

# Residential Broadband in the United Kingdom:<sup>\*1</sup>

Observations from South Korea and Japan

英国における家庭向けブロードバンド：日韓からの観察

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## [要旨]

1980年代はじめ以降、英国は、通信への競争導入という点において先進的な国々の中に位置づけられてきた。長年、英国は通信サービスにおいて、低コストとより多くの選択肢という恩恵を享受し、同国の通信企業は世界的に最も成功を収めていた。しかし、2001年10月にOECDが発表したブロードバンド展開の現状に関する研究では、英国は28カ国中22位になってしまった。通信における成功のための重要な新しい手段であるブロードバンドにおける英国の失敗は、同国のインフラ競争の早い展開から見て驚きだとOECDは書いており、それを説明するのは、関係企業が別のところに重点を置いていたからだろうと示唆している。

本稿では、OECDの報告は部分的に正しく、英国の通信企業のビジネス戦略は他の問題に重点を置いていたが、しかし、英国のブロードバンド取り込みの失敗の主因は、同国が採用した競争政策の失敗にあるということを示す。英国は、インカンベント事業者と競争できる自前のネットワークの構築を競争事業者に促すことによって競争が最も達成される、という競争哲学に従ってきた。しかし、この「多ネットワーク」競争モデルは、インターネットの到来がもたらした根本的变化を考慮に入れていない。サービスにおけるイノベーションはもはや物理的なネットワーク・インフラの所有には結びついておらず、ブロードバンドにとってもっと適切な競争モデルはオープン・アクセスだということである。

2001年以来、英国の政策は大きく変わり、ブロードバンドは急速に伸びている。英国は現在、ヨーロッパで最もブロードバンドが普及した国のひとつである。しかし、まだ重大な弱さが残っている。つまり、一般の人々が利用可能な料金のブロードバンド・サービスは、英国人口の67%しか使うことができず、また、現在利用可能な512Kbpsから2Mbpsの間の通信速度の「第一世代」ブロードバンドを超えるスピードのブロードバンドを、英国の通信産業が提供できるという見通しがほとんどないということである。

[ Abstract ]

Since the early 1980s the United Kingdom had been among the pioneer nations in the introduction of competition to telecommunications. For many years the country reaped benefits of lower costs and more choice in telecommunications services, and its telecommunications firms were among the most successful globally. However, in October 2001 the OECD issued a study on the state of broadband deployment indicating that the UK was just 22nd in a league table of 28 nations. The OECD stated that UK's failure in this new important measure of success in telecommunications was a surprise given the country's early roll-out of infrastructure competition, and suggested an explanation might be that the companies involved had been focused elsewhere.

In this report we attempt to show that the OECD was only partly correct, UK telecommunications companies' business strategies were focused on other issues, but that the main cause of the UK's poor up-take of broadband was actually due to the failure of the type of competition policy the country had adopted. The UK had followed a regulatory philosophy that competition would be best achieved by encouraging new entrants to build their own networks to compete with the incumbent operator. However, this "many networks" competition model failed to take account of fundamental changes brought by the rise of the Internet; that innovation in services was no longer tied to owning physical network infrastructure, and that a more appropriate competitive model for broadband was open access.

Since 2001, UK policies have changed significantly and broadband growth has increased rapidly. The UK is now one of the most broadband penetrated countries in Europe, and broadband prices are globally competitive. But there are still important underlying weaknesses. Affordable broadband services are only available to around 67% of the UK population, and there are few indications that the UK communications industry will be able to deliver broadband at speeds above currently available "first generation" broadband transmission speeds of between 512Kbps and 2Mbps.

# 1. Introduction

In October of 2001 the OECD issued a report on the state of broadband deployment indicating that at the end of 2000 the United Kingdom was a lowly 22nd in a league table of 28 nations<sup>\*2</sup>. This came as a surprise to many. The UK had been at the forefront of telecommunications liberalization since the early 1980s, and it was a shock to find that the country had now fallen seriously behind in the development and deployment of the latest communications networks and services.

Why this happened, and how the UK government and industry have reacted since the OECD announcement will be examined in this report. We know from examining the situation of broadband markets in Asia, particularly Japan and South Korea, that very rapid and sustained growth of broadband is possible and that this growth can be the result of various conditions. Briefly looking at why South Korea and Japan have seen such rapid growth in broadband may offer a useful contrast to the problems in the United Kingdom. While South Korea has many unique features that enabled its broadband industry to grow, other factors are common to most countries. The telecommunications environment and experience of Japan is closer to that of the United Kingdom, and many of the factors that helped growth in Japan might be seen as absent in the UK. Japan, the UK and the United States began liberalization at around the same time in the early 1980s, and it is interesting to note how almost 20 years later they have reached very different levels of success in the uptake of broadband, a current leading indicator of communications market success. We should also note that while the UK is beginning to enjoy a period of sustained growth in broadband, and has become one of the most broadband-penetrated countries in Europe, its growth rate and total penetration is significantly less than Japan and South Korea. So much so that UK and EU measures of what is successful might be questioned.

## 2. Setting the scene: residential broadband in South Korea and Japan

### 2.1. Broadband in South Korea

In October 2002 there were slightly more than 10,000,000 DSL and cable modem subscribers in South Korea, an increase of over 2.2 million new subscribers since October of 2001. The South Korean broadband market grew by over 3.5 million new subscribers in both 2000 and 2001. Transmission speeds range from 1.5Mbps to 8Mbps service (with some higher speed service offerings) averaging around 3 Mbps, according to the

Ministry of Information and Communications.

Reasons for this phenomenal growth have been well documented and are usually understood to be the result of a mix of factors, some intended and some not<sup>\*3</sup>. The basic conditions for growth were the result of long-term Korean government policy to develop advanced networks —though not policy specifically designed to stimulate residential broadband. This included government investments of many hundreds of millions of US dollars in network infrastructure. In the early 1990s, data networks were among the first communications services to be liberalized in Korea. Later the government encouraged private sector investment in data network services, particularly by power companies and others with rights of way. After the economic crisis of 1997 this resulted in an over supply of cheap fiber optic network capacity, which became one of the enabling factors of later broadband growth. During 1996 and 1997 the Korean government began liberalization of the local telecommunications market with the creation of a powerful conglomerate, Hanaro, established to challenge the incumbent Korea Telecom.

Shortly after Hanaro's launch, Korea was engulfed by the Asian economic crisis and the company was forced to change its business plan from offering local telephony services, which required very large capital investments that were simply impossible given the new economic conditions, to a focus on a new area, the supply of fast Internet services. The Korean government has recently tried to claim that its policies were the main factor in creating Korea's broadband success, and while government's role was not as great as it now likes to claim it should receive credit for allowing Hanaro to change strategy so drastically from the one it was created to undertake. Many governments and regulators in the same situation might not have allowed Hanaro this freedom, and might have required it keep to its original purpose. Cable modem operator Thrunet began the first major broadband service in June 1998. Hanaro began commercial DSL and cable modem services in April 1999. Korea Telecom (KT) launched its first DSL product in June 1999. KT was initially reluctant to move into the DSL market, but responded rapidly to Thrunet and Hanaro's quick success and turned its Internet service business from an ISDN based strategy to DSL.

There are many factors in the success of Korean broadband that are typical to Korea and so not repeatable in other countries. Particularly that the most common housing type is large apartment complexes, blocks of 1,000 to 5,000 residential units in a complex. To reach a potential broadband subscriber, the service provider does not need to gain access to the incumbent's local loop, a usual stumbling block and expense. Instead a leased line can be taken from the provider's network to the housing complex

from where internal wiring belonging either to the residents collectively, the housing management group, or installed by the service provider, can be used to deliver broadband to the residence. Clearly, the very significant penetration of broadband in Korea would not have been possible without this dominant housing type.

The market appears to have been driven to a large degree by a desire for home education and gaming, by parents and students respectively. Entrepreneurship is rampant, from the PC Bang Internet Cafe/online game centers that did so much to inspire and create enthusiasm for broadband among early adopters, to the many Internet start-ups, particularly in online stock-trading and auctions. These new online businesses reflected the need for new ways of doing business after the collapse brought by the Asian economic crisis. Vibrant Korean entrepreneurship and e-commerce is illustrated today by the wide use of micro-payment schemes. Government initiatives to encourage the use of broadband among groups that are typically less quick to adopt new technologies such as home-makers and elderly had a positive effect in sustaining growth, as did general government strategies to promote broadband positively in all sectors of society.

The IT industry has been the engine of growth of the Korean economy, contributing about one third of GDP growth since the 1997 Asian economic crisis. The IT industry's share of GDP rose from 7.7% in 1997 to 15.6% in 2001, with the greatest year on year growth matching the peak years of broadband deployment:

Table 1: Impact of IT and broadband on the Korean economy

	1997	1998	1999	2000	2001
Growth rate of IT industry	30.5	20.7	36	35.8	6.3
Growth rate of GDP	5	-6.7	10.7	9.3	3
Contribution of IT industry to GDP growth	37.6	-	32.8	46.8	31.7
	1998	1999	2000	2001	2002 (October)
Total Broadband subscribers	13,801	373,571	4,017,492	7,805,515	10,002,015

(source, Korea Information Society Development Institute, 2003, and Korean Ministry of Information and Communication, 2003. "Broadband" includes subscriber access by xDSL, cable modem, LAN and a small number of satellite users.)

While the Korean success with broadband is inspiring, in some significant ways, it is the result of factors unique to Korea, from the dominant housing type to the impetus for the adoption of new technologies provided by the economic crisis, and consequently it is not an appropriate model against which to directly compare the situation in the

United Kingdom. However, strong lessons do emerge. The Korean government was supportive of broadband in a wide sense. For example it provided seed funds, created an appropriate regulatory environment, and balanced policies between supporting entrepreneurial activity and taking a hands-off approach when businesses needed to adapt and change. When things looked to be working the Korean government got out of the way and let the market develop. Korea Telecom's positive reaction to Hanaro and Thrunet's creation of the broadband market, quickly becoming champions for xDSL services rather than trying to defend their old telecommunications turf, is an example of the vital importance of the incumbent telecommunication operator's support for broadband deployment. Too often, the incumbent telecommunication operator can be a significant obstacle.

## 2.2. Broadband in Japan

The situation of broadband in Japan may offer a more informative comparison with the United Kingdom. The history of telecommunications liberalization in both countries is quite similar, with none of the pronounced anomalies of Korea. Considering how both have approached the deployment of broadband may provide an indication of successful and unsuccessful strategies.

Japan and the UK began liberalizing their telecommunications markets in the mid 1980s. Along with the United States, they were the first countries to introduce competition to telecommunications in a significant way, "blazing a trail that by the turn of the century would be followed by practically all countries in the world"\*<sup>4</sup>. For Japan this meant the introduction of carefully managed competition. NTT remained a monopoly provider in the local telecoms market, and very dominant in segments where competition had been introduced. By 1996, more than 10 years after the introduction of competition, new common carriers (NCCs) had achieved a 12.3% share of revenues in the domestic telephone services market and their percentage share of the market would not increase by more than a few percentage points by the end of the decade\*<sup>5</sup>. At the time, many observers commented that NTT was shielded from full and vigorous competition by a "parental" regulator, the Ministry of Post and Telecommunications (MPT). Competition was allowed, but within a very controlled framework. British Telecom, the UK incumbent, faced a much harder competitive environment and very vigorous control from the UK regulator, Oftel.

The push for broadband in Japan began after the US Telecommunications Act of 1996 was enacted. The US 1996 Act was expected to enable new entrants to easily use incumbent's telephone networks to provide high-speed Internet services. These DSL

services were not only 10 or more times faster than dial-up connections, they were also charged at a flat rate with no per-minute call fee. Some Japanese communications policy experts recognized that this was just what Japan needed. Many Japanese Internet users, the media and advocates were annoyed at having to pay high per-minute phone connection charges for their dial-up Internet access, and the high costs were clearly holding back Internet growth. It was realized that broadband DSL services could be an answer to all these problems. The “flat rate”, “always on” characteristics of broadband would be an important driver of the rapid growth experienced later.

Attempts to encourage MPT to seriously consider DSL technologies began during 1997, and were at first quite firmly rebuffed. For some years, the main issue on MPT’s agenda had been the reorganization of NTT. The ministry was clearly unable to address the regulatory implications of DSL —unbundling, co-location and facility sharing, etc.— while also trying to re-organize the incumbent. It wasn’t until the 1998 Nagano Winter Olympics that Japan saw the first public ADSL trials, and these slowly lead to the first commercial service launched by Tokyo Metallic in December 1999. In the mean time, NTT’s reorganization was settled, and a holding company created that owned two regional companies offering local service and a long-distance company. The reorganization saw a new relationship emerge between NTT and MPT, with the ministry being less protective of the company. After the reorganization, forces inside NTT’s management that had been pushing the company towards a strategy of embracing new IP-based networks and the Internet as the future of the company came to the fore and were able to begin moving company strategy away from old telephony, particularly ISDN-dominated business models. However, during 1999 and most of 2000, NTT remained an obstacle to DSL deployment, creating difficulties for Tokyo Metallic as it tried to use its local loops and gain access to NTT facilities.

In the late 1990s, broadband services were mainly available via cable television companies. Titus Communications had launched a cable Internet service in the autumn of 1998, and by the end of 1999 there were 154,000 subscribers to cable Internet services in Japan and just 19 DSL subscribers. Early broadband growth in Japan was almost all cable modem, 625,000 subscribers by the end of 2000, vs. 9,732 DSL subscribers. At the time of the OECD broadband report, June 2001, Japan was the 11th placed nation in broadband uptake. The rapid growth of broadband cable, almost 500,000 per year, gave a clear example of the pent-up demand for high speed Internet services and was an important factor in changing attitudes towards DSL.

By the summer of 2000 there were already around 6,000,000 broadband subscribers in South Korea, more than 10 times the number in Japan. Japanese political and business

interests realized that the country was increasingly lagging behind in the uptake of information technologies. As a reaction to this and to protect the country's global competitiveness, in July 2000 the Japanese government created the cabinet-level IT Strategy Headquarters and its senior advisors from industry and academia to create a new "e-Japan" vision<sup>\*6</sup>.

Various factors were coming together to enable the broadband growth we see today. There was an obvious commitment to bringing about the creation of broadband networks by government and business leaders. The new strategy differed from earlier National Information Infrastructure plans in that it had real and wide spread support across many sectors. In December 2000, after a two-month investigation into complaints that NTT was blocking competition from eAccess and Tokyo Metallic, the Japanese Fair Trade Commission issued a report critical of NTT East's anti-competitive practices. The Wall Street Journal quoted NTT East as saying "it was 'highly regrettable' that its actions had drawn suspicion" and the company pledged to follow the commission's recommendations. The investigation came only a few months after the FTC had issued a report warning against such behavior by the NTT group, and appears to have had a significant effect in correcting NTT's behavior towards its competitors.<sup>\*7</sup> In the autumn of 2000, MPT introduced ordinance on unbundling and collocation that required NTT to offer easy access to its premises and facilities at low rates and with short provisioning periods. MPT also reduced the cost of unbundled line sharing to the extremely low rate of ¥187 per month and required NTT to unbundle its back-haul fiber network to its local exchanges, so enabling competitors to return traffic to their own networks at low monthly rates. Low tariffs for local loop-unbundling were essential in enabling DSL wholesale newcomers eAccess and ACCA Networks to enter the market.

The number of DSL subscribers increased steadily during the first half of 2001, from 16,194 in January to 291,333 by the end of June. eAccess, a seller of wholesale DSL services to ISPs launched in October 2000, NTT began offering DSL service to ISPs in December 2000, and a second DSL wholesale provider, ACCA Networks, launched in January 2001. But rapid growth would begin after the launch of Yahoo!BB, Masayoshi Son's broadband service, which began accepting subscribers in June 2001. Son launched Yahoo!BB by buying Tokyo Metallic for a low price. Tokyo Metallic had built the foundations of good network, but after costly early battles with NTT had no money left and was unable to attract venture capital. Yahoo!BB introduced new, very low monthly subscriber fees, Son often being quoted as saying he was offering service at a price he thought consumers would want to pay. Japanese broadband subscriber fees are now the lowest in the world, partly due to Son's entrepreneurship, and also as a result of

the tariffs encouraging competition throughout the DSL service market.

The broadband regulatory regime has encouraged 3 services models to develop. (1) The “Flets” model, a line connection offered by NTT East and NTT West with the ISP service provided as separate services. This is a typical retail model found in most broadband markets around the world — effectively ISPs providing service over the incumbent’s line.

(2) An integrated model, where the operator leases lines via a line sharing unbundling agreement from an NTT regional company and bundles both the DSL line and ISP service as a package to the subscriber. Yahoo!BB operates on this model. The network design of the integrated model brings lower costs and consequently Yahoo!BB has been able to offer some of the lowest prices to the consumer.

(3) A wholesale model, where providers (there are two, eAccess and ACCA Networks) lease lines under line sharing agreements from NTT and provide DSL services to ISPs on a rental basis. This is similar to the Flets model, but with eAccess or ACCA Networks rather than NTT providing service to ISPs.

Giving new operators access to essential elements of the incumbent’s network has resulted in competition at different levels of the retail and wholesale market, and very low broadband prices for Japanese consumers. Wholesellers eAccess and ACCA Networks own and manage their networks and can add new technology and services without going to the incumbent for permission. This has helped innovation in services. For example, ACCA introduced an 8Mbps DSL product to the Japanese market in September 2001, closely followed by eAccess in December. 12Mbps products were launched in June 2002 by ACCA, eAccess and Yahoo!BB. NTT introduced its own 8Mbps and 12Mbps products some months later.

NTT’s market share of DSL lines peaked at 65% in June 2001 when the Flets rate was reduced to ¥3,800/month, but with Yahoo!BB’s launch soon after and a range of new cheaper services from eAccess and ACCA Networks to follow, the NTT regional company’s share is now between 40-45%. It should be noted that ACCA networks is partly owned by NTT Communications, the NTT group company involved in long distance and international service and held under the holding company with the two regional NTT companies.

The Japanese cable modem market continues robust growth, but at slower rates than the DSL sector. Despite efforts to encourage the formation of business alliances among

the largely municipality-based and locally owned CATV companies, and easing of the CATV law to allow cable companies to offer more telecommunications services, the CATV industry remains fragmented and has not achieved national coverage and penetration.

Fiber to the home is also seeing steady growth. NTT is providing its Flets fiber services, but about 30% of subscribers use fiber network provided by alternative fiber service provider Usen. Power utility companies are also aggressively rolling-out fiber to the home services, and 100Mbps Internet service is available for as little as ¥3,900/month in some large Japanese apartment complexes.

Table 2: Broadband market in Japan, subscriber growth October 2002 to March 2003

	xDSL	change/month	Fiber	change/month	Cable	change/month
October	4,639,545	416,329	138,030	23,442	1,852,000	52,000
November	5,117,867	478,322	172,344	34,314	1,901,000	49,000
December	5,645,728	527,861	206,189	33,845	1,954,000	53,000
January '03	6,119,883	474,155	233,072	26,883	1,992,000	38,000
February	6,589,867	469,984	263,144	30,072	2,028,000	36,000
March	7,023,039	433,172	305,387	42,243	2,069,000	41,000

(source, Ministry of Public Management, Home Affairs, Posts & Telecoms (MPHPT))

A number of factors have caused this extremely rapid growth. Government, industry and users, particularly vocal users and advocates, have been unified in supporting the need for affordable and widespread broadband services. Appropriate regulation was introduced ensuring low tariffs for elements of the incumbents network essential to the operation of competitive broadband service providers. At the same time the incumbent was strongly discouraged from interfering with competitors businesses. Entrepreneurial behavior was enabled and present, and competition was encouraged at different levels in the broadband market, wholesale and retail, resulting in strong price competition and innovation in services. However, it would be a mistake to think this is the result of a “master plan”. On the contrary, many elements came together by coincidence. But it offers strong indications as to the factors that enable strong growth in broadband services.

### 3. Deployment of residential broadband in the United Kingdom

When noting the low penetration of broadband in the UK, the authors of the OECD report commented that the 22nd-place ranking was “lower than might have been expected given the early roll-out of infrastructure competition”, and that this suggested “the focus of the companies involved has been elsewhere”<sup>\*8</sup>. However, this explanation does not tell the whole story. The underlying cause appears to have been that the UK’s long established telecommunications competition policy was no longer effective or appropriate.

Liberalization of the UK telecommunications industry began in 1982, and throughout the 1980s and 1990s followed a regulatory philosophy that competition in telecommunications would be best achieved by encouraging new entrants to build their own access networks using different access technologies, what has been described as a “many networks” policy. The reasoning being that without alternative delivery methods a true mix of services and full competition would not develop.

The process of telecommunications liberalization began in 1982 when Mercury Communications, a consortium lead by Cable and Wireless, the global telecommunications carrier, gained a license to build and operate an independent network to compete across the full range of telecommunications services. In 1984 an independent regulator, Oftel, was created. Oftel kept British Telecom’s dominance in check through a rigorously enforced regime of restrictions on the services the company could offer and tight control over tariffs. Privatization of British Telecom was begun the same year with the sale of 51% of the company’s shares. The results of this approach were mixed. British Telecom’s monopoly power was much reduced and a raft of new services were introduced. Mercury did well in the business sector, but failed to make any meaningful entry into the residential market. Fighting British Telecom in the local market was too costly, and there were easier pickings to be had offering services to the business sector.

The next phase of liberalization began in 1991 when after a review of the British Telecom/Mercury duopoly situation the government decided to permit cable television operators to offer telephony and interactive services. The UK cable TV market was not well developed, the country had been well served by free-to-air terrestrial networks, and as an island nation there was less concern over interference than in mainland Europe, where state funded cable networks were the norm. In 1990 less than 100,000 UK homes received cable TV. To encourage growth of a cable industry, local franchises were put on offer and tax incentives made available to companies willing to

make the necessary investments in new network construction. Throughout most of the 1990s, UK telecommunication policy focused on encouraging local cable operators to build their networks, and to provide local competition in communications services. This was recognized as a capital-intensive exercise, so in order to encourage cable operators to invest the estimated £12 billion required to build their networks, regulation was introduced to prevent British Telecom from offering broadcast services over its existing voice network until at least 2001. The UK cable industry as it exists today has been built entirely by private investment. At the height of network rollout in 1996, cable companies were investing an average of £6 million per day. This policy was again partly successful. By the end of the 1990s there were over 4,000,000 cable homes, but British Telecom still controlled over 85% of all residential telephone lines.

### 3.1. Consolidation of the cable industry

The opportunity to enter the potentially lucrative telephony market encouraged a number of large American companies, mainly subsidiaries of Regional Bell Operating Companies, to start buying cable TV franchises for very telephony oriented reasons. Oftel measured the success of a franchise operator by its rate of network rollout, with a minimum requirement for network built being the main license condition. The license requirement to roll-out network and high revenue potential of telephony lead most operators to initially ignore the broadcast content element of their operations. Most instead relied on BSkyB, the UK's commercial satellite broadcaster for packages of programs. Building networks was proving to be more expensive than anticipated, and take-up of local phone services slower than hoped. The cable industry's early failure to differentiate its content product from that of a main competitor lead to lower than expected uptake of cable services once networks had been built. And cheaper telephony services were not enough to cause many consumers to choose cable over satellite and British Telecom.

At the same time, US companies began to move out of the UK cable industry, taking profits back to the US market where they saw new opportunities after the 1996 Telecommunications Act. The remaining UK and European companies began rounds of merger and acquisition to consolidate the inefficient locally-oriented networks. By 1999, two companies —NTL and Telewest— had absorbed all the other operators and are now the only cable operators in the UK. They too are expected to merge as soon as their financial situations permit them to do so. NTL's network is about twice the size of Telewest, but its network is older and has much more analog elements that need to be upgraded to be made ready for high speed data services. NTL and Telewest are able to offer service to a total of 13.3 million UK households (about 50% of all house-

holds), NTL passing 8.4 million homes and Telewest 4.9 million. Both have a take-up rate for service of around 28% of homes passed<sup>9</sup>.

While the UK approach to liberalizing the telecommunications market was bringing a range of new services, particularly for businesses, it was not having the transforming effect on the local access market that the government had hoped for. The competition regime also did little to encourage British Telecom to upgrade its domestic network. Oftel exerted tight control over tariffs and new services and seemed to give British Telecom little incentive to innovate. As the cable companies were frantically trying to be competitive, they first had to build a new nationwide local access network, and this was taking time and more money than they had available. Clearly, the cable companies failed to mount a significant competitive threat to British Telecom in the residential telecommunications market.

Local access competition simply wasn't successful. UK competition policy had been designed to encourage competitors to invest in alternative local access networks rather than allowing new entrants to gain access to the existing access network, i.e. an open access model. The growth of the Internet in the mid-1990s made clear that innovation in services was no longer tied to owning physical infrastructure, and the UK competition regime failed to recognize this fundamental change. This misdirection of policy was magnified as the UK tried to encourage broadband deployment. However, there was no effective regime in place that enabled new entrants to gain reasonable access to the incumbent's local access network. On the contrary, there was a strong policy legacy against it.

During the period of cable industry consolidation, NTL also absorbed the telecommunications operations of Mercury Communications/Cable and Wireless. The idea of having multiple strong competitors to BT was not working. Instead, a new type of duopoly in the local access market developed, this time between BT and the limited coverage offered by NTL and Telewest. The cable company's networks do not compete against each other. They only overlap in a few small markets, and their services are available to less than 50% of UK households.

### 3.2. BT looks to overseas markets

By the mid-1990s, British Telecom was a much leaner and more efficient company. Competition in the residential market had failed to appear, but British Telecom faced a much harder task in the business and international markets where competition was making margins tight on ever decreasing market share — below 50% for many busi-

ness services. It also had a series of disagreements with Oftel over uncompetitive practices. All these factors helped lower British Telecom's relative stock market performance and its share value at this time lagged behind its rivals in the telecommunications sector and was as much as 20% behind the FT all share index<sup>\*10</sup>. This fierce environment at home encouraged British Telecom to seek growth overseas. First BT was almost successful in an attempt to take over the US carrier MCI, then when this deal fell through it began a global joint venture with AT&T. BT's international investments included significant stakes in new carriers in all the major European fixed and mobile markets, as well as large investments in Japan, Asia and Latin America. While all these deals would eventually be undone by the telecommunications crash in 2000-2001, for a period of a few years from 1996 British Telecom was at the forefront of changes occurring in the global telecommunications industry. While the UK faced vigorous competition in all domestic communications markets, the rest of Europe only planned to break up their telecommunication monopolies by January 1998.

### 3.3. UK Internet Market

The UK's first major commercial ISP, Demon Internet, was established in 1992, and the first commercial Internet Exchange, LINX, in 1994. The competitive communications environment encouraged new entrants, British Telecom was slow to begin offering Internet services, and unlike the rest of Europe the UK Internet access market was not dominated by the incumbent telecommunication company. In 1995, shortly after launching its first ISP, British Telecom's share of the Internet access market was 8%, rising to 12% in 1997. British Telecom's position in the ISP market has improved over the years, and it now operates the 3rd largest ISP with around 1.8 million subscribers. AOL has approximately 2 million subscribers and Freeserve around 2.5 million. An estimated 11 million homes, 42%, of all UK homes, now have some kind of Internet access. Freeserve, the largest ISP, has about 23% of the market.

Two local innovations had a significant impact on the way in which the UK Internet business developed as a mass market product. In 1998, a new company called Freeserve launched a new type of "pay as you go" subscription-free service for the price of a local call. Freeserve's business model was based on revenue received for terminating a subscriber's dial-up call on the British Telecom network, rather than money from the subscriber in the form of a monthly fee. Within five months of launch, Freeserve had over one million accounts and had overtaken market leader AOL. Subscription-free service was a great innovation and brought many new Internet users. It is ideal for light usage, but still expensive for anyone using the Internet more intensely.

The Campaign for Unmetered Telecommunications was launched in March 1998, shortly before Freeserve changed the market with its “free” service. The “CUT” campaign was a pressure group of Internet users who attempted to persuade major telecommunications companies and OfTel to allow free local calls to ISPs. Unmetered local calls as they existed in the US and other countries had been instrumental in encouraging widespread Internet use. The campaign began as a simple demand for flat rate fees to one number, but eventually won with a more complex tariff proposal known as FRIACO (Flat Rate Internet Access Call Origination.) To be able to offer unmetered FRIACO services, an ISP or wholeseller typically leases ports at a British Telecom local exchange. Each of these ports can usually handle between 6 and 12 dial-up users. The cost of a port is usually around £400/year (¥75,000/year.) Calls to lines on this port are then effectively paid for, and the ISP can then charge its subscriber whatever flat rate monthly fee it wishes, e.g. if the port can handle 6 users at £400/year then the ISP might charge around £70/year (1 sixth of the total cost) over 12 monthly payments. FRIACO was supported by OfTel and finally was introduced in early 2001. ISPs typically charge between £12 and £16/per month (¥2200 - ¥3000) for a fully unmetered unlimited access subscription. The European Union has endorsed FRIACO and hopes it will be implemented in all EU member states.

British Telecom failed to anticipate and take advantage of the rapid growth that Freeserve’s “free” Internet access model created. While BT’s Internet business, Openworld, is now one of the company’s five main business divisions, and mass market Internet has become an important corporate priority, BT’s historic lack of engagement in the UK Internet market has left the company as just another player rather than a dominant force. As such, the UK Internet market is different from most of the rest of Europe where incumbent telcos were able to enter the Internet business later and nurture their ISPs within their monopoly telecommunications operations. For example, when France Telecom launched its Internet company “Wanadoo” in 1996 it was able to adapt its historic monopoly Minitel service and quickly became a significant player in the French Internet access market. There are approximately nine million Internet users in France, of which four million use Wanadoo. Of the 1,400,000 French broadband users, over one million use Wanadoo’s broadband service. France Telecom has been able to leverage Wanadoo’s strong presence in the Internet market to become dominant in broadband access. By comparison, BT’s weak Internet access strategy had a negative impact on the company’s broadband strategy. The bottom line being that any investment BT made to aid broadband access would benefit other operators as much if not more than BT itself.

In January 2003, UK Internet subscribers using a “free access” plan accounted for 25%

of all users, with 37% of subscribers using an unmetered plan. 18% used a monthly billing plan, 5% mixed access (fixed rate plus “free”), 8% always on (mainly broadband connections), with “other” at 7%\*<sup>11</sup>. A year earlier in January 2002, 37% of subscribers used free access and 29% unmetered, almost a mirror image of the situation in 2003. The switch to unmetered access indicates that UK Internet users are spending more time online and that a growing percentage are moving towards the kind of unmetered, potentially always-on experience offered by broadband.

### 3.4. BT contemplates broadband

While BT was clearly reluctant to begin commercial broadband services, it had been conducting trials for many years. BT began looking at DSL services in 1995 as a possible means of providing broadcasting services, and as a competitive response to the interactive services then being planned by cable companies. An ADSL trial involving over 5,500 individual subscribers began in June 1995. The services offered were typically of a video-on-demand type, and the trial was completed in July 1996 with claims of success but no published results or technical details. In December 1996, BT announced it would begin a high-speed Internet access and pay-per-view service using ADSL technologies, but did not specify a launch date. Nothing more has been heard of this new service.

BT’s next ADSL trial began in 1998. Focus shifted from video-on-demand, which was no longer seen as the “killer application” for high speed interactive services, to high-speed Internet access. Frustrated by the lack of progress, Alcatel, one of the equipment providers working with BT in the trial, openly criticized BT and Oftel for being slow to open the DSL market, claiming BT was worried that the technology would undermine its leased line and ISDN revenues. As the trial began in October 1998 BT refused to commit to any start date for commercial DSL service that might result. Instead it launched two new heavily promoted residential ISDN services.

Towards the end of 1998, equipment makers and alternative telecommunication services operators began lobbying for the introduction of local loop unbundling—which was enabled in the United States by the Telecommunications Act of 1996 and had become a key issue in telecommunications policy and regulatory activity—but found resistance from Oftel and other government departments that continued to support competition policy based on infrastructure investment. Unbundling would enable other operators to gain control of BT’s local access lines so they could provide their own services direct to the customer. This solution was essentially the opposite of UK policy since 1982 to encourage alternative operators to build their own access networks to

compete with BT. While the UK delayed, the European Union issued a directive that member states must introduce a regime for unbundling of local loops, to be in place no later than December 31, 2000.

Preparations for the launch of commercial DSL services finally began in June 1999 when BT began an investment program to upgrade 400 of its 5,500 exchanges for DSL service. BT said it would begin DSL service in March 2000<sup>\*12</sup>. The service would cost £39.99 per month with an installation fee of £150. The 400 exchanges selected for upgrade covered the most densely populated areas of the country and could provide service to approximately 60% of the population. Work to upgrade other exchanges would continue and BT expected to be able to offer ADSL services to 70% of the country by the end of 2001.

The UK government and BT finally gave in to industry pressure on unbundling, and in November 1999 Oftel announced that BT must upgrade its exchanges and copper lines and be ready for unbundling of local loops by July 2001. At the same time, Oftel also required that BT offer DSL lines as a wholesale product to ISPs that wished to resell DSL service under their own brand. Because BT's wholesale and retail divisions operate as separate companies, DSL services could be provided to competitors on a non-discriminatory basis.

The UK DSL program was already behind the timetable set by the European Union, and while Oftel seemed unconcerned at the prospect of the UK falling behind the rest of Europe<sup>\*13</sup>, in November 1999 a US-based provider of DSL service, Covad Communications, encouraged the United States Trade Representative (USTR) to threaten to file a complaint with the WTO saying Oftel was allowing BT a monopoly in DSL services until unbundling began, and no alternative operator would be able to compete by reselling BT's services. USTR didn't follow through with the threatened action, probably because the schedule for introducing wholesale DSL service was delayed and the issue lost urgency. But USTR said that the US trade negotiator would consider this course of action an indication of how out-of-line with the rest of Europe and the US the UK's policies around broadband had become.

### 3.5. Local Loop Unbundling Fails

Preparations for Local Loop Unbundling (LLU) began against the background of the European Union demanding that the UK quickly allow all operators equal access to local telephone exchanges by January 2001. Oftel continued to defend the July 2001 date but many, including officials within the UK government, had come to believe

that Oftel was being dictated to, or at least manipulated by BT. Commentators from the European Commission warned that the UK was falling behind other member states<sup>\*14</sup>. And then the UK's attempt at unbundling went terribly wrong.

Discussions began among industry players about technical and service issues while Oftel set prices and general requirements on access and conditions. When these discussions began around the beginning of 2000, over 150 operators were asking for access to unbundled loops and demand was forecast at 1.2 million lines. But as negotiations progressed companies began to drop out, and by the time an Operator Policy Forum working group was established to agree on a process for unbundling and allocating lines only 40 companies remained interested. In March 2000 the telecommunications market began to crash, and few of the surviving operators could afford to make new investments. By September 2000 companies began pulling out for other reasons. RSL Communications was typical, accusing Oftel of failing to ensure that BT treated its rivals fairly<sup>\*15</sup>.

The first round of exchanges made ready for unbundling were all from among the list that companies had given as the least popular, 361 exchanges mainly in rural areas. World Online commented that Oftel allowed the least popular exchanges to be opened first because it didn't like the selection criteria industry had developed. Oftel responded saying that industry was unable to decide on a fair procedure for allowing which operators should go into which exchanges, a problem when 30 companies wanted to go into a particular exchange, each needing dedicated space for their equipment, interconnection with BT, etc. Whatever the truth of this argument, rather than opening the popular exchanges in question and waiting for a fair process to be established, Oftel allowed BT to offer the least attractive exchanges first. World Online would later quit the first unbundling trial in February 2001 complaining that BT had more than double the costs of participating in the trial since it was launched<sup>\*16</sup>.

Colt Telecom stated that in Germany the regulator had been tougher on the incumbent, and that they did not understand why the process in the UK was so drawn out. OnCue Telecommunications, which had been chair of the Operator Policy Forum work on LLU and had been expected to be a major unbundled-loop service provider, entered voluntary bankruptcy at the end of June 2001. OnCue claimed its failure was the result of BT slowing the process of introducing unbundling<sup>\*17</sup>. Again, how much of OnCue's failure was the result of the slow unbundling process rather than its own business failure and the adverse financial climate cannot be known. According to a report on LLU commissioned by the European Commission<sup>\*18</sup>, companies participating in the LLU process complained, for example, of constant delaying tactics by BT, of

being told that exchanges they have agreed to access were suddenly scheduled for closure, that prices increased unexpectedly, even that gaining physical access to premises was bureaucratic and slow with out-of-hours access difficult (e.g. making it impossible for new entrants to offer 24/7 Quality of Service guarantees.)

By the end of 2001 competitors had ordered only 150 unbundled lines from BT, the number of companies active in the LLU process had fallen from 40 to 9, and the number of exchanges where they sought access dropped from 2020 to 202. In many cases helpful Oftel rulings were made too late, for example allowing competitors to make unescorted visits to BT exchanges to carry out maintenance was introduced in December 2001. By then there were too few companies left to be able to take advantage.

The policy development process used in the LLU activity, combined with the collapse of the telecommunications and dot.com market, were a significant factor in the failure of LLU in the UK. But Oftel has also admitted some responsibility, saying it should have taken a stronger and more proactive role. BT defended claims that it had acted anti-competitively by saying it simply could not respond to the chaotic and ever changing demands for access to its exchanges and for lines.

However, a number of companies are providing DSL services over unbundled local loops, but as a broadband solution for business, not for residential use. The most successful is a company called easynet, responsible for around 90% of unbundled loops in the UK. By the end of February 2003 easynet had unbundled 81 BT exchanges and planned to unbundle a further 70 exchanges by the end of the year. They have no intention to offer nationwide coverage. The average cost of unbundling an exchange — installing equipment, building out network to serve the exchange, etc.— is £90,000, with annual operating expenses for each exchange around £30,000. Easynet currently has 8,500 broadband customers and receives average revenue per customer of £1,500/year<sup>\*19</sup>. Easynet's basic 0.5Mbps product costs £79/month, 1Mbps for £99/month and 2Mbps for £119/month. It also offers DSL products up to 8Mbps, and a range of data hosting and similar services. The main cost involved is the capital expenditure required to unbundle the exchange. The yearly fee paid to BT for an unbundled copper pair is £122, the equivalent of a monthly fee per line of just over £10. However, ISPs estimate that when other BT charges related to unbundling are added the total cost of leasing an unbundled copper pair is approximately £21/month<sup>\*20</sup>. As BT's wholesale DSL price is £14.95, it is not economically viable for operators to offer services based on unbundled loops in competition with those based on the wholesale DSL product. The complexity and cost of the process adopted by Oftel contrasts with the much simpler, and much more successful unbundled line sharing arrangements adopted in Ja-

pan.

The failure of LLU as a means of providing residential broadband services in the UK begs the question whether Oftel ever fully supported the idea of introducing a requirement that was so contrary to its long-term strategy of encouraging the development of alternative access networks. As mentioned, the authors of the OECD report suggested that the companies responsible for broadband deployment in the UK might have focused on other issues. This is partly correct. BT's corporate strategy was focused on overseas markets, and cable companies focused on building a new nationwide network that was at first designed for pay-per-view TV and telephony, not high speed data. But a more significant reason for the slow deployment of broadband in the UK is that competition policy did not respond to changes in the nature of telecommunications and the influence of the Internet.

### 3.6. Broadband growth - UK tries to catch up.

NTL's cable modem service was launched at the end of 1999, and Telewest's service in March 2000. Growth was slow during most of the year, the result of high prices, technical problems with set-top boxes that effected Telewest in particular, and general lack of awareness about broadband. NTL suffered from having a significant amount of analog equipment in its network that required expensive and time-consuming upgrades before high-speed data services could be provided. NTL's network reaches a potential 8.4 million homes, but in 2000 only 50% were passed by network capable of providing broadband. Financial problems have hampered the company's ability to complete expensive upgrades and still today only 79% of homes passed by NTL's network can receive broadband services. In addition to being a significant drain on resources, it makes company-wide marketing of services to customers difficult. Telewest's network is more modern; Approximately 90% of its network in 2000, and 96% in 2003 is broadband enabled. At the end of 2000 there were less than 20,000 residential broadband users in the UK, and with technical problems slowing DSL rollout virtually all were subscribers to broadband cable services.

Initially, broadband cable had been expensive; there is very little overlap between NTL's and Telewest's networks, and they had (and still have) no unbundling or wholesale requirement. When Telewest began broadband service in March 2000 the cost was £50/month, a price Telewest CEO, Tony Illsley, agreed was high and would need to be reconsidered when DSL services began. The company reduced the price of its cable modem service to £33/month in August 2000 in response to BT's announcement that it would launch DSL service at £39.99/month<sup>\*21</sup>. Competition had an almost immedi-

ate effect: by March 2001 NTL's cable modem service was priced at £25/month and was among the least expensive broadband services available in any OECD member state<sup>\*22</sup>.

In February 2001, the UK government published "UK online: the broadband future", an appraisal and statement of policy on communications and e-commerce<sup>\*23</sup>. The report set the very ambitious target for the UK to have "the most extensive and competitive broadband market in the G7 by 2005". The UK government had made previous statements about the importance of broadband. As early as 1994 in the original UK National Information Infrastructure vision document it defined broadband as having a capacity of at least 2Mbit/second<sup>\*24</sup>. It is interesting to note that Oftel's March 2003 "Internet and Broadband Brief" stated " 'Broadband' is used in this brief to refer to higher bandwidth, always-on services, offering data rates of 128 Kbps and above."<sup>\*25</sup>

The target to be the best in the G7 by 2005 may be overly ambitious, but it is clear that during 2001 the UK government made a new and real commitment to encouraging broadband deployment. Mr. Ed Richards, the UK government's senior policy adviser on communications issues, recently described how he was called to meet Tony Blair shortly after the Labor Party's re-election in June 2001. The Prime Minister apparently told Richards "First, I want you to tell me what this broadband thing is. Second, I want you to tell me why it's in crisis, and third, I want you to sort it out."<sup>\*26</sup>. The office of the e-Envoy, the senior government department responsible for ICTs and the e-economy began criticizing UK providers for their expensive broadband services, which it said was inhibiting growth. Other communications departments began to put pressure on BT to lower its wholesale DSL price, and Oftel introduced measures to improve service.

In April 2001 the UK government established an important new advisory body, the Broadband Stakeholder Group (BSG)<sup>\*27</sup>. The BSG is an expert group of companies and organizations independent of government, created to advise on broadband strategy. The BSG has issued three reports, the first in November 2001, presenting a vision of ubiquitous and affordable broadband services. It has attempted to explain the current state of the broadband market and offered recommendations for improvements. Rather than defining broadband in absolute terms of a target transmission speed, the BSG instead described the main qualities it saw as existing in broadband: an always on access service, offered at unmetered rates, and ever increasing bandwidth. "Ever increasing bandwidth" refers to the view that the UK is at the beginning of the broadband "journey", a journey that over time will see transmission speeds increasing, permitting new content services to be delivered and created<sup>\*28</sup>. The BSG has modified the

government's overly bold target of being the leading broadband country in the G7 to "being in the world's leading group of countries with extensive and competitive markets for Broadband Services by 2005"<sup>29</sup>. The common sense of this position is obvious when considering that when the BSG issued its first report in November 2001 the UK was seventh among G7 nations in broadband deployment.

The BGS's first report indicated that some of the UK's strengths in Internet might also be having an inhibiting effect on broadband deployment. The UK has a high penetration of narrow-band Internet, with many users on some kind of unmetered access package. This is in contrast to the situation in Japan, for example, where one of the driving forces behind user demand for broadband has been the high cost of per-minute charging for dial-up access. While these UK users are only able to access at narrowband dial-up speeds they do already enjoy some of the features of broadband, i.e. paying a fixed fee each month, and while their service is not always on, they are able to access at anytime for any length of time without paying an additional charge. Consequently, while there was a large difference between the price of narrowband and broadband access, narrowband users lacked some incentives to absorb the high price of broadband. Some UK observers pointed to this as a sign of potential pent-up demand that could be released by a reduction in broadband prices. In addition to the need for price reductions, BSG identified two key barriers to broadband take-up: a lack of awareness of what broadband had to offer and poor coverage outside urban areas. Costs must fall, awareness must rise and coverage must increase.

### 3.7. Accessible Broadband and rapid growth

BT's commercial DSL service began in September 2000 at a retail price of £39.99/month, and wholesale price to other ISPs of £35/month. Initial demand was high: more than 100,000 people expressed interest in the service. The first few months were troubled by complaints as providers struggled to meet the backlog of orders and faced technical and administrative problems. Coordinating between ISPs reselling BT's DSL lines and the BT engineers who had to visit customers homes to complete the installation was difficult and caused long delays. BT was forced to apologize for these early problems, but by spring of 2001 claimed the average time to install was down to two weeks. Comments from ISPs and users quoted in the press of the period suggest these problems continued for much longer.

In September 2001 BT reduced the wholesale price to £30/month, and each price reduction saw a jump in customer demand. BT's license prohibits it from making a loss on any product it sells, and the September wholesale price reduction prompted Oftel

to begin an investigation into BT's pricing. The investigation, which took almost six months and was still underway when BT announced its next price reduction, found that the lower price was acceptable. It is almost ironic that as all sectors of UK society, from the Prime Minister and his government ministries and their expert advisors to the media and ordinary users, demanded lower broadband prices, the regulator was still obliged to conduct investigations of this type. BT's competitors are able to take a loss on products they offer. By the end of 2001 there were 196,000 broadband cable subscribers and 136,000 subscribers using DSL. BT's Openworld service was estimated to have approximately 60% of the DSL market, with the rest subscribers of other ISPs reselling BT's wholesale product. BT's success in the DSL market should be considered in light of its share of the total broadband market including cable, i.e. around 25%. In December, Oftel required BT to introduce service level agreements for its wholesale DSL products that would allow ISPs to claim compensation if BT failed to meet its obligations in providing wholesale DSL lines. Also in December 2001, ISPs and other carriers were allowed to begin unescorted access for maintenance on their equipment in BT exchanges. Both these actions helped improve the quality of service ISPs were able to achieve. While LLU was failing for being too expensive, too complex and unable to compete directly on price with the wholesale product, ISPs were rushing to provide wholesale DSL. By the end of 2001 over 200 ISPs were reselling BT's DSL service.

A self-install DSL product was launched in mid-January 2002 and this marked the beginning of rapid growth of DSL in the UK. Subscribers no longer had to pay a £150 installation fee, and they could buy their own modem, retailing for less than £100, rather than pay a monthly rental. To attract customers in the competitive resale/retail market, ISPs soon began offering deals on cheap or free modems. The wholesale price offered little room for ISPs to differentiate their services by subscription price alone and the introduction of the self-install product gave another opportunity for marketing and competition. Significantly, the availability of self-install modems also meant it was no longer necessary for a BT engineer to visit every customer of the 200 or so ISPs reselling BT's DSL lines. BT also reduced the wholesale price of the self-install product by £5 to £25/month.

The period from the end of December 2001 to spring of 2002 also saw significant changes at BT. During the first quarter of 2001 BT announced its debts had reached £30 billion. Sir Ian Vallance resigned as Chairman in April 2001 to take responsibility for the failure of the company's strategy, and a period of board room uncertainty began as BT searched for new senior management and slashed its debt. During the 2nd and 3rd quarters of 2001 BT sold off a string of subsidiaries and international investments,

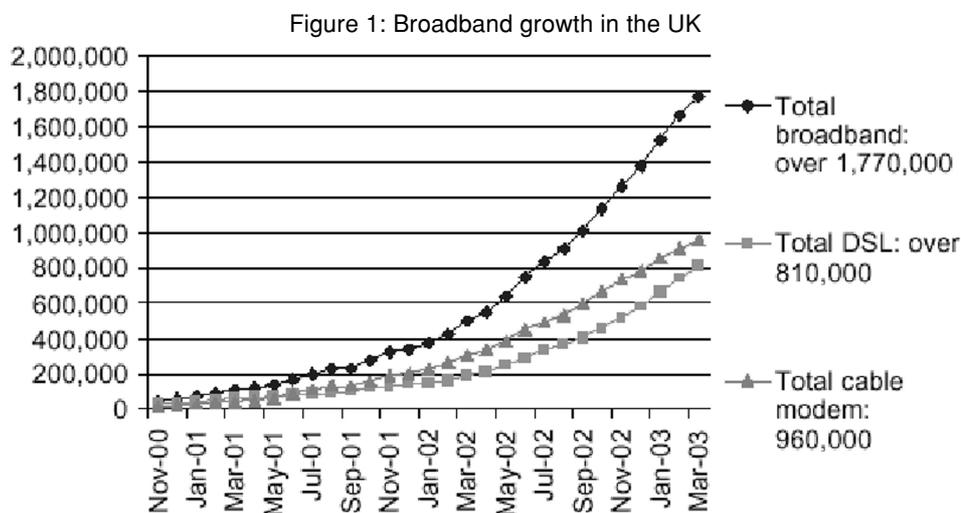
paying down the debt by some £16.5 billion. In October 2001 Sir Peter Bonfield said he would leave BT at the end of the year. On the bright side, BT's underlying business was still profitable—more than £1.3 billion during the 2nd quarter of 2001—but the debts and uncertainty made it impossible for the company to make aggressive investments in new networks or to upgrade old ones. By the end of 2001 Sir Ian Vallance and Sir Peter Bonfield, who had lead BT as Chairman and Chief Executive through its international expansion and successes and later decline, had both left the company. The new Chief Executive, Mr. Ben Verwaayen, joined BT at the end of December 2001. At the beginning of February Verwaayen announced there would soon be sweeping changes in BT's approach to broadband. This was widely interpreted as being preparation for a further reduction in the wholesale price, and in March BT announced, pending Oftel approval, that the wholesale DSL price would drop over 40% to £14.95/month. This significant reduction in price enabled ISPs to resell DSL at an average of around £27/month for a 512Kbps service. While more expensive (and at slower transmission speeds) than DSL products in Japan and Korea, UK prices were now cheaper than those available in France, Germany and the United States<sup>\*30</sup>.

Lack of awareness about broadband had been cited by many experts and studies as a major factor inhibiting uptake. As a response, in the first six months of 2002 BT spent £10 million on a nationwide broadband awareness advertising campaign and gave over £1 million to ISPs to help support their own DSL marketing campaigns. In October 2002 BT began a new £23 million campaign to promote a new "no-frills" DSL product offered by its retail division. The no-frills service is just a DSL line with no ISP services on top. Provided by BT Retail, the division providing local phone services, the no-frills product bypasses the BT's ISP "OpenWorld". Other ISPs lodged complaints with Oftel claiming that BT Retail would be able to use the phone bill it sends to 20 million telephone customers as a marketing channel for DSL not available to other operators, and that this would be a significant disadvantage to their businesses. These complaints have not been resolved at the time of writing. However, the no-frills service seems to have been less popular than ISPs feared. It was launched in June 2002, and despite the rapid growth of DSL generally still has only around 100,000 subscribers. Under Verwaayen BT has accepted the importance of broadband to the company, and moved from an attitude where it delayed progress.

The cost of NTL and Telewest cable modem service has been steady since mid-2001. NTL's basic 600Kbps service costs £25/month, and 1Mbps is available for £35/month. Telewest provides a 500Kbps service for £25/month for customers that also take its telephone service, and £29 for those without the telephone service. 1Mbps is available for £35/month for telephone service customers, and £40/month for cable Internet only

customers. Both NTL and Telewest offer reductions for customers taking what they call a “triple play” of services, i.e. telephone, multi-channel television and Internet. NTL also offers a 128Kbps service for £15/month.

In July 2001 the NTL and Telewest a conducted a joint marketing campaign to raise awareness about cable broadband services. Both companies marketed their services aggressively, offered a series of special offers on reduced installation, bundled services, etc. In May 2002 NTL and Freeserve announced that Freeserve would begin re-selling NTL’s broadband cable service. Since the spring of 2002 broadband cable subscriptions have increased as rapidly as those for DSL services. Oftel estimates there are currently more than 30,000 new broadband subscribers each week. BT Wholesale says it connected 80,000 DSL lines in January 2003, and 25,000 during the first week of February. New connections averaged 50,000 per month in the closing months of 2002. BT’s goal is to have a total of one million DSL lines by the end of June 2003. The latest figures, end of March 2003, indicate there are currently around 810,000 DSL users and it will be close whether or not BT achieves its target. NTL claims it has 650,000 broadband subscribers to its 1Mbps, 600Kbps and 128Kbps broadband services<sup>\*31</sup>. Telewest claims 297,000 broadband users, with 31,000 using its 1Mbps service. The rate of broadband growth in the UK since January 2002 has been the most rapid in Europe.



(source, Oftel, March 2003.)

## 4. Broadband availability - the weakest link

Broadband growth in the UK over the past year has been rapid and shows no signs of slowing. But the raw figures hide some significant underlying problems. Broadband is growing where it is available, but affordable services are not available to around 33% of the population, and realistic competition, a duopoly between DSL and cable, is a reality for only 40% of the population. Broadband is provided by two cable companies whose networks do not overlap, and by resellers of a single wholesale provider of DSL service. The reseller ISPs cannot change the technical specifications of BT's wholesale product so are only about to compete at a more superficial level, i.e. in special offers on those factors they do control such as modem price, installation, etc. However, innovations in broadband cable services are beginning to encourage BT to introduce new DSL services. NTL and Telewest plan to launch a new 2Mbps service, and this in turn is causing BT to consider upgrading its standard wholesale DSL product from 512Kbps to 1Mbps. The comparison here with Japan is important: significant innovations in the Japanese market, such as the introduction of high-speed services (8 Mbps and 12 Mbps), were introduced by ACCA and eAccess, not by NTT. Yahoo!BB is pioneering IP Phone over DSL and is forcing NTT to consider offering similar services, and so undermining its dominance in local telephony. Even with BT's recent more enlightened attitude towards broadband, it is unlikely it will make the necessary investments to improve the range of services it offers unless its hand is forced, as is happening very slowly by NTL and Telewest.

BT's strategic focus overseas rather than on its domestic market for much of the 1990s seems to have resulted in less investment in its UK network than might have been expected. Particularly, local exchanges were not upgraded for DSL service, and recent statements about the cost of upgrading exchanges indicate that backhaul networks from many local exchanges are suitable only for narrowband telephony traffic. As we have already mentioned, in the cable sector the cost of attempting to build nationwide networks and general conditions after the telecommunications market crash of 2000 left both NTL and Telewest under Chapter 11 bankruptcy protection. Both are recovering from these significant financial problems but as a result neither company has been able to expand their network coverage, and NTL has struggled to upgrade its network for high-speed data traffic. 43% of UK homes, around 11 million, have broadband available via cable<sup>\*32</sup>. This lack of broadband choice and availability has been a focus of the Broadband Stakeholder Group (BSG).

67% of the UK population lives in areas that currently can receive affordable broadband service. In its second report, issued in June 2002, the BSG presented the problems

of broadband availability by describing four color-coded categories:

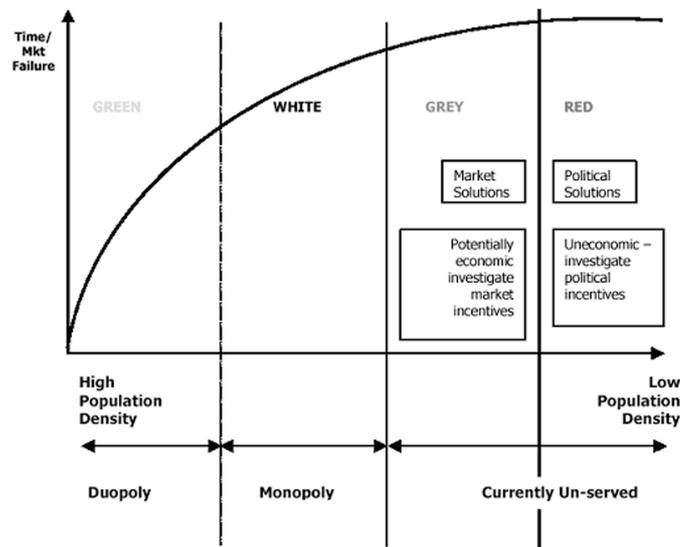
**Green** — Where there is a competitive market between at least two affordable mass-market services, i.e. areas where there are currently DSL and cable services available, a duopoly.

**White** — Where there is at least one provider of affordable mass-market services, usually DSL, a monopoly.

**Gray** — Where no services are currently available, but there is potential for commercially sustainable service. The goal is to shrink the gray area through market incentives, the introduction of new technologies and encouraging deployment of existing technology to provide wider and cheaper service.

**Red** — Where there is little expectation that the market will provide affordable mass-market broadband services. In these regions political solutions will be the only answer to making broadband available in the near future<sup>\*33</sup>.

Figure 2: Broadband availability



(source, BSG, Interim Report, June 2002.)

This diagram shows the availability of broadband in the UK. The green area represents the 40% of the population that enjoy a choice between cable and DSL service and is the current ideal. The White area describes the approximate 24% of the population served by only a single broadband technology. The goal is to introduce competition to the White area by expanding coverage of competing broadband technologies. As NTL emerges from financial problems and is able to upgrade the remainder of its network to carry broadband services, an additional two million homes that the network passes will have a choice between receiving cable or DSL broadband. Telewest and NTL are expected to merge, and the combined company and network would be in a stronger

position to expand coverage. Their networks currently cover approximately 50% of the UK population, and it is likely that it would be commercially viable for a merged company to expand that coverage. New broadband technologies are seen as a way to offer competitive choice, and we will describe two of these later.

Table 3: Availability of broadband in the UK

	DSL	Cable	FWA <sup>*34</sup>	Total
Urban centers (50% UK population)	89%	60%	22%	95%
Suburban centers (25% UK population)	52%	33%	3%	58%
Market towns (15% UK population)	21%	11%	1%	26%
Rural villages (7% UK population)	6%	1%	0%	7%
Remote rural (3% UK population)	1%	0%	0%	1%
Overall	61%	40%	12%	67

(source, Broadband Stakeholder Group, 2nd Annual Report, November 2002.)

The above chart clearly shows that broadband is an urban service.

The currently un-served areas are a major concern. The UK is behind Canada, Sweden and Germany (where 90% of the population can receive DSL) in broadband availability, and significantly behind Japan: in March 2003, 94% of users of NTT East can use ADSL service<sup>\*35</sup>. When BT announced it would launch DSL service it said it would upgrade an initial batch of 400 of its 5,600 exchanges for DSL service. BT claimed these 400 selected exchanges would cover the most densely populated areas of the country and could provide service to approximately 60% of the population. As the numbers below indicate this estimate was rather high, and BT's claim that DSL enabled exchanges would serve 70% of the population by the end of 2001 has yet to be achieved.

Table 4: BT DSL enabled exchanges

	Number of DSL-enabled exchanges	% of UK consumers (residential and SME) within the area of a exchange
Jul-00	516	35%
Sep-00	619	40%
1-Mar	839	50%
1-Sep	1000	60%
2-Mar	1010	60%
2-May	1115	66%
2-Aug	1116	66%
2-Sep	1119	66%
2-Nov	1120	66%
3-Mar	1167	67

(source, Oftel, March 2003)

Because of the technical limitations of DSL, approximately 6% of people in each exchange area cannot get the service. By the end of 2003 BT hopes to have improved technology in place so that 97% (an additional 600,000 people) of people in each exchange will be able to receive DSL.

In July 2002 BT announced that further exchange upgrades would only be carried out when it was commercially viable to do so. Exchanges would be upgraded if a predetermined number of people sign-up to express interest in receiving DSL service. These predetermined “trigger” levels were set at a first batch of 338 local exchanges, and BT indicated it would set trigger levels for a further 560 exchanges by the end of September.

Over time, conditions on these trigger levels have become less severe. At first, once a trigger had been met ISPs then had to follow-up and secure registrations for 75% of those who expressed an interest before BT would begin work. This condition was dropped in December 2002. In many cases the numbers required to trigger the upgrade have been lowered. BT had set the trigger levels for many of these quite small rural areas from 150 to as many as 750 people, and many other operators questioned these targets as being unrealistically high, arguing that many exchanges would be commercially viable with 100 or even less DSL customers. But estimates for the cost of upgrading exchanges also varies, from around £50,000 in some estimates to £200,000 in others\*<sup>36</sup>.

By January 2003 work had begun to upgrade 80 exchanges that had passed their trigger levels, and BT lowered the trigger level at 388 exchanges and set trigger levels for the first time at an additional 87 exchanges. Local registration campaigns have sprung up in many communities, and in recent months BT claimed it has helped 240 of these local groups with practical advice, and help with leaflets and posters. At the end of March 2003 BT announced new trigger levels for a further 200 exchanges, and with this latest batch of exchanges under the registration scheme 85% of the population would have access to DSL if all the trigger levels were met.

After initial problems the registration scheme appears to be working. It is slow and is very unlikely to achieve the 85% or 90% coverage that BT hopes for it, but it is turning some of the BSG's Grey area White, and Red area Grey.

#### 4.1. New technologies expanding coverage

New technologies offer the hope of being able to provide service to areas that were previously uneconomic to cover, and to provide increased competition to areas where there is already service. The UK government mentions two such technologies quite prominently: broadband fixed wireless and broadband satellite.

Ubiquitous satellite services are available; however they are currently not an affordable service for residential use. BT Openworld offers a two-way broadband satellite product with 500Kbps downstream and 150Kbps upstream for £60/month and an installation charge of £899. An acceptable price for some small businesses in remote areas, but not within the price range of most households. A more promising development for residential users comes from the European satellite operator Eutelsat, which recently began a broadband satellite product called OpenSky that offers a peak downstream transmission speed of 1.5Mbps, an average downstream speed of 400Kbps, and up to 64Kbps upstream. OpenSky provides connectivity only; users still need an ISP and to pay for local calls, and a connection to a local ISP via ordinary PSTN or ISDN call must be maintained while using the satellite link. A UK company, Everywhere Broadband, is partnering with Eutelsat to bring the OpenSky service to the UK. Everywhere Broadband expects to launch service in June 2003 (having postponed an initial target launch of March 2003). Prices start at £19.95/month for a connectivityonly service where the subscriber pays the cost of local calls, and £34.95 for unmetered local calls<sup>\*37</sup>. The service is not a true "always on" service because users still need to make a local call to initiate the connection. OpenSky also offers a full range of entertainment services including television channels, videos, music and games, and if pricing packages for combined content services are attractive it could be a competitor to cable and

DSL in urban areas. If it launches successfully, OpenSky could be a means to provide ubiquitous “almost” broadband service to the UK, offering coverage to the Red areas that had been considered to be uneconomic to serve.

The UK government hopes competition in urban areas, most of which are already served by at least one broadband technology, and more often than not two, could be provided by broadband fixed wireless (see table above). Auctions were held in 2000 for UK national licenses for 3.6GHz to 4.2GHz and were reasonably successful. More recent auctions for licenses in 28GHz have been less successful, mainly because the distance limitations imposed by higher frequency made them less commercially attractive. The 28GHz auctions realized £38 million, although the government had hoped they might raise as much as £1.5 billion. However, just because the license allows service in a given geographic area doesn’t mean that the provider will actually offer service in all or even any parts of the franchise. Fixed wireless providers are apparently concentrating their initial services in residential districts where there are more potential customers. James McCall of Liberty Broadband, the leading fixed wireless service provider, explained “we’re not BT. We can’t throw a few million at advertisements and billboards telling people about us,” so they have tended to begin service in areas which have been marketed to by DSL and cable companies<sup>\*38</sup>. Liberty Broadband’s prices, £39.99/month for 512Kbps burst service (guaranteed 64Kbps), are significantly more expensive than the monthly fee for comparable DSL or broadband cable service. The only service provider currently operating commercial service in the 28GHz range, Your Communication, promotes its services to businesses at prices that are very much beyond those that could be afforded by residential users. In November 2002 the BSG estimated there were approximately 2,500 fixed wireless subscribers in the UK<sup>\*39</sup>.

## 4.2. Remote areas and political solutions

Despite the recent promising developments in DSL deployment and the hope offered by broadband satellite, for the foreseeable future a large percentage of the rural population will remain unserved by commercial broadband services of the same quality and price as available in urban areas. It is not economic for any company to try to provide service to remote areas. Consequently, some kind of political solution is required if these areas are to have equitable access to broadband. In early 2002 discussion began within the UK government about combining public sector spending on broadband services and how aggregation of this demand could be used as an incentive for the private sector to provide solutions to unserved areas of the country. The bandwidth requirements of local authorities, schools, and health services in remote areas could become “anchor tenants” guaranteeing a return on any investment the

private sector made in serving those areas. For example, in the summer of 2002 the National Health Service Information Authority was to begin public tender processes for its next generation network linking hospitals, health authorities and doctors surgeries. The current health network contract runs out in 2004, so the health authorities were under time pressure to get a new contract in place. Regional Broadband Consortia, regional groupings of local education authorities, were set up to provide broadband of 2Mbps or faster to all UK schools, and by August 2002 had connected 20% of schools in their regions. These social enterprises will spend very significant amounts of money on their network needs, and planning and meeting their requirements collectively would have many obvious benefits.

In November 2002 the Prime Minister launched the UK Broadband Task Force to support this aggregation of public sector demand. PM Blair announced that the government would invest over £1 billion in 2003-2006 in broadband services connecting every school, doctor's surgery, hospital and health authority. Primary schools will receive a minimum 2Mbps connection, and secondary schools 8Mbps. Doctors should have a minimum 256Kbps connection and every hospital and health authority at least 2Mbps. The government is recommending synchronous connections in most cases, which means typical asynchronous (A)DSL products will not be adequate, and that they be able to communicate with each other (school to school, school to education authority) at those designated transmission speeds. This means the government is anticipating building networks among these public sector organizations, not just providing them with high-speed access to the Internet<sup>\*40</sup>.

Aggregation of public sector spending holds great promise for enabling the spread of broadband, but only if the policy is carefully coordinated. Since November there have been complaints about the slow pace and lack of details about how this government policy will be implemented. Expecting their local school, hospital or clinic and doctor's surgery to be connected, people in some remote areas are unsure whether they still need to continue their registration scheme campaigns to have the local exchange DSL-enabled. It would make sense to make broadband available to all in the area around those public services. To date there has been no information provided about how these promised services will be delivered to remote areas or how spending will be aggregated.

BT recently commented that the government's plans to provide schools and health care facilities with broadband could benefit the whole community if they helped to reduce trigger levels, and suggested that public-private partnerships to deploy broadband that have already been successful in some regions could be another way for-

ward<sup>\*41</sup>. However, the promised levels of service for schools and hospitals, i.e. 2Mbps and 8Mbps, would need to be provided by a means other than BT's typical low-speed wholesale DSL product. xDSL using unbundled local loops could offer a solution if the distance from nearest exchange was not too great. It might be possible to use public funds to cover the high initial capital expenditure required to unbundle and upgrade exchanges ready for DSL. With these initial costs covered, commercial operators might then be more willing to offer services from those exchanges. But even at 12Mbps over optimal short distances from the local exchange, xDSL can only be considered an interim solution.

Long term, high-speed, non-distance dependant solutions will require more innovative approaches. For example, the Regional Broadband Consortium for the counties of Cumbria and Lancashire has used money allocated in its education budget for network services to build and operate its own network. The Cumbria & Lancashire Education OnLine (CLEO) Broadband Consortium is a sub-regional Local Education Authority partnership delivering 10Mbps to every school in the region for less than 40% of the cost of contracting with commercial providers. CLEO has contracted to supply broadband services to the region's libraries, and is now planning to sell off excess bandwidth to local businesses. The CLEO network used £3.5 million in government grants to build a backbone network of 2.4GHz wireless links and fiber optic cable running at 155Mbps, and local delivery generally by (Synchronous) SDSL and some fixed wireless. This model of community built, owned and managed networks may be the only way to deliver very high-speed data services of 10Mbps and above to many rural areas of the UK<sup>\*42</sup>. Certainly BT and other operators have been reluctant to try to provide even 2Mbps, the speed the UK government considered the definition of "broadband" in 1994, let alone any faster service.

## 5. Conclusion: beyond first generation broadband, and achieving national coverage

As higher speed services slowly become available in cities and towns, the broadband gap between city and country can be expected to widen. Some rural areas will be stuck with at best satellite broadband connections operating at around 500Kbps, and still will be dependent on dial-up access to make and control the connection. The answer to enabling rural broadband deployment lies with leveraging public sector spending on broadband services to stimulate deployment in these remote areas. Yet despite the significant progress made over the last 18 months, and the UK rapidly becoming one

of the more advanced broadband countries, there is a strong sense that the full commitment of all parts of the government, public sector and business is still lacking. As noted, there is already confusion about plans to aggregate public sector demand to help rural areas. It is not even clear that the various ministries and departments of government responsible for allocating funds to education, health and other public services have been persuaded by the e-Envoy that such aggregation is in their best interests, and perhaps most importantly that it can help them in a timely manner.

The most widely available service nationally, BT's wholesale DSL, is too slow at 512Kbps, and with providers unable to change the technical situation innovation is BT's prerogative. Yet rather than putting all its efforts into devising policies to release faster broadband products onto the market, Oftel has been re-defining broadband at an all time low speed.

Broadband cable is available to less than 50% of the population, and while the leading broadband service in terms of current subscribers is obviously not the solution for nationwide coverage. However, in reports and appraisals issued to further boost the country's perception of the success of its policies, the government has reacted to this lack of coverage and lack of choice by presenting technologies such as fixed wireless and broadband satellite as being widely available, even ubiquitous, when of course they are not.

This lack of consistency and apparent lack of commitment to shared goals might be remedied by making broadband a Cabinet level issue, and by involving industry leaders more directly in the policy making process. Japan's IT Strategy Headquarters and influential council of advisors from industry and academia were instrumental in creating Japan's broadband policy, and also in ensuring that there was widespread commitment to it. It is said that within the IT Strategy Council Softbank's Masayoshi Son pressed NTT President Miyazu to accept opening of NTT facilities on the favorable conditions that have been so conducive to the creation of the competitive broadband market Japan now enjoys. In the UK, for example, giving the already effective Broadband Stakeholder Group a more direct role in writing policy might have a similar positive effect.

Affordable residential broadband, DSL and cable, at current transmission speeds are first generation broadband services. They offer fast Internet access but are not synchronous, and not fast enough to enable the new services and intensive uses that will bring the real benefits of broadband. To get beyond 1Mbps-2Mbps will probably mean revisiting the local loop unbundling regime. If the UK wants to be the best in the G7 it

should look to Asia, and particularly to Japan, for examples of how an unbundled local loop regime might look. The goal must be to introduce competition at the wholesale as well as retail level. And unlike Japan, Korea and even parts of China, there is no indication that BT or any other operator in the UK is seriously planning fiber to the home<sup>\*43</sup>. Despite Ben Verwaayen putting broadband at the heart of BT's strategy and the positive developments that he has made, the company lacks the money and the competitive incentives to make greater changes. Without competition in wholesale the pace of change will continue to be dictated by BT and that company will, sensibly, continue at a pace that is best for it, not for government policy.

END

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- \*1 This report was originally written for translation into Japanese as a chapter in a book on global broadband strategies and deployment.
- \*2 “The Development of Broadband Access in OECD Countries”, Organisation for Economic Co-operation and Development, October, 2001, OECD, Paris.
- \*3 Izumi Aizu’s paper “A Comparative Study of Broadband in Asia: Deployment and Policy”, versions found on Aizu’s website <<http://www.anr.org>>, and Brunel University, Department of Trade and Industry study, “Korea BroadBand Mission Report” <<http://www.brunel.ac.uk/~csstjic/Mission%20Report%20v3.pdf>>, offer the most complete picture.
- \*4 “Telecoms in the Internet Age: From Boom to Bust To ... ?”, Martin Fransman, Oxford University Press, 2002. Fransman’s highly recommended book offers a comprehensive and very informative look at how these three countries began liberalizing their telecoms markets and approached the challenges posed by the Internet.
- \*5 “Information and Communication in Japan”, InfoCom Research Inc., 2001.
- \*6 See e-Japan strategy documents at <<http://www.kantei.go.jp/>>
- \*7 “Japan Agency Demands That NTT Take Steps to Improve Competition”, by Peter Landers, Wall Street Journal, December 21, 2000, now archived at <[http://www.dotcomeon.com/ntt\\_investigation.html](http://www.dotcomeon.com/ntt_investigation.html)>, “Competition Policy in the telecommunications sector”, Fair Trade Commission, June 12, 2000, at <<http://www.jftc.go.jp/e-page/report/survey/2000/tuusin.html>> and related article at <<http://www.mainichi.co.jp/english/news/archive/200010/25/news05.html>>
- \*8 OECD report, 2001, *ibid*.
- \*9 Independent Television Commission, Cable Statistics, 20 September 2002 <<http://www.itc.org.uk/>>.
- \*10 Reuters Business News, 1996.
- \*11 Report from the UK Government department, National Statistics Online, Internet Connectivity, November 2002, <<http://www.statistics.gov.uk/>>.
- \*12 Technical problems delayed service launch first until July 2000 and then September 2000.
- \*13 Oftel’s Director General went on record at the time saying the delay would not hurt the UK market, and that the country would be able to catch up with Europe if it fell behind.
- \*14 Senior European Commission staff quoted in the Financial Times, September 22, 2000 as saying “The UK has relegated itself from the premier league [of European telecoms regulation] to the relegation zone of the second division,”.
- \*15 News article, ZD Net UK Technology News, “US companies abandon UK broadband schemes”, 21 September 2000 <<http://news.zdnet.co.uk/story/0,,t269-s2081530,00.html>>
- \*16 Companies involved in the LLU process were quite consistent in their complaints about BT and Oftel, but it must be noted that these were generally companies whose businesses had failed. It is not clear how much of their complaints are sour-grapes, and how much genuine grievances. Source: discussion with UK telecommunications experts and confirmed by reference to industry press of the period.
- \*17 Technical and Operational Aspects of Local Loop Unbundling, Gilbert & Tobin/Politi-

cal Intelligence, September 2001. Report produced for the European Commission.

- \*18 Gilbert & Tobin/Political Intelligence, *ibid*.
- \*19 See easynet website <<http://www.easynet.com>> and interim and full annual reports for 2002 for examples of costs involved in providing LLU service.
- \*20 Discussions with various UK Internet access providers, Autumn 2002.
- \*21 News article, ZD Net UK Technology News, “High-speed Net access from the blueyonder” <<http://news.zdnet.co.uk/story/0,,t269-s2077933,00.html>>.
- \*22 OCED report, *ibid*.
- \*23 Available at <[http://www.e-envoy.gov.uk/oeo/oeo.nsf/sections/reports-broadband/\\$file/ukonline.pdf](http://www.e-envoy.gov.uk/oeo/oeo.nsf/sections/reports-broadband/$file/ukonline.pdf)>.
- \*24 Creating the Superhighways of the Future: Developing Broadband Communications in the UK, Department of Trade and Industry (DTI), November 1994, <[http://www.archive.official-documents.co.uk/document/dti/dticmd/anx-c.htm#broad\\_narrow](http://www.archive.official-documents.co.uk/document/dti/dticmd/anx-c.htm#broad_narrow)>.
- \*25 Oftel’s Internet and Broadband Brief — March 2003, <[http://www.oftel.gov.uk/publications/internet/internet\\_brief/broad0403.htm](http://www.oftel.gov.uk/publications/internet/internet_brief/broad0403.htm)>.
- \*26 Speech at the Oxford Internet Institute, 27 March 2003, references at <[http://www.bowblog.com/archives/cat\\_internet\\_accessbroadband.html](http://www.bowblog.com/archives/cat_internet_accessbroadband.html)> and newswires.
- \*27 BSG website has reports and other information about the group <<http://www.broadbanduk.org/>>.
- \*28 Oftel’s recent decision to include 128Kbps service in its definition on broadband is of course inconsistent with this. Broadband would be even more successful if all had the same level of commitment and understanding.
- \*29 Presentation by Mr. Tom Wills-Sandford, Broadband Stakeholders Group, June 2002.
- \*30 Paper, “Promoting Broadband : The Case of Japan” , from the ITU’s Promoting Broadband workshop, April 2003 <<http://www.itu.int/osg/spu/ni/promotebroadband/index.html>>.
- \*31 NTL does not disclose how many subscribers use the “non-broadband” ISDN equivalent speed 128Kbps service, however reliable estimates place the number at around 300,000 homes. If the true situation of broadband in the UK is to be understood and appropriate public policy made, the number of subscribers by transmission speed should be made available.
- \*32 A map of cable and DSL coverage in the UK at the end of 2002 is available from the BSG, <[http://www.broadbanduk.org/images/National\\_map.jpg](http://www.broadbanduk.org/images/National_map.jpg)>.
- \*33 See BSG website and publications, <<http://www.broadbanduk.org/>>.
- \*34 As we will discuss later, data about the availability of Fixed Wireless Access (FWA) can be misleading. Overall coverage of DSL has increased to 67% of the population since November 2002. Cable coverage is now at 43% according to recent Oftel data.
- \*35 Source <<http://www.rbbtoday.com/news/20030110/10102.html>>.
- \*36 BSG Second Annual Report and Strategic Recommendations, November 2002 suggests this higher amount.
- \*37 Information about Eutelsat’s OpenSky technology is available online at <<http://>>

[www.eutelsat.net/index.html](http://www.eutelsat.net/index.html)>. Everywhere Broadband provides information about their services on their website at <http://www.everywherebroadband.com/html/index.html>>.

- \*38 “Fixed wireless - low frequencies hold key”, May 2002, Broadband magazine [http://www.broadbandmag.co.uk/features/may\\_02/fixedwireless.htm](http://www.broadbandmag.co.uk/features/may_02/fixedwireless.htm)>.
- \*39 BSG 2nd Annual Report, November 2002, <http://www.broadbanduk.org/>>.
- \*40 A campaign by a member of parliament, Sir George Young, “Broadband Access for All” to secure wider access to broadband across all rural areas of the UK is informative on government policy. <http://www.sirgeorgeyoung.org.uk/pages/broadband.htm>> A letter from Stephen Timms MP, Minister for E-commerce and Competitiveness, February 2003, provides an overview of current UK government policy <http://www.sirgeorgeyoung.org.uk/pages/timms030226.htm>>.
- \*41 BT press release, April 3, 2003, <http://www.btplc.com/Mediacentre/Archivenewsreleases/2003/nr0313.htm>>. These comments seem to indicate that BT is as much in the dark as anyone about how and when these public services will be delivered and aggregated.
- \*42 The best example of such community built networks are the “condominium fiber” networks pioneered in Canada. See presentation by Bill St. Arnaud, Senior Director Network Projects, CANARIE. “CANARIE - CA\*net 3 ‘The Customer Empowered Networking Revolution’” <http://old.www.aarnet.edu.au/projects/2000/internetworkshop/bsta/text66.htm>>
- \*43 October 2002, there were over 80,000 fiber to the home subscribers in the Chinese provincial city of Hangzhou, and 60,000-70,000 DSL subscribers.

