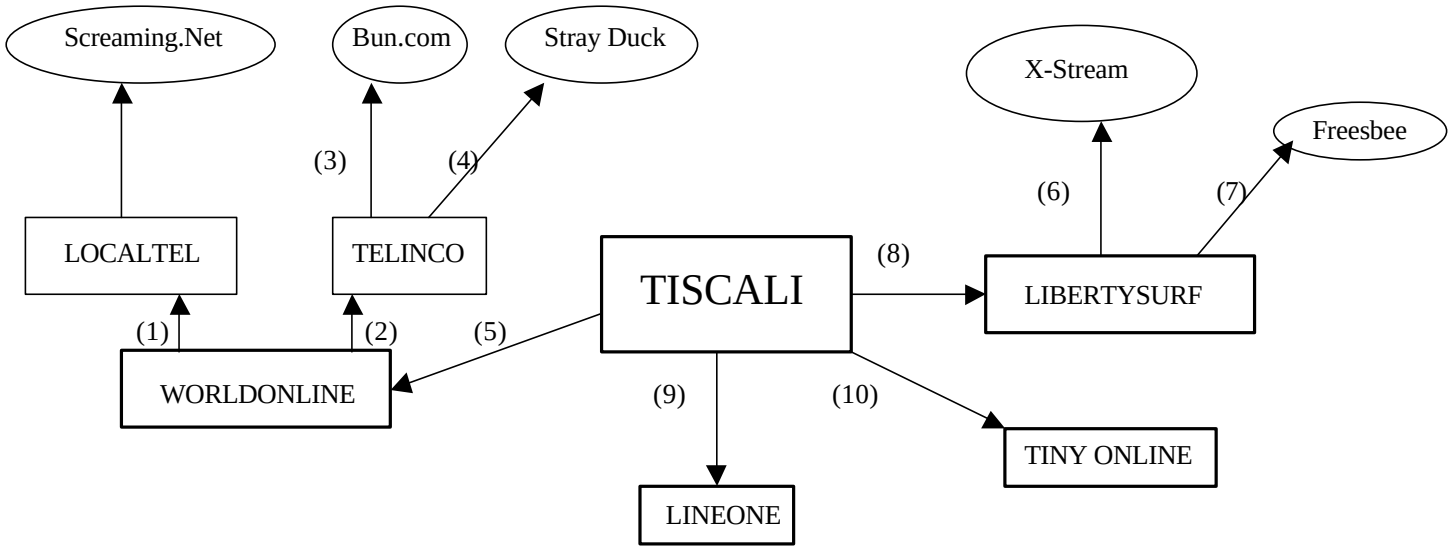
Source: compiled by M. Javary (2002) from The UK Telecommunications Industry: Market Information, 1999/2000 and 2000/01, Oftel, December 2001 as published in *Effective Competition Review of Number Translation Services*, Oftel, 27 March 2002 and *Effective Competition Review of Number Translation Services*, September 2000.

TABLE 3: SUMMARY OF SECOND FRIACO RELATED DIRECTIVE OF 13/02/2001 AFTER RESULT OF COMMISSIONED RESEARCH INTO AVAILABLE TANDEM CAPACITY

STAGES OF IMPLEMENTATION **For revised 26/05/2000 OFTEL Direction**	**OFTEL's DIRECTION**
Motivation	**Commissioned consultants provide evidence of spare capacity at BT's tandem exchanges and advise that more capacity can be released from the rearranging of OLOs' metered traffic to DLEs**
15/02/2001	Publication of the Second FRIACO Related Direction
Stage 1 of implementation **Starting 26/2/2001**	• establishes limits on the volume of ST FRIACO ports that operator can buy from BT at any given tandem switch • at tandem switches which have no or insufficient capacity, BT is able to require traffic rearrangements to create additional tandem switch capacity for ST FRIACO
18/07/2001	• Oftel issues a documents of guidelines for reasonable re-arrangements
Stage 2 of implementation **Starting 01/02/2003**	• BT's obligation to supply ST FRIACO will not be dependent on the limitations for stage 1 • BT will be expected, if necessary to take further steps to address network capacity issues in order to meet this obligation • Cost of additional capacity necessary for stage 2 must be borne of operators (including BT) that use the tandem network (regardless of whether they have any ST FRIACO) since all operators using tandem network contribute to the scarcity of capacity at the tandem level. • Work is being conducted on the development of further FRIACO product using IP interconnection that potentially would reduce costs and limit needs for investment in stage 2

Sources: M. Javary, 2002 compiled from: *Determination relating to a dispute between British Telecommunications and WorldCom concerning the provision of Flat Rate Internet Access Call Origination (FRIACO)* dated 15/02/2001, at www.oftel.org.uk/publications/fria0201.htm; *Guidance as to how the Director General will consider whether British Telecommunications has acted reasonable in the provision of Single Tandem FRIACO* dated 18/07/2001 at www.oftel.org.uk/publications/internet/fria0701.htm; *Consultation by the Director General of Telecommunications on amendments to the FRIACO Direction* dated 28/01/2002 at www.oftel.org.uk/publications/internet/

Figure 3: The consolidation of Tiscali by acquisitions



(1) WorldOnline acquired LocalTel and ISP Screaming.Net in March 2000 with 180,000 estimated subscribers
(2) WorldOnline acquired Telinco (Chesshire-based Telco) in January 2000. Telinco was the 'outfit' for Bun.com a successful ISP. It is suggested that WorldOnline paid over 250m Pounds for the Telco. Telinco's founder Chris Matthews ("e-entrepreneur") started the company on 16,000 pounds.
(3) WorldOnline acquires Bun.com on 02.03.2000. Originally launched by News International on 30.03.1999, Bun has an estimated 450,000 users (The Register, Tim Richardson).
(4) WorldOnline acquires Stray Duck with its acquisition of Telinco. Stray Duck was Telinco's ISP.
(5) Tiscali acquires WorldOnline in December 2000. WorldOnline now rebranded as part of Tiscali
(6) LibertySurf (French ISP) merges with X-Stream by buying outstanding shares for X-Stream that launched an 0800 service early 1999
(7) LibertySurf acquires Freesbee (part Telco)
(8) Tiscali acquires LibertySurf for $570million, and takes over 75% of Excite Italia (14.02.2001). Kingfisher sells its share of LibertySurf (39% for $499m) takes up 3.5% stake in Tiscali.
(9) Tiscali acquires LineOne former joint venture between News International and BT, with estimated subscriber-base of 430,000 in April 2001 for 100million Pounds
(10) Tiscali acquires former Tiny Computers ISP, Tiny Online in August 2001 and maintains a distribution agreement for the ISP with Tiny Computer.
Italian Telco, Tiscali, was founded by Renato Soru in 1997, floated in 1999
Source: Compiled by author (2002) from specialist press and companies / news releases / news archives

The Structural underpinnings of BT's dial IP wholesale product strategy

Table 4: BT Non-FRIACO Dial IP Products

Product Name	Product includes:		
	Call Origination	Call Termination	Connectivity
Non-FRIACO products	NTS call share revenue applies between BT and ISP*		Competition for connectivity only possible with SurfPort.
SurfPort	NO	YES	NO
WebPort	NO	YES	YES

- For a summary of details of Port rental/service options charges, see table *'BT's wholesale Product/service options – non-FRIACO products'*

Source: Compiled by author (2002) from product outlines provided by BT Ignite during interview 14.03.2002.

Table 5: BT Dial IP FRIACO Products

Product Name	Product includes:		
	Call Origination	Call Termination	Connectivity
FRIACO Products			Competition for connectivity only possible with SurfPort24
SurfPort24	YES	YES	NO
WebPort24	YES	YES	YES

- WebPort24 by design, 'vertically' reintegrates the three wholesale market segments for the delivery of unmetered Internet Access packages.

Source: Compiled by author (2002) from product outlines provided by BT Ignite during interview 14.03.2002

Table 6: Evolution of the UK Dial-up Internet Access Market July 1999 – May 2002 by Estimated Market Share of top ISP Players in the transition from Metered to Unmetered Internet Access (%)

ISP Names	July 1999		ISPs Names	May 2002
	Fee-Paying ISPs	Non Fee-Paying		Unmetered
AOL	29	-		20
Compuserve	20	-		-
Demon	9	-	**Demon (Telco Scottish Telecom /rebranded THUS, see figure 2)**	-
BT Internet	6	-	**BT Openworld**	23
Global Internet	5	-	**(Brightview Ltd)**	?
Freeserve		32		20
X-Stream		7	**(Tiscali)**	5
Currant Bun		6		
Breathenet		5	**Breathe.com (Affinity's Subsidiary)**	?
LineOne		5	**(Tiscali)**	
	-	-	**Virgin.net**	3
NTL (including Cable and Wireless, see figure 2)	-	-		12
Other	31	44		17
Total	100	99 *		100

Source: Compiled by author from Durlacher (1999) for July 1999 figures and Oftel's recent survey of ISP share of UK residential homes with Internet Access (based on an ISP consumers' use) for May 2002 figures, last accessed on June 28, 2003 at www.oftel.gov.uk/publications/research/2003 .
* Durlacher's figure

Note: Brightview Limited does not appear as a significant market player in Oftel's recent survey. BT Ignite, however, - (Interview, 14.03.02) - revealed that it considered Brightview a significant market player. Brightview recently acquired XO Communications' UK Internet operations that include Global Internet. XO Communications' UK Internet operations also encompassed the provision of connectivity to a number of smaller vISPs. Affinity Internet is also a substantial player. Therefore, we would expect that Brightview Ltd. and Affinity Holdings Plc have a significant share of the remaining 17% alongside Telewest (Eurobell)' ISPs. In 2002/03, Demon Internet is positioning itself in the competition for the residential broadband market.

LIST OF ABBREVIATIONS

BT	British Telecommunications Plc (Incumbent)
DLE	Digital Local Exchange
DMSU	Digital Main Switching Unit
FRIACO	Flat Rate Internet Access Call Origination
INS	Internet Network Services (company)
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
ITG	Internet Technology Group (company)
NTS	Number Translation System
OLOs	Other Licensed Operators
PSTN	Public Switched Telephone Network
ST FRIACO	Single Tandem Flat Rate Internet Access Call Origination
LLU	Local Loop Unbundling

Notes

[1] A study conducted by UK.netvalue shows that low-income users are the largest group online in the United Kingdom. The announcement on the 24th of May 2001 shows that subscribers in the very low income group comes top as the larger subscriber group comprising 26.9% of all users earning less than £600 a month, http://uk.netvalue.com/presse/cp0056.htm accessed on 06.06.2001.

[2] Empirical evidence for this article has been collected from research conducted over a period of 12 months (June 2001-May 2002) and has been funded by the United Kingdom Economic and Social Research Council (ESRC) (Javary, 2002). It has provided data on final demand, institutional and regulatory changes, examples of significant competitive and collaborative ventures between market players (strategic positioning) as well as a historical record of entrepreneurial activities in the rapidly growing United Kingdom ISP dial-up market. The original sample of UK ISPs targeted 30 firms. However, the rapid turnover of firms entering and leaving these markets implies that in practice a much larger number of new entrants were considered over the course of the research.

[3] British Telecom was privatized in 1984. There followed a gradual transition from the public to the private sector. The UK government retained almost half the shares in the privatized company British Telecommunications Plc until December 1991 time at which it sold half its remaining shares reducing its stake to 21.8%. A third flotation of the government's remaining shares took place in July 1993 and in July 1997, the new Labor Government relinquished its "Golden Share" that had been retained at the time of the last flotation. The British Telecommunications market was liberalized only gradually and stayed under duopolistic control (BT, Mercury) until the issue of the Government White paper in March 1991 that put an end to the duopoly enjoyed by BT and Mercury since November 1983.

[4] British Telecom (precursor of the privatized British Telecommunications Plc) started a programme of capacity expansion for its domestic network in the late 70s. By 1983, it was using optical fiber in all new trunk circuits (Mansell, 1994: 111).

[5] BT opens its Worldwide Network Management Centre (Shropshire). This centre monitors all trunks and DLEs and provide centre managers with continuous data on numbers, destination and duration of calls with specialized designed consoles and an overview of the network alerting management to the dangers of bottlenecks (http://www.btplc.com/Corporateinformation/BTArchives/, 1984-1991, last accessed 18/02/03). By 1995, all BT's exchanges now allowed TouchTone dialing, fast call connection, fully-itemized bills, and selective pricing discount schemes, as well as per second pricing. 80% of customers connected to the latest digital exchange technology. By, after successive waves of investments, BT network is finally entirely digital (BT's online archive, ibid. 1995).

[6] Services first known as 'Star' and later 'Select' services enable the introduction of a 3-way calling, call diversion, call waiting and many other options not available with the analogue system. Some of BT's new services are provided with quarterly rental charges, other without registration or service fee. For example, the PremierLine (1995) Discount Residential Option package was introduced with £6 per quarter registration fee. 'Friends and Family' (1994) discount scheme was introduced at a cost of £4.99 and offered a 5% discount on any calls to 5 selected numbers. This service was free for customers already registered with PremierLine. In 1996, the fee for 'Friends and Family' is abolished; the discount doubled to 10% and an additional number (6 instead of 5) was authorized for registration. Other discount schemes followed such as Key Countries, Key Cities and Key Regions Discounts in 1998. (http://www.btplc.com/Corporateinformation/BTArchives/, last accessed 18/02/03).

[7] The 0345 number range was later replaced. Two new number ranges were put in operation 0845 and 0844, namely Special local calls and Lo-Call.

[8] In 1995, the Office for Telecommunications (Oftel) organizes a consultation process to mediate the development and changes in the structures and delivery of BT's Number Translation Services. In January 1996, Oftel issues a determination for charges that BT and operators should pay for access to BT's services. It sets the basis for the calculation of payments BT should make to operators for terminating calls destined for their (or their service providers) services. (Oftel, January 1996).

[9] For example, Planet Online one of the early entrepreneurial ventures entering the UK ISP market creates a main partnership with GTE Internetworking who owns BBN Technologies, the organization responsible for the development of ARPANET (http://www.theplanet.net/partners/interpart.htm last accessed in August 1999).

[10] The Technical Director UUNET-PIPEX/WorldCom (2002), citing the example of the first networked platform used by Demon when it launched it Internet services in 1992.

[11] Xara Networks later known as GX Networks was founded by Charles Moir a software programmer. The company merged with Global Internet to form ITG. ITG is acquired by its US partner Concentric Networks (2000). Concentric goes on to merge with another US ISP venture, NextLink. The company named XO Communications was backed up by the US financial 'centre' Fortsmann and Little. Plans to refinance/restructure the venture as part of an agreement between TELMEX (Mexico) and Forstmann and Little had recently fallen through and XO Communications has sold its United Kingdom Internet Operations to Brightview Ltd (2002) (www.brightview.com).

[12] Figure 3 entitled 'Consolidation of Major Incumbents of UK Industry (Ownership linkages)', (Javary, Mansell 2002, 174). Demon Internet is acquired by Scottish Telecom (subsidiary of Scottish Power/ rebranded Thus) in 1998; Planet Online is acquired by Energis (subsidiary of the National Grid Company) in August 1998; Internet Network Services (INS) is acquired by Cable and Wireless Plc in July 1999. Energis also buys into Freeserve (5% of stock) in 1999 (Network Briefing, 25.6.1999).

[13] BT Internet, the dial up Internet access package aimed at the domestic and small business user was launched in March 1996 with a one-off registration fee of £20 for set up and a monthly charge of £15 for network provision and services. Time spent on line is charged as part of the customer's ordinary phone bill at special local call rate. As the pressure of competition increases and the first

non-fee paying dial-up packages make their appearance on the market in 1997, BT abolishes the one-off registration fee and decreases the monthly charge to £11.75. BT only introduces its non-fee paying dial-up Internet access package in February 1999.
[14] Screaming.net starts offering off-peak toll-free access late April 1999, GreatXscape in June 1999.
[15] T. Ridchardson reports in 'The Register' on 01/09/09 that the watchdog Oftel after leading an eight-week inquiry into the dispute confirms that "defects in the transition process were causing major problems for consumers." (http://www.theregister.co.uk)
[16] 22,000 people have obtained 08004u dial-up coordinates via user forums. A 'community of hackers' quickly develops and is surfing the net using the free dial-up number that leaves 08004u to pick up the network costs and 0800 call charges. The company folds by November 1999. Screaming.net is experiencing major network bottlenecks that bring their service to a standstill to the outrage of its subscribers who come by coach loads to protest at the company's headquarters, branding effigies of Francis Bacon's famous painting 'The Scream'. CallNet 0800 launched in collaboration with North American Gateway shortly before the 08004u's failure, is forced to suspend service early December 1999, resurging shortly after with substantial backup from CISCO and Siemens Network Systems. Having survived the migration to Flat Rate Internet Access Call Origination (FRIACO Hybrid), CallNet 0800 will finally abandon the race in August 2000 alongside many of the more significant players in the market, e.g. LineOne. CallNet's 0845 service option and its customer base are acquired by Brightview Limited (see note 21).
[17] ST FRIACO is in other word the platform for unmetered interconnection for Internet traffic with handover at the tandem switch where most of BT's competitors (operators) have points of connections.
[18] Claire Woffenden reports for vnunet's news that, "During August, ISP LineOne announced its intention to abandon its 0800 service with telco Quip at the end of September, after admitting it can no longer support the economics of providing free access." ['Freeserve jammed by unmetered refugees', www.vnunet.com 21.08.2000, press archive accessed 13.11.2001].
[19] From a phenomenal growth and success in January 2000 - (subscribers up 12% on its previous quarter and a significant decrease on its losses from £5m to £3.6m) -, Freeserve faces a developing crisis in August 2000 straining to manage its overloaded service and its subsequent network disruptions. The company decides the closure of its existing unmetered sign-up in October 2000. Freeserve relaunched new packages but was finally forced to close its pledged £10 Internet Access package in 2001. [www.vnunet.com, Press archive, accessed June 2001, October 2001 and January 2002].
[20] The most notorious but not unique case being that of the ISP RedHotAnt that led to sustained Kent County Council and police investigations after numerous official customer complaints were filed and upheld against the company. (For details look up News Archives of online specialised press, www.theregister.co.uk or www.vnunet.com, www.internet-magazine.co.uk).
[21] There are two significant examples of this phenomenon on the UK ISP market; One is Affinity Internet; having secured a prime market position as an 'early entrant' in the new window of opportunity provided by BT's SurfTime 'solution', Affinity went on to acquire a number of ISPs that were in trouble, raising it scale of operations. Affinity acquired the popular ISPs Breathe.com and BlueCarrot. Affinity has recently gone into administration (FT.com 25.03.03). Affinity's Internet operations were sold to Cleverview Ltd on 10.03.03. However, Cleverview Ltd. is a 'bought off-the-shelf' company. Current new owners are still unknown. Another significant but rather elusive player (in terms of its public image) emerged in the UK ISP market in April 2001. In April 2001, Brightview Ltd was chaired by Giles Vardey, former director of the London Stock exchange and creator of the AIM market. Among its directors, Brightview included David Laurie, former property consultant during the property boom of the 1980s and current managing director of New Capital Invest Plc., Fenton Conway, an expert in trade finance and David Stirling, former director of an AIM listed medical equipment company. David Tarsh, Brightview's PR and secretary remained fairly vague about the company's activities. After changes on the board of directors, Brightview has recently gone into administration (9 April 2003) (Companies House, Cardiff, Company number 04197790, www.companies-house.co.uk, last accessed 14.05.03).
[22] XO communications for example, specialise in the provision of bandwidth and connectivity. XO Communications UK Internet business and operations have recently been acquired by Brightview Ltd (www.brightview.com, last accessed March 2003).
[23] Cloud Nine's report and accounts (Companies' House, Cardiff, UK) does not record any substantial debt. Cloud Nine chose to split its assets and sell its tangible assets (Servers etc.) and intangible assets (its customer base) to other ISPs.

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