

**KENT & MEDWAY ECONOMIC BOARD - KENT COUNTY COUNCIL
BROADBAND INFRASTRUCTURE INVESTMENT MODELS**

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BROADBAND INFRASTRUCTURE INVESTMENT MODELS

1 INTRODUCTION AND TERMS OF REFERENCE

1.1 Terms of reference

This report considers the commercial environment for the supply of telecommunications services into new developments and established developments in the Kent & Medway sub-region.

It was sponsored jointly by Kent County Council (KCC) and the Kent & Medway Economic Board (KMEB), to meet their combined objectives. KMEB has a business focus, but KCC has a broader scope covering community and social requirements as well as business. Thus, while the report is focused on the supply of telecommunications services to the business market it also considers the supply of equivalent services to the residential market.

The principal requirement was to assess commercial opportunities to overcome deficits in the supply of telecommunications services across the sub-region, particularly in the 'Growth Areas' of the Thames Gateway and Ashford, and similar development areas, such as those in the Priority Areas for Economic Regeneration.

The outcome of the project is a practical commercial framework and set of actions that if adopted would stimulate the supply of competitive telecommunications infrastructure across Kent & Medway, particularly in those areas that are currently under-served by telecommunications suppliers. This improvement in supply is intended to enhance the attractiveness and value of the individual developments, and stimulate take up of premises by businesses in knowledge based sectors and other sectors that create significant value.

The commercial models are considered to be roles, responsibilities and particular actions for property developers, telecommunications companies and, where applicable, public sector funding agencies. These commercial models will ensure that appropriate capacity is funded and provided. Business cases have been developed for a number of schemes to demonstrate the viability of the commercial models given requirements for compensation for individual stakeholders for the investment that they make and the risk that they take.

Key stakeholders associated with the supply of telecommunications services are:

- The property developers, who may fund or provide infrastructure that telecommunications operators and service providers may then use;
- The telecommunications operators and service providers themselves;
- Potential public sector funding agencies such as SEEDA, ODPM, KCC, Medway Council and others.
- Local authorities in adjacent areas of Kent & Medway that require improvements in telecommunications facilities for their communities

Property developers already acknowledge the need for excellent telecommunications infrastructure on and to their developments. However, they have difficulty in expressing this requirement in a manner that attracts investment from a telecommunications company. Therefore, the commercial models require an assessment of telecommunications requirements and an assessment of the revenue opportunity over a period of some ten or more years with the intention of determining the value to a telecommunications supplier of investing in infrastructure in a new development.

Further, we understand that, as a matter of course, BT or the developer acting for BT lays telecommunications infrastructure for BT's own use within a development. BT does not have any obligation to lay infrastructure for other operators. Indeed, it has no obligation to share its ducts, although it will do so for on-site access and at pinch points such as river crossings. The intention of this project is to encourage the provision of additional capacity by suppliers other than BT.

The cost of local infrastructure is high and some degree of cost sharing may benefit not only new operators but also BT. Such cost sharing would reduce the investment requirement of every investing telecommunications company, and would significantly reduce the market share necessary for profitability. Thus, the report assesses how sharing of trenches or ducts may be facilitated.

Second tier telecommunications service providers require backhaul to a top tier telecommunications centre such as London Telehouse, where many operators interconnect so that they can exchange telephone, internet and other traffic. The report assesses the availability of such infrastructure and makes recommendations concerning stimulation of further provision. It is likely that the effect of these networks will be felt beyond the confines of development areas, since once established they can be used to extend reach further into Kent & Medway. Thus, we anticipate that neighbouring areas of Kent & Medway will benefit from any opportunity to attract suppliers.

1.2 The approach adopted

Interviews were carried out with several developers to determine their views and intended level of intervention in telecoms infrastructure. Interviews were also carried out with the following telecommunications service providers: BT, Telewest, NTL, Sota, Neos, Swedia and Bulldog. The results of these interviews¹ were used to characterise the issues associated with telecommunications supply onto new developments and in established areas.

We also reviewed strategies for the area prepared by Medway Unitary Authority and Kent County Council and the Kent & Medway Structure Plan Deposit Edition. These documents and documents from the Department of Transport and the ODPM were used to characterize the service requirement and requirement by area. The team working on the Ashford Development Plan were consulted and projected growth data obtained.

In parallel with these activities, we prepared a business model of a telecommunications service provider. This model was used to test the business cases of different commercial models for the competitive supply of telecommunications services.

The outcome of this analysis and the results of the interviews were used to develop the commercial models and a policy statement for the provision of telecommunications services in Kent & Medway.

1.3 Report contents

Chapter 2 summarises the conclusion of the study.

Chapter 3 considers development plans in Kent & Medway and the consequential requirements for telecommunications services, based on the strategies for Kent County Council and Medway Council, and the Deposit Structure Plan.

¹ This report's authors believe that the notes made of these interviews may disclose commercial interests and are believe, therefore, that they are exempt information under The Freedom of Information Act 2000, Part II Section 43(2).

Chapter 4 discusses the availability of telecommunications services generally in the UK and more specifically in Kent & Medway. It discusses the supply arrangement, and briefly regulation, competition, the availability of infrastructure and services from BT and from second tier services providers and operators.

Chapter 5 considers the options for the supply of service into new and established developments. It considers supply solely to a new development, supply to an individual local exchange area and supply to an area covered by multiple exchanges. It assesses the different funding requirements of alternative methods of providing infrastructure and determines implications for commercial models.

Chapter 6 defines the policy and commercial models for the provision of telecommunications services on a business park, in local exchange areas and for the region as a whole, in terms of the value to each party, their roles and their responsibilities to provide service given the most likely method of delivering services. It provides an overall policy for the provision of telecommunications services in Kent & Medway. The commercial models are primarily concerned to improve facilities and services in defined areas of Kent & Medway or on individual developments. However, the issue of backbone networks is also addressed, together with the actions that may be taken by stakeholders to promote improvements in such networks across Kent & Medway.

2 SUMMARY OF CONCLUSIONS

Over the next twenty years, Kent & Medway, like the rest of the UK will become increasingly dependent on telecommunications infrastructure and services for business and domestic use. The policy of attracting knowledge based businesses and ICT intensive businesses to Kent & Medway, however, will lead to specific requirements for the best available infrastructure to be provided in many of the new developments in Kent & Medway.

Requirements for telecommunications services from residential users, from small and medium sized enterprises and from large companies are changing. Over the next fifteen to twenty years we expect a gradual migration to broadband for the delivery of basic telephone and internet services and, a wider range of services to be provided. New services provided over broadband will include TV and potentially high definition TV in the home, and similar image rich document and information exchange in the workplace. These new applications will add significantly to the requirement for speed of access required, continuing present trends.

We believe that the present access infrastructure, based on twisted copper pairs, will begin to constrain service delivery in the medium term. As the life of access infrastructure is measured in decades, not years, access infrastructure implemented now will have an impact on services delivered over the infrastructure for up to half a century. We anticipate that lack of capital and lack of a clear benefit for telecommunications operators for upgrades to their networks could lead to a shortfall in capacity in the access network that is used by residential users and small and medium sized enterprises.

We believe that the telecommunications requirements of large companies will grow significantly over the next twenty years. However, the infrastructure used by such companies, at least at major sites, will be able to be adapted and upgraded to meet their long term needs. Therefore, there should be no shortfall in capacity for large companies. However, large companies locating in Kent may be placed at a cost disadvantage if competitive supply of access services is not possible.

Telecommunications access networks in Kent & Medway are provided mainly by BT, Telewest and NTL. BT provides service across the whole of Kent & Medway while Telewest and NTL cover more restricted areas. A number of backbone networks exist, but there are few points of presence for the competitive supply of sophisticated and innovative services for large and small companies that are dependent on telecommunications for their business operations.

Nevertheless, in Kent, as in other areas of the country, there is competition in telephony and in internet access. Therefore it is mainly in the provision of leased line services and more innovative data and internet services that there is a lack of competition. These services are the ones that are dependent on access infrastructure.

The delivery of new services will require continued development of the access infrastructure, with a potential need to migrate from copper to fibre (or possibly radio) within ten years. The availability of competitive supply of a number of telecommunications services will require either:

- The development of alternative access infrastructures
- The sharing of a single infrastructure capable of supporting very high speed broadband by a number of operators or service providers.

The sharing of the existing twisted pair infrastructure is made possible by the present regulatory environment. BT provides wholesale services – wholesale line rental, whereby a second operator can lease a line from BT, and wholesale DSL services, whereby a second operator or service provider can lease a DSL service from BT. Sharing is also possible using local loop unbundling in which another operator has direct access to the copper wire. Wholesale DSL services have proved

very popular, and recent price changes imposed on BT by OFCOM suggest that local loop unbundling will become popular in large exchanges, particularly as other operators can offer highly differentiated services over an unbundled local loop. NTL has estimated that the break even point for LLU is 300 broadband subscribers in the exchange area. Thus, as broadband penetration rises, more exchanges will become feasible for LLU, with the break even point dependent on penetration, market share of the unbundling operator and availability of backhaul. By 2008, we anticipate that it will be feasible for a major ISP to unbundle exchanges with more than 3500 subscriber lines. However, exchanges with fewer subscribers will not be attractive to unbundlers. The services on these exchanges will be limited to the ones available from BT either at a wholesale or retail level. In Kent, this may amount to some 85 of 134 exchanges.

We anticipate that sharing of a fibre infrastructure may also be mandated by OFCOM.

The large new development areas, such as the Thames Gateway in the North West of Kent, and Ashford in the South, will give rise to opportunities to establish state of the art infrastructure and competitive supply of telecommunications services. Competitive supply in these areas, together with demand from public sector users and other large telecommunications users, and from competitive provision of services in adjacent developed areas, will encourage the extension of the existing backbone networks in Kent & Medway, and lead to the establishment of new points of presence where sophisticated and innovative services can readily be obtained.

We have investigated the feasibility of the provision of alternative infrastructures by competing telecommunications operators. In doing so, we made the assumption that such an operator would (a) consider one or more adjacent exchange areas, and (b) only build in an exchange area if backhaul was available nearby, and hence did not lead to large incremental costs. A competing operator or service provider might adopt one of the following approaches to supply of competitive access services:

- (a) By procuring wholesale services from BT
- (b) By unbundling local loops provided by BT
- (c) By building its own fibre infrastructure
- (d) Through a combination of own infrastructure and LLU.

We evaluated (b) and (d). In (d), we assumed that new infrastructure was provided for new housing and business developments and LLU was adopted elsewhere. In (d), we evaluated two sub-options, a pro-active build option, and a retro-active build option. A pro-active build option is one where infrastructure is funded and built in advance of the housing or business development. A retro-active build option is one where cable is laid retrospectively.

Finally, we evaluated the difference between two funding options, one where the telecommunications operator or service provider funds the duct infrastructure, the other where the developer or the state funds the duct infrastructure, and recovers its costs over the life of the service.

Feasibility was tested over a period of twenty years, starting in 2005. The model was tested specifically with Kent areas of the Thames Gateway, the Sittingbourne exchange area and the development area around Ashford.

In all cases, (b), local loop unbundling, gave the based return on investment, and (d) using developer or state funding of infrastructure yielded the next best performance.

We therefore believe that the most appropriate method of providing alternative supply of differentiated services is for KCC, Medway Council, SEEDA and KMEB to:

1. Encourage local loop unbundling.
2. Encourage BT to provide fibre in the local infrastructure for new developments and where it is recabling the local infrastructure.
3. Work with OFCOM to require the fibre equivalent of LLU.
4. On new developments, fund developments of infrastructure to enable competitive supply, if BT does not provide fibre.

The public sector, developers and telecommunications service providers and operators all have a role to play in delivering the envisaged services and all will benefit from their provision. Actions to be taken comprise.

1. Active marketing of Kent & Medway to telecommunications companies to overcome the lack of awareness of development areas, particularly in the Thames Gateway areas, around Ashford, the strategic sites and the technology and knowledge clusters.
2. Encouragement of LLU in the larger exchange areas, and adjacent exchanges, particularly where new development is taking place.
3. Provision of ducting or fibre for exploitation by service providers in new commercial development through Section 106 of the 1990 Town and Country Planning Act or otherwise. Provision of ducting in residential development is not necessary since LLU or fibre sharing is the most appropriate option.
4. Liaison with BT to encourage the supply of state of the art infrastructure into new developments in Kent & Medway.
5. The use of public procurement to stimulate new PoPs on existing backbone networks, LLU on particular exchanges and selective extensions of backbone networks to increase coverage across Kent & Medway.

The public sector needs to gather requirements and demonstrate the opportunities that exist in Kent & Medway for telecommunications operators. By doing this, the public sector will encourage these operators to provide services where it is economic for them to do so. Developers need to establish links with telecommunications operators and service providers to deliver services competitively on their sites, and particularly to start the provision of fibre in the local loop in line with expectations set by the telecommunications industry.

3 KENT AND MEDWAY ECONOMIC DEVELOPMENT

3.1 Economic development objectives

Kent & Medway economic development objectives arise from the relative disadvantage of the sub-region in comparison with other sub-regions in the South East, and more generally in comparison with the country as a whole.

While the Kent & Medway sub-region is located in the second most prosperous region in the UK, Kent & Medway is below average on a number of indices not only in comparison with the region but also in comparison with the UK as a whole. For example, Gross Value Added (GVA) per head is only 83% of the UK average (see Table 3-1), and Gross Fixed Capital Formation per head is below average (see Figure 3-1) for the UK. Indeed Kent & Medway performs relatively badly in comparison with its neighbours in the South East Region as well as London.

	GVA per head (£)	GVA per head indexed
United Kingdom	14,852	100
South East	15,908	110
Kent & Medway	12,074	83

Table 3-1: Gross Value Added (GVA) per head at current basic prices, 2001²

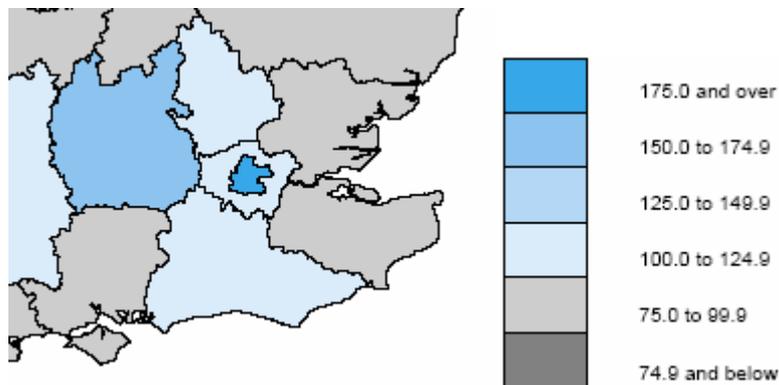


Figure 3-1: Gross Fixed Capital Formation per head, indices, average over 1998-2000 (UK=100)³

² Sub-regional Gross Value Added: Methods and Background, Office for National Statistics

³ Regional and subregional gross fixed capital formation, Office for National Statistics, consistent with the estimates of UK GFCF published in the 2002 edition of the *UK National Accounts – The Blue Book*.

Kent County Council's "Vision for Kent" and Medway's "Community Plan" put forward a number of objectives to strengthen the Kent & Medway infrastructure. As expressed in Kent's Vision, they are to:

- *promote modern high-technology industry and business, spreading development across all sectors...;*
- *create more opportunities for qualified workers in Kent to reverse the 'brain drain' to London...;*
- *promote strong public sector support for businesses which encourage investment in infrastructure and skills, whilst meeting the modern demands of the business community.*

The Deposit Structure Plan provides a policy framework for achieving such objectives. Annex 2 of this report presents an analysis of the policy framework and identifies requirements for telecommunications facilities and services arising from it.

In summary, there is a requirement for the provision of telecommunications facilities and services in new development areas of Kent & Medway and elsewhere in the sub-region to support the following sectors: Financial Services, Business Services, Transportation, Storage and Communications, and more generally knowledge based industries. The facilities and services required will need to accommodate telecommunications traffic from individual businesses measured in Megabits/sec and even Gigabits/sec⁴. Moreover, the traffic requirements will grow by two orders of magnitude between 2004 and 2020.

Comprehensive, development-wide high capacity services will need to be provided at or in:

- Locations of strategic importance for business, industrial or distribution uses.
- Technology and knowledge clusters near Canterbury, and at Fort Halstead (Sevenoaks), Kings Hill (West Malling), Pfizer and the Sandwich Corridor at Richborough, Sittingbourne Research Centre, Rochester Airfield, and Chatham Maritime have specific requirements for best of class telecommunications facilities and services.
- Town and district centres for retail support.

Lower capacity contended broadband services will be required for smaller firms in other areas including:

- Premises for small firms to support new economic activity and growth in existing activity, particularly in urban areas or large villages near primary or secondary roads.
- Some farm buildings to enable re-use.
- Tourist sites, particularly for conference centres and principal hotels. As these are often away from business centres and town centres, provision is more likely to be linked to area wide facilities.
- New residential developments and retrospectively in established residential areas.

⁴ 10⁶ bits/sec to 10⁹ bits/sec; a telephone call requires 64 x 10³ bit/sec and standard ADSL offers 512 x 10³ bit/sec

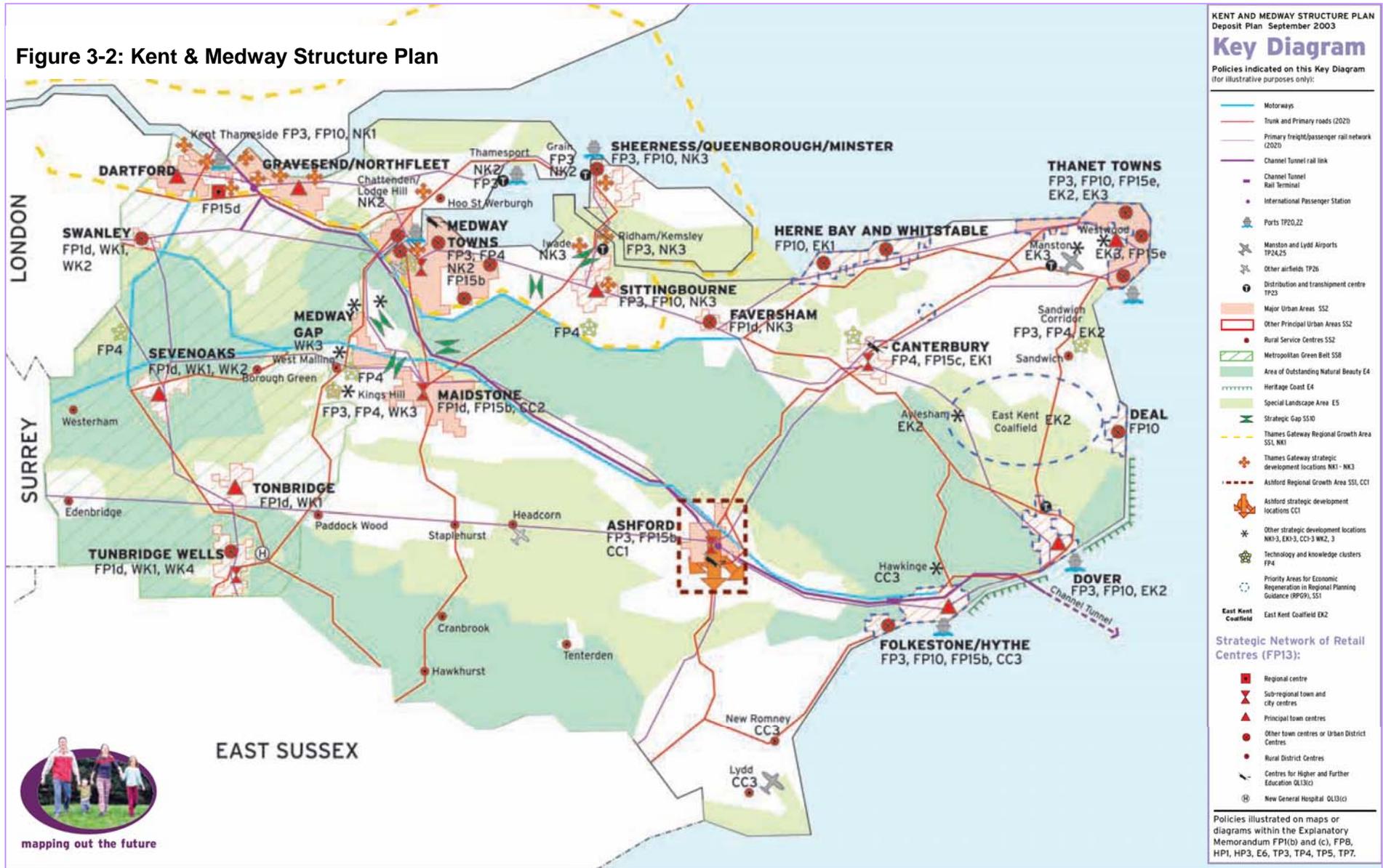
The bandwidth requirement from individual premises for such contended services will grow by two orders of magnitude between 2004 and 2020, from about 1Mbit/s now, to 10Mbit/s by 2010 and 100Mbit/s by 2020.

3.2 Principal development areas

Figure 3-2 below shows the principal development areas to be supported by advanced telecommunications facilities and services. These include:

- Thames Gateway strategic development locations in Dartford, Gravesend and Northfleet, Chattenden Lodge Hill, Medway Towns, Sheerness, Ridham/Kemsley, Iwade and Sittingbourne
- The Ashford strategic development area
- Other strategic development locations at Westwood and Manston in Thanet, Aylesham, Hawkinge, Kings Hill, West Malling, and Medway Gap
- Technology and Knowledge clusters in Sittingbourne, Canterbury, Sandwich, West Malling, Kings Hill and near Sevenoaks
- Priority areas for economic regeneration in Thanet, the East Kent Coalfield, Dover and Folkestone/Hythe
- Airports, ports and other urban areas.

Figure 3-2: Kent & Medway Structure Plan



3.3 Funding

3.3.1 Thames Gateway

The ODPM has committed £330m for support packages to take forward key development projects in the Gateway area. These packages are aimed to deliver sites for new development and address community, environment, education and employment issues needed to create an environment where people want to live and are able to work. A further £120m is to be allocated to projects which are in the process of development, including affordable and key worker housing schemes and those that will emerge from the Urban Development corporations in East London and Thurrock. In total, ODPM expects investment of £446m of directly targeted resources in the Thames Gateway over the next three years, complemented by transport investment of at least £600m, will lever a further £2 billion from public and private sector partners⁵. Of this total, £142.7m has been secured for North Kent, and SEEDA will deliver £53.4m of this investment across a range of physical development projects, engaging with the local communities as part of this work.⁶

3.3.2 Ashford

ODPM has announced an £8 million package to support growth at Ashford including help to facilitate several Regional Development Agency projects to kick-start the town centre regeneration, which is seen as crucial to the Ashford growth agenda⁷. ODPM and SEEDA funding amounts to some £12.6m funding in total⁸.

3.4 Telecommunications requirements for residential and small business markets

3.4.1 Broadband requirements

95% of businesses⁹ now have internet access in one form or another and an increasing number of businesses and households are migrating to broadband provided either using DSL or using cable broadband technologies. Figure 3-3 shows our forecast penetration of DSL and cable broadband technologies in areas where broadband services are available using those technologies. In September 2004, there were 5.27m¹⁰ subscriptions to broadband services amongst the 24.3m households¹¹ and 1.16m SMEs¹² in the UK. We forecast that this penetration will rise from some

⁵ Making it happen: Thames Gateway and Growth Areas, a progress report by the Deputy Prime Minister, January 29, 2004

⁶ SEEDA Business Plan, 2004-5

⁷ Making it happen: Thames Gateway and Growth Areas, a progress report by the Deputy Prime Minister, January 29, 2004

⁸ SEEDA Business Plan, 2004-5

⁹ Business in the Information Age: The International Benchmarking Study 2004, DTI, 2004

¹⁰ The Communications Market October 2004 Quarterly Update, OFCOM

¹¹ In contrast with 25 million dwellings, Social Trends 34, Office of National Statistics, 2002 figures

¹² VAT registered enterprises with fewer than 250 employees; source: Small Business Service, Start 2002

21% of available households and SMEs in 2004, including 50% of SMEs¹³, to some 61% by 2011¹⁴. DSL adoption will become the dominant method of delivering service. We believe that DSL penetration will continue to grow slowly after 2011, with the total volume dependent on service pricing. Our analysis suggests that additional growth in broadband penetration has occurred as a result of recent price reductions which have encouraged substitution of narrow band internet access by broadband (at a saving to the consumer if a second line is involved). We expect prices to continue to fall in real terms for the same service.

There is the possibility of wireless technologies acting as a substitute for DSL. Wireless technologies may ultimately substitute for DSL or cable broadband in areas where it is available, and may expand the market somewhat by offering different price propositions.

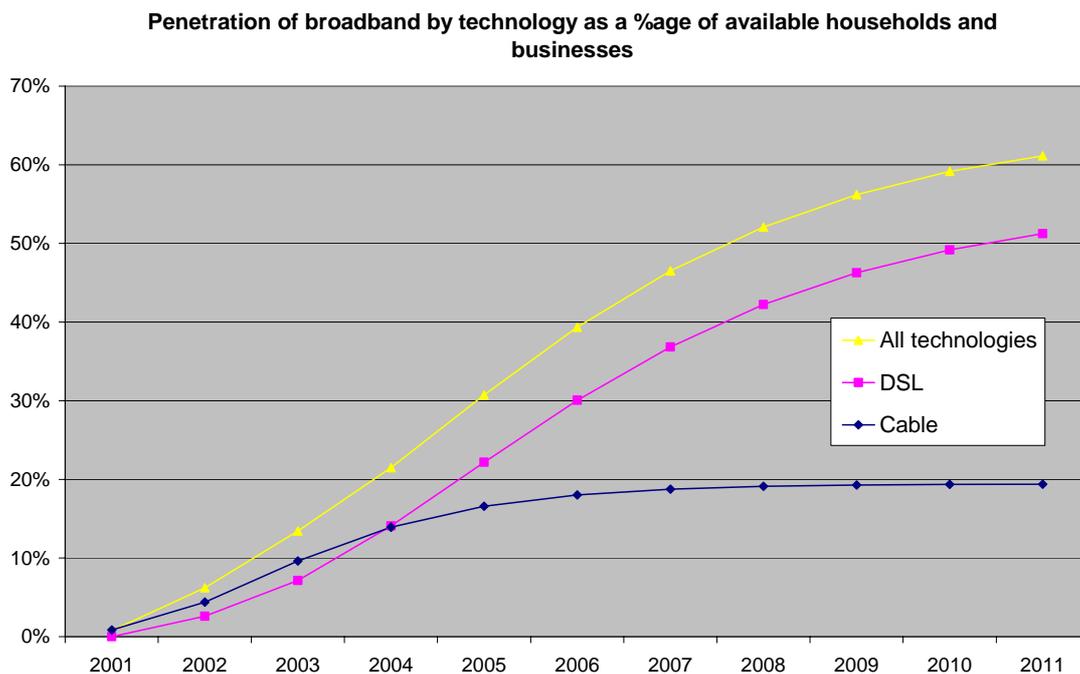


Figure 3-3: Penetration of broadband by technology¹⁵

The anticipated speed of broadband connection is likely to increase through time. Various predictions of the change in broadband connection speed have been produced. In 2004, a minimum broadband connection speed of 384Kbit/s could be considered to be broadband. This is the maximum speed currently available over 3G mobile networks, although 512kbit/s could be considered a reasonable base for fixed broadband access. Anticipated speed in 2010 and 2020 is likely to be significantly higher, but it is not possible to predict with certainty.

The following factors need to be considered.

- Historic rate of increase in the speed of telecommunications access.

¹³ The Communications Market October 2004 Quarterly Update, OFCOM, no note of the base number of enterprises is given

¹⁴ Intercai Mondiale estimate

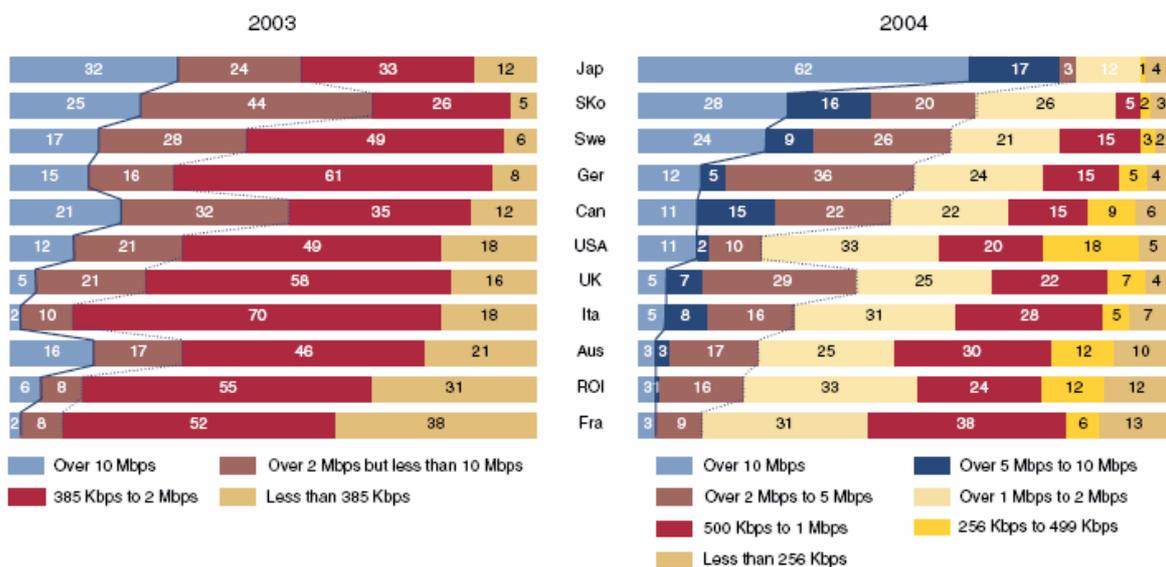
¹⁵ Source: Based on OFCOM source data for 2001 to 2004

- Application and service requirements.
- Local loop infrastructure constraints
- Replacement of local loop infrastructure
- Substitute technologies for delivering applications and services
- The relative power of proponents of alternative means of delivering applications and services

These are considered in the following sections.

3.4.2 Historic rate of increase in the speed of telecommunications access

Bandwidth requirements are increasing rapidly. Figure 3-4 shows the change in speed of broadband connection used by business by country. It demonstrates, first, how far behind the UK is in comparison with other countries in access speeds. In addition, it demonstrates how in all cases prevailing speed of access has increased. Japan (Jap), South Korea (SKo) and Sweden far surpass other countries in the use of services with greater than 5Mbps bandwidth. The UK is in a middle tier of countries with Germany and Canada. In the UK in 2004, 41% of companies use a service rated at greater than 2Mbit/s. This should be contrasted with 2003, when only 26% of responding companies in the UK used greater than 2Mbit/s. At the other end of the scale, whereas in 2003, 16% of responding companies in the UK said that they used less than 385Kbit/s, in 2004, 11% of companies indicated that they used less than 500Kbit/s. Thus, year on year there is a distinct and measurable increase in access capacity.



Question: "...and what bandwidth do you have?"

Base: All businesses using "Broadband" connection technology (xDSL, cable, leased line, wireless/satellite)

Note: New categories were introduced in 2004

Figure 3-4: Change in access speed, all companies with a broadband connection, 2004 over 2003¹⁶

¹⁶ Business in the Information Age: The International Benchmarking Study 2004, DTI, 2004

Figure 3-5 below shows historic growth and forecast growth in performance of telecommunications access technologies used for accessing data networks in the USA.

For expectations based on historic performance to be achieved, local loop infrastructure used for SME and residential broadband services will need to be able to deliver 5 to 10Mbit/s by 2010, and 50 to 100Mbit/s by 2020.

It should be noted, by way of example of the developments in this area, that Bulldog is already offering 4Mbit/s to customers in the urban areas where it provides services, and from 2005, Easynet will be providing 8Mbit/s to customers in areas where it provides services.

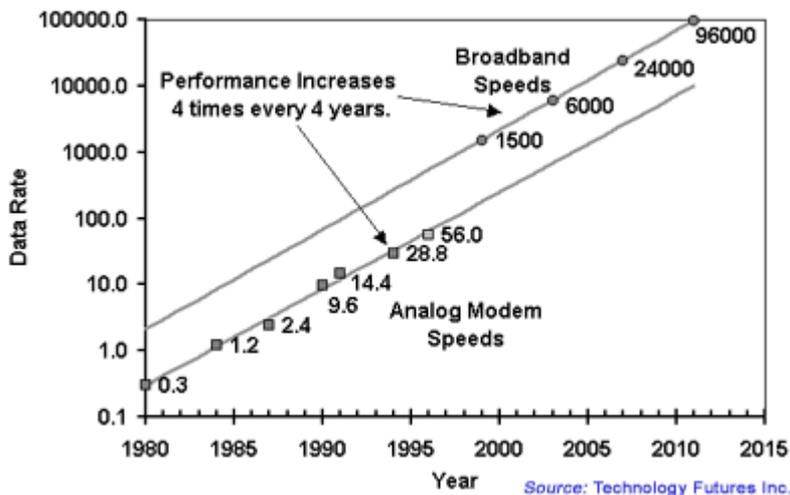


Figure 3-5: Analogue modem and broadband data rates¹⁷

Such increase in expectations is likely to tax the capability of existing access infrastructure. About half of all businesses and SMEs should be able to obtain 5Mbit/s services by 2010 over existing copper cable, but extension of that service to the remainder, and increase in capacity to 50Mbit/s will require partial or complete replacement of the local loop with fibre. While peak performance of DSL will rise over the decade, it will not be possible to sustain peak data rates over long distances. Thus, as peak data rates rise, the distance carried will fall. At 54Mbit/s for example, distance will be limited to less than 300 metres. Thus, the line plant used for access will have to be modified for historic rates of increase to continue.

In contrast, fibre provides at least 100Mbit/s transmission speed over distances of tens of kilometres. Partial use of fibre to limit the copper tail used to deliver services to a building may enable 100Mbit/s transmission. Replacement of whole local loop with fibre would enable far higher speeds in the range of 1 to 10 Gigabit/s.

BT's plans for its 21st Century Network include the possibility of replacing either part of the local loop or the whole local loop with fibre. BT is about to start fibre trials and may start to implement such infrastructure in new developments from 2006. BT is to some extent dependent on OFCOM's regulatory approval. Our anticipation is that BT will indeed provide fibre infrastructure in new developments and progressively replace its existing copper infrastructure over its economic life which may be 30 to 40 years.

¹⁷ Residential Broadband Forecasts, Technology Futures Inc

3.4.3 *Application and service requirements*

Application and requirements for telecommunications services are dependent on a number of factors, primarily expectations on availability of bandwidth and continuity of supply. These expectations lead application developers to provide opportunities for use of multimedia content and require close coupling of databases within and between organizations. These expectations are driven by what is happening in the primary markets for such applications. Thus, the UK requirements for capacity in telecommunications will be driven by the conditions in the USA, in Korea and Japan and the rest of Europe as much as they are driven by local requirements. As we have already seen, the telecommunications capacity taken by individual companies in these countries is already considerably greater than that taken by companies in the UK.

Overall our expectations are as follows for the period to 2020.

Business applications. Business applications now require always on broadband communications at greater than 2Mbit/s. We anticipate that greater use of graphics and multimedia content in business, and greater degrees of synchronization between databases will require two orders of magnitude increase in capacity by 2020. Thus, by 2020, we would expect a small enterprise to require of the order of 100 to 200Mbit/s access.

Personal computer applications and virtual private networks. These are now commonly server based and require local area network speeds to perform satisfactorily. Wide area VPNs require contended broadband at greater than 512Kbit/s. We anticipate that capacity requirements will increase as file sizes increase, leading to a minimum contended access speed of 5 – 10Mbit/s by 2010 and 100Mbit/s by 2020. Increased requirements for working from home will therefore require such capacity to be available almost universally.

Domestic applications. Domestic applications will increasingly be multimedia in nature. They will include enhanced games, video on demand, and two way distribution of home produced multimedia content. The minimum channel capacity for video is about 2Mbit/s, DVD quality requires about 4Mbit/s and High Definition TV requires 19.8Mbit/s. Multiple TV households would require multiple high capacity inbound channels. These channels could not be highly contended due to the continuous bit rates required and therefore the capacity cannot be shared between multiple users. Early experiments in the transmission of TV over the Internet are now being carried out. We believe that these will lead to commercial transmission of significant amounts of content by 2010. If this is correct, then there will be a requirement for multiple 2 or 4Mbit/s channels by 2010. Timescales for the introduction for HDTV are not clear. Nevertheless, it should be expected by 2020. Thus, by 2020 domestic applications are likely to require multiple 20Mbit/s channels.

A countervailing factor is the possibility of the use of other technologies for video on demand. One option is the use of near video on demand and a caching server in the home for TV. Using this approach, broadcast TV is captured in the home based caching server for later viewing. This approach allows efficient use of bandwidth, and could be delivered by satellite or by terrestrial TV wireless broadcast networks.

3.4.4 *The relative power of proponents of alternative means of delivering applications and services*

There is historical evidence in other technology areas that the power of individual technology proponents is at least as important as technical characteristics. This is shown by the relative success of the VHS standard over the superior Betamax standard for domestic video tape recorders, and is also shown by the geographic patterns of mobile phone technology adoption.

Thus technology diffusion may be disrupted by commercial power, by the difficulty of guaranteeing digital rights, sales channels and a variety of other political factors. Thus, the

ownership of multimedia content, and the channels favoured by those owners may have an impact on choice of distribution channel.

3.4.5 Availability of capital for increasing the capacity of the access network

The current copper based access network is ultimately not sufficient to handle the substantial increase in traffic that new applications and services and the evolution of existing applications and services will require. However, replacement with a fibre based network, or possibly a wireless network will require considerable amounts of capital depreciated over a long period of time. The availability of capital for local loop replacement is not apparent. Therefore, it is to be expected that there may be a shortfall in the capacity of the access network, that will to some extent constrain the development of services in the UK.

3.5 Telecommunications requirements of medium and large companies

Medium and large companies require multi-site private networks of varying levels of sophistication. Whereas for small companies, the instantaneous bandwidth requirements of individual users dictate capacity, for medium and large companies, it is the consolidated requirement of all users at a particular site that determines access capacity. Small sites may have capacity requirements no different from homes or small businesses. Larger sites will require very large amounts of capacity, and this will grow as the requirements of applications and file sizes grow. Nevertheless, leased line services are available using fibre in most locations that will be able to satisfy demand for some time, and the capacity such services will grow as demand requires. Therefore the capacity of telecommunications networks should not act as a constraint on the development of the technology base of medium and large companies in the way that it might for small companies.

3.6 Implications

The cost of replacing local loop infrastructure is high and depreciation periods for the cable are at least 25 years. Thus, capacity that is installed in 2005 will probably still be in use in 2030. If this is copper, it is likely that it will not be able to meet broadband requirements of businesses or households beyond 2010. It is possible that wireless infrastructures may evolve to provide sufficient bandwidth. However, it is not clear at the moment that this will happen. Fibre local loop infrastructure would be able to accommodate any demand for bandwidth to 2020 and probably for a considerable period beyond. Fibre transmission is a mature technology that can be implemented and operated at about the same cost as copper.

The vision for the Kent & Medway sub-region is to attract high technology and knowledge based jobs, and jobs that rely on high technology. It therefore needs to be able to provide an infrastructure that will sustain growth in telecommunications capacity requirements of such technology for decades. We have seen that this probably means generally available capacity of 10Mbit/s by 2010 and more than 100Mbit/s by 2020. Therefore, Kent & Medway needs to oblige the provision of fibre based infrastructure in all new developments as soon as possible.

4 AVAILABILITY OF TELECOMMUNICATIONS SERVICES

4.1 Telecommunications suppliers in the UK industry

The suppliers of telecommunications services in the UK can be characterized in the following way:

Telecommunications operators: BT, NTL and Telewest that provide local infrastructure and provide a full service portfolio for domestic and business subscribers. The cable operators also provide television. BT provides IT related services and has a greater penetration of the business market than the other two. The cable companies only cover 52% of all households nationally, considerably less in Kent, and have a lower coverage of business premises than residential premises.

Long distance carriers. These include the telecommunications operators but also include Cable & Wireless, Energis, Scottish and Southern (Neos Networks) Global Crossing, Thus, MCI, Colt and a number of others. They provide national and international backbone networks with a limited number of points of presence (PoPs) in the UK. Some have built local infrastructure in financial districts of large cities to accommodate access to financial services companies.

Local loop unbundlers including Cable & Wireless (Bulldog), Easynet, NTL, Wanadoo and Video Networks Ltd. They provide or will provide broadband access and voice over IP services, and business telephony services using BT's local infrastructure. They have limited geographic scope and tend to focus on the same urban exchange areas. Typically, they have plans to service the top 400 exchanges in the country. Video Networks Ltd offers Homechoice - broadband and video services including TV, film and video on demand. Homechoice is directly in competition with satellite and cable service providers but uniquely, till now, is delivered via LLU. Homechoice is currently offered in 81 exchange areas in the London area and Stevenage.

Carrier preselect, calling card and other voice service providers. A number of companies provide international and national call services. These can be accessed by subscribers from their normal telephone lines or for business subscribers through a PABX. Carrier preselect provides a transparent method of routing calls via one or other of these service providers, but it is also possible to route calls by dialling a prefix. These voice service providers include the following.

- OneTel - 795,000 customers (45% - Carrier preselect)
- Carphone Warehouse - 511,000 customers
- Centrica - 390,000 customers

Internet service providers. There are at least 120 ISPs in the UK, some large, some small. Large ISPs include BT, NTL, Telewest, AOL and Wanadoo (formerly Freeserve and now owned by French Telecom). Typically ISPs build infrastructure only when necessary to access particular customers and otherwise lease services from carriers or operators. Typically, they purchase wholesale dial internet access and wholesale DSL to provide access to their subscribers. Some may have international networks, but smaller ISPs have only national or regional networks centred on one of the internet exchanges in the UK, where they exchange traffic with other ISPs. Nevertheless, Wanadoo has stated that it is intending to deploy LLU but has not yet announced any plans.

Outsourcing companies. Companies like Unisys, EDS, IBM, HP and Accenture provide corporate networks for IT and other systems, but generally lease these networks from operators or carriers.

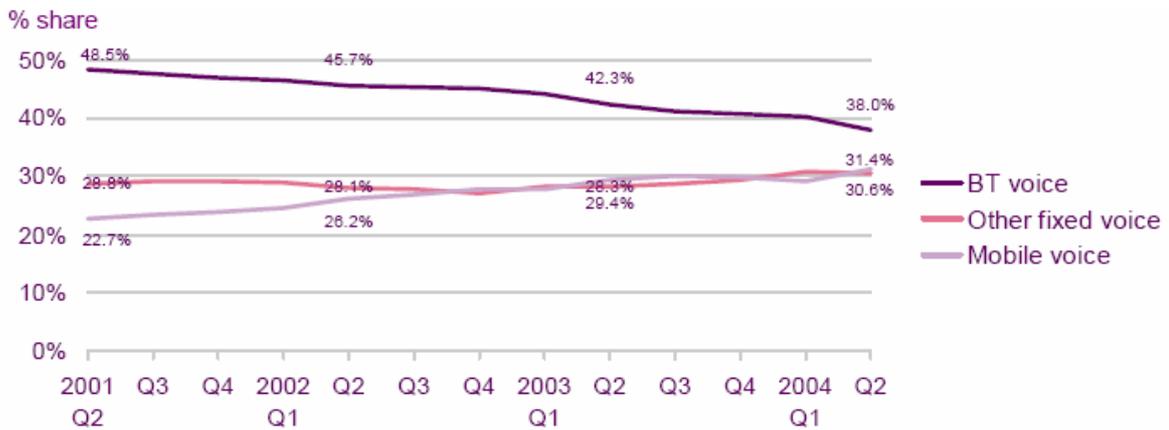
Ad hoc tactical providers. Local examples include Sota, which is providing services at Sittingbourne. These companies are like ISPs except they tend to focus on local opportunities such as a business park or a town, which they can service tactically by providing a leased line to carry voice and data traffic to Telehouse in London, where it can be processed. The opportunity for them is arbitrage. They exploit the scale economies in line rental and the lower cost of call and other processing at Telehouse to generate a profit margin. They provide a useful if tactical service, which runs the risk of substitution when the arbitrage opportunity is closed off.

Of these types of companies, only the operators, carriers, local loop unbundlers and ad hoc tactical providers are of direct importance, since they are the only ones that have an interest in local infrastructure or providing backbone facilities for accessing local infrastructure. These are at a local infrastructure level: BT, NTL, Telewest, C&W through Bulldog, Easynet and Wanadoo, and at a carrier level: BT, NTL, Telewest, C&W and Level 3 who have backbone infrastructure in Kent & Medway.

We shall see in the next section that the other suppliers have an impact in the competition that they provide.

4.2 Competition in the supply of services

The UK can stake a claim to having the most competitive telecommunications services industry in the world. BT's market share in many services is at a historically low point as can be seen in Figure 4-1 to Figure 4-5, which show respectively, BT's share of total voice call volumes, BT's share of the fixed call market, the Non-BT share of lines, BT's share of the UK residential ISP market, and BT's broadband market share. It demonstrates that in retail services, BT is facing real competition from NTL and Telewest, and from other operators and service providers. In the retail market for internet access, it is particularly pressured, with no greater market share than a number of other service providers.



Source: Ofcom / operators

Figure 4-1: Share of total voice call volumes¹⁸

¹⁸ The Communications Market, October 2004 Quarterly Update, OFCOM October 2004

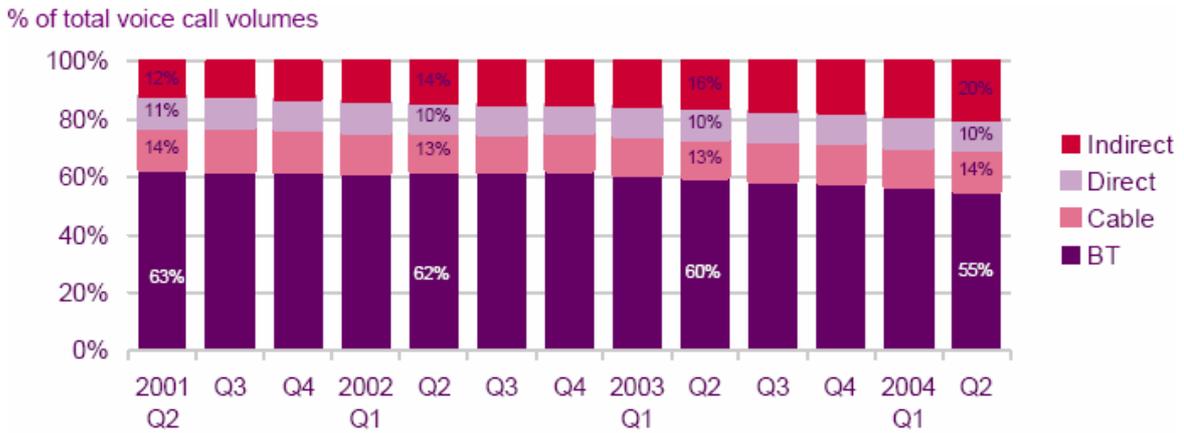


Figure 4-2: Fixed call volume market share¹⁹



Figure 4-3: Non-BT share of lines²⁰

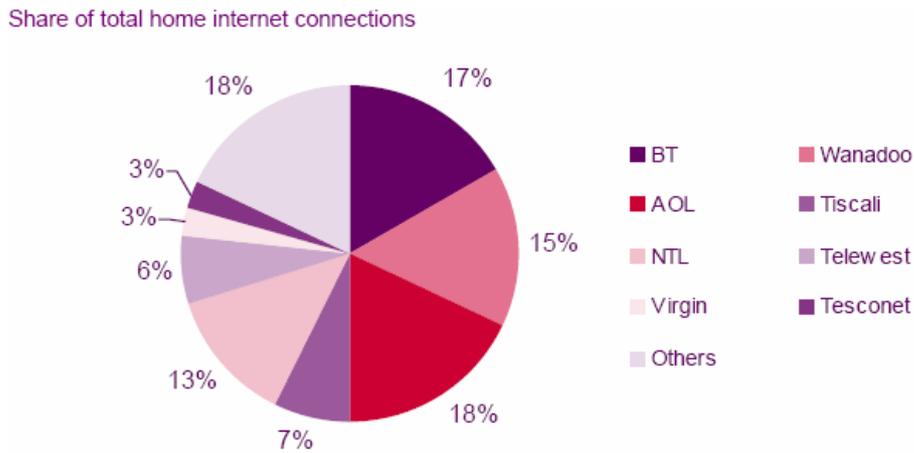


Figure 4-4: Share of UK residential ISP market, based on all ISPs used²¹

¹⁹ ibid

²⁰ ibid

²¹ ibid. Base: All UK adults with internet access at home; base size: 2131

Share of total broadband connections

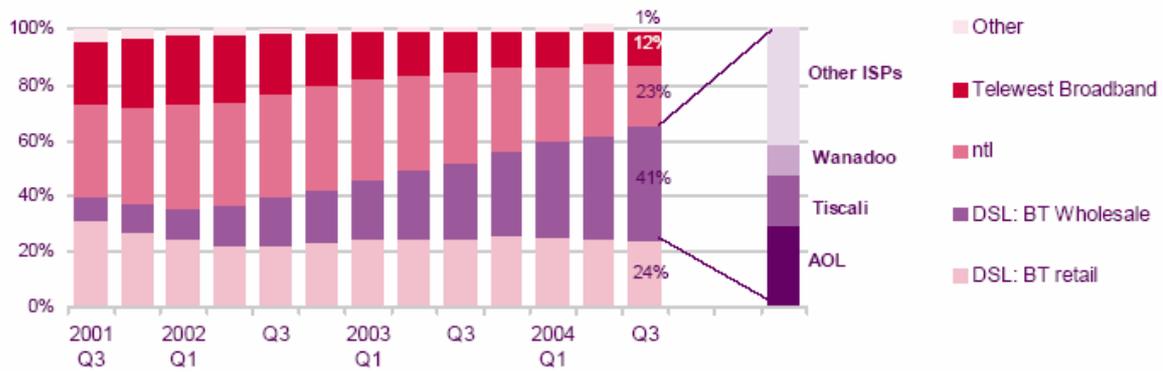


Figure 4-5: Broadband market share²²

At a wholesale level, and in infrastructure, the position is different. In terms of local loop infrastructure, and hence an ability to provide lines at a wholesale level, call termination, wholesale broadband services, and wholesale leased lines, BT has almost 100% coverage of premises due to its universal service obligation. The two cable operators, between them, cover some 52% of homes²³ but much less in Kent, and we believe a lesser coverage of business premises due to their business model. All other operators have negligible coverage of homes or businesses outside major urban commercial centres.

4.3 BT's infrastructure

4.3.1 Current infrastructure

BT's trunk network provides fibre connections to every exchange, and this is being upgraded during the present broadband implementation to ensure that it is able to provide broadband services at every exchange by 2006.

BT's access network mainly uses twisted copper pairs in a hierarchical network that has a number of distribution points fanning out from an exchange. This network is largely passive, although there is some line conditioning equipment in place. This is removed when broadband is provided.

The access network provides analogue and digital voice services, broadband services, and some leased circuits. The voice network is based on a system of more than 5000 local and trunk exchanges.

About 97% of the terminations at the customer premises are suitable for broadband services. The remainder are either too far from an exchange, use sub-standard cable or use either aluminium or a

²² *ibid*

²³ OFCOM, November 2004

Cable TV homes passed and marketed	
NTL	7,861,100
Telewest	4,678,182
Total	12,539,282

passive optical network. Provision of broadband at these locations would require a replacement or alternative infrastructure. The broadband service available at a location is dependent on its distance from an exchange, with about 76% within 3Km and able to receive 2Mbit/s broadband. 96% can receive 1Mbit/s broadband, while the remaining 1% can only receive 512kbit/s broadband.

BT is upgrading a number of exchanges to provide SDSL, which is a symmetric service suitable for business sites where outgoing traffic is relatively high, and is advantageous for connecting branch offices to corporate networks. BT has implemented SDSL in Kent & Medway at the exchanges shown in Table 4-1 below.

Exchange	Implementation date	Exchange	Implementation date	Exchange	Implementation date
Ashford	Implemented	Canterbury	Implemented	Gravesend	Implemented
Medway	Implemented	Maidstone	Implemented	Tunbridge Wells	Implemented
Dartford	17/04/2005	Sittingbourne	17/04/2005	Sevenoaks	01/05/2005
Folkestone	08/05/2005	Strood	15/05/2005	Rainham	22/05/2005
Thanet	29/05/2005	Tonbridge	29/05/2005	Dover	03/07/2005
Gillingham	10/07/2005	Ramsgate	17/07/2005	Whitstable	24/07/2005
Herne Bay	31/07/2005	Deal	14/08/2005	Broadstairs	04/09/2005
Bluebell Hill	25/09/2005				

Table 4-1: SDSL enabled exchanges in Kent

4.3.2 21st Century Network plans

BT is intending to replace its existing voice network comprising a large number of exchanges with a new network, the 21st Century Network. This will be based on broadband technology and the same underlying technology as the internet and will allow BT to reduce its costs and improve the range of services that it offers, thereby strengthening its competitive position. The new network should be completed by 2009.

A pilot scheme is about to be launched that covers two areas including the installation of 'multi service access nodes', (MSANs) and other infrastructure at 18 exchanges in Kent & Medway (the Dartford exchange), London and East Anglia that are linked to network nodes in Woolwich and Cambridge to enable 1000 customers to go live by end January 2005, increasing to 3000 customers in June 2005. Subsequent network roll out is intended to start in 2006.

As part of the 21st Century Network programme, BT is considering changing from predominant use of copper cables in its access network to fibre. There is apparently no cost penalty from such a change, and fibre will provide greater flexibility and opportunity for new services. Thus, by implementing a fibre access network, BT would be able to provide broadband at speeds two or three orders of magnitude greater than those available today, and greater than those that would be available universally over a wireless network. Initially, fibre is likely to be used only for new developments and possibly for areas that are not currently able to receive broadband services over

copper infrastructure. Subsequently, fibre would be used to replace copper based access infrastructure. *However, this replacement is unlikely to be rapid, because of the long period of depreciation of the copper network.* To replace the copper network before it is fully depreciated would require BT to write off a major asset, and this would probably be viewed as unacceptable by its shareholders²⁴.

4.4 Other operator's Kent infrastructure

4.4.1 Backbone infrastructure

Except for BT, Kent & Medway is not well served with backbone points of presence. Points of presence (PoPs) are available in Maidstone, Ashford, Sittingbourne and Dover.

There are a number of fibre routes to the ends of undersea cables for international telecommunications. There is fibre that runs along the A2 through Chatham, Sittingbourne and Canterbury. In addition, NTL has fibre to support its CATV networks that runs from Hastings through Tenderden to Hythe and Folkstone, from Maidstone through Ashford to Folkstone, and from there to Dover, Sandwich and Thanet. Telewest has a feed coming across the Thames to Medway supplying its service. Our research indicates that the typical physical utilisation of fibre is less than 40% on most carrier networks. There may therefore be an opportunity to use some capacity for new uses within the sub-region.

The majority of Kent & Medway towns lie on these routes but few derive benefit from this proximity because there are so few PoPs in Kent & Medway. It is perhaps significant that the Kentish MAN university network has largely been based on wireless links with limited capacity and even more limited upgrade capability.

A recent development in Sittingbourne has shown that there is at least a possibility of further exploiting this hidden fibre resource and to build new PoPs. The company operating the broadband service on the Kent Science Park has invested with Neos Networks in establishing a PoP at Sittingbourne by renting previously unlit fibre from Telehouse in London to Sittingbourne. This gives a large pipe to the Internet and to Neos' national network for business services. The fibre is the property of KPN who were persuaded to break out at Sittingbourne. There are other possible opportunities to establish PoPs in urban areas lying on the fibre routes.

4.4.2 Cable networks

Cable network coverage is patchy. NTL's original franchise areas cover towns on the south and east coast of Kent whereas Telewest provide services around the Dartford area. We understand that NTL has built cable networks and local loop infrastructure and is able to provide broadband on this infrastructure in the following exchange areas: Ashford, Archers Court, Cheriton, Dover, Folkstone, Hythe and Sevington. We understand that Telewest has built cable networks and local loop infrastructure in the Aylesford, Barming, Bearsted, Bluebell Hill, Dartford, Gillingham, Gravesend, Greenhithe, Maidstone, Medway, Sittingbourne, Snodland, Strood, Swanley, Tonbridge and West Malling exchange areas.

²⁴ "At this stage we don't envisage a widespread deployment of fibre to the premises or the cabinet in the near or medium term. While we believe the use of fibre can help deliver better operating costs in terms of maintenance, we need to balance this against the cost of installation and systems developments. These trials will help to shape our thinking and help us make strategic investment decisions." Source: Paul Reynolds, BT Wholesale chief executive, Regulatory Announcement NR0445 June 9, 2004 to the London Stock Exchange.

We believe that both NTL and Telewest, unlike BT, have a 'deep fibre' infrastructure that uses fibre in the access network. Thus, NTL claims to be able to provide 5Mbit/s ADSL services to 85% and 12Mbit/s to 50% of customers that are within cabled areas, is able to provide fibre to business premises within cabled areas.

Outside these areas NTL has adopted LLU to provide differentiated broadband services and otherwise uses BT's wholesale DSL services.

4.4.3 *Wireless*

Several companies are operating wireless networks across west and mid Kent including schemes in Cowden, Edenbridge, Four Elms and Penshurst exchange areas. These are using both unlicensed and lightly-licensed spectrum, with WiMax being deployed in January 2005.

4.4.4 *Local loop unbundling*

There is no local loop unbundling in Kent & Medway. However, Easynet has provided local loop unbundling at the Bromley and Orpington exchanges which are adjacent to Kent.

4.5 **Financial viability**

In its recent Telecommunications Review, OFCOM said that "capital to the sector has gone from being abundant, to scarce, to selectively available"²⁵. These changes arose because a rapid drop in share prices gave rise to a very high cost of capital raised through equity and a rapid rise in gearing of debt to equity. In addition, most operators had raised large amounts of debt to pay for investment, and this together with very high gearing meant that cost of capital is now very high for most telecommunications operators. Most operators have tried to reduce their debt through the use of debt to equity exchanges, divestment of non-strategic investments and freezing of non-essential capital expenditure. As a consequence, most fixed telecommunications operators find it difficult to make large investments. Nevertheless, we have seen recently that there are some exceptions to this position, and OFCOM believes that there is capital available to established operators "with proven business models" to fund organic growth. C&W, NTL and Easynet have strategies of investing in LLU in urban areas, for example. Morgan Stanley indicates that "all of the carriers have now completed their restructuring programmes with a significantly improved balance sheet and cost structure. Several suggested that, with their new financial and operating position, they are closer to efficient scale."²⁶

Of the operators with infrastructure in Kent & Medway, Global Crossing²⁷ is still loss making in terms of EBITDA. Its run rate for capital expenditure is around \$26m per quarter, and "two thirds" of this is "driven by" specific customer requirements. However, this investment belies Global Crossing's cash, financing and liquidity outlook. Its 2004 funding requirement is \$140m, and this has been financed through an extension to a bridging loan while a second recapitalisation is arranged. Thus, Global Crossing is unlikely to be able to extend its offer within Kent & Medway without underwriting.

²⁵ Strategic review of telecommunications, Phase 1: Consultation, Appendix H, OFCOM, 2003

²⁶ Morgan Stanley, Telecommunication Services - UK Wireline, July 2003

²⁷ Global Crossing Reports Third Quarter 2004 Results, <http://www.globalcrossing.com/xml/news/2004/november/15.xml>, November 2004

C&W²⁸, on the other hand, has announced increased profits for the first six months of 2004 and a clear strategy for the UK, where it intends to exploit its backbone network and LLU to “lead the IP/broadband transformation” and to deliver access services for all segments of the market where it is profitable to do so. It will do this through Bulldog. It should be pointed out however, that in terms of immediate importance, Bulldog only contributed £4m (2%) of the UK revenue in the first half the financial year, whereas the smallest of the other three business streams consolidated under the UK reported £198m (nearly 25%) revenue. Moreover, Bulldog made a £5m loss in the half year.

NTL, while making a net loss, has positive cash flow. However, its capital investment programme is limited, with a substantial proportion of new investment a product of TV customer acquisition. Nevertheless, NTL is investing in broadband provision with approximately 25% of its Q3 2004 investment in wholesale internet procurement, meeting broadband capacity requirements, access engineering, and Video on Demand product development.

4.6 Telecommunications market regulation

4.6.1 Wholesale call services

BT is obliged to provide a number of line and call services to other operators. Principal amongst these are interconnection to other operators so that a subscriber can choose to use another operator’s network to make calls, a subscriber can receive calls originating on another operator’s network, and wholesale line rental, which enables another operator to bill for the subscriber’s telephone lines as well as the calls made. Wholesale line rental establishes the possibility of having a telephone service from another operator without any need for the subscriber to have contact with BT.

4.6.2 Local loop regulation

BT is obliged to provide a number of local loop services at regulated prices. These include:

- Local loop unbundling and related co-location services, services that are provided at a BT exchange to enable another operator to house necessary equipment and link that equipment to the local loop infrastructure and the operator’s backbone network.
- Wholesale DSL services, that enable another operator or an ISP to provide retail broadband services. BT provides two types of DSL service, IPStream and DataStream. IPStream is a generic product that allows only a small level of differentiation by ISPs. DataStream allows somewhat more differentiation, but is still limited in this respect in comparison with LLU.

Pricing of the two types of wholesale DSL and LLU are in a state of flux. BT reduced its LLU pricing as a consequence of pressure from OFCOM in June 2004, and OFCOM is obliging BT to reduce prices further in the new year. LLU is priced on a Long Run Incremental Cost basis in the UK. The reductions in price have had a marked impact on the relative attractiveness of LLU and wholesale DSL and have encouraged announcements of investment in LLU from Easynet, C&W / Bulldog and others. The pricing of wholesale DSL services has also changed under pressure from OFCOM.

²⁸ Cable And Wireless Plc Interim Results, 10 November 2004

Other operators argued in 2003 that BT was applying a margin squeeze that meant that DataStream was not economic in comparison with IPStream, and BT was using this to reduce the possibility of differentiation and to maintain the higher returns given by IPStream. In response to pressure from OFCOM, BT aggressively increased IPStream prices and reduced DataStream prices. The consequence was a series of complaints to OFCOM by small ISPs that had constructed business plans around IPStream pricing but had not got the scale to migrate to DataStream. OFCOM's response was that a second market would arise in DataStream services run by larger operators who were taking this service from BT, and that smaller ISPs could use these services. Developments in the market would indicate that OFCOM's response may be correct.

Support by BT of other operators for LLU and co-location services is a continuing concern of OFCOM.

In the short period of time since LLU and broadband services were launched there has been considerable turmoil, first because of ineffectual regulation of BT's co-location services and subsequently by more aggressive price regulation of BT in the broadband area since the change in regulator. It is likely that such turmoil will continue for some years, since broadband is central to BT's 21st Century strategy, and broadband regulation will have a marked impact.

4.6.3 Regulation of 21st Century network infrastructure and services

The migration to a new technology architecture by BT will not by itself preclude the continued supply of local loop unbundling and wholesale DSL services.

Issues will arise concerning particular services, such as for example, Voice over Broadband, which provides a telephony type of service over a broadband connection. Other operators may offer competitive services in this area over a suitably configured wholesale DSL service.

OFCOM has recently launched a consultation programme regarding BT's 21st Century Network.

4.6.4 Fibre in the local loop

Migration to fibre in the local loop will mean that LLU and wholesale DSL as they are currently defined will not be possible in areas where fibre is used in place of copper. As indicated elsewhere, we do not expect that fibre will rapidly replace copper, but BT may use it in new development relatively quickly. It may be applied in the Thames Gateway and around Ashford.

OFCOM has yet to determine how it will regulate fibre in the local loop. Indeed, BT has not yet determined how it will deploy fibre in the local loop. We believe BT is still evaluating alternatives such as fibre to the distribution cabinet (with continuation of service by copper to the premises) and fibre to the premises.

Fibre to the distribution cabinet would still allow wholesale DSL and some elements of LLU. However, new interface points would need to be defined to avoid the necessity of another operator of having to cable to each such cabinet in an area that it wishes to cover. It is beyond this study to speculate on the nature of such interfaces.

Fibre to the premises would allow the provision of dark fibre to another operator, or a dedicated bitstream. In principal, different bitstreams could be rented to the same premises by different operators or service providers. Thus, it is conceivable that a TV company could rent a bitstream to deliver TV in parallel with a second telecommunications operator that uses a bitstream to deliver enhanced telephony products, and utilities companies rent bitstreams for metering supply of water, electricity and gas. Again it is premature to speculate about the nature of OFCOM's regulation of fibre. However, we are of the opinion, to be tested subsequently with OFCOM, that:

- BT may be regulated to provide wholesale multi-megabit services to the premises over fibre, because it is likely to be found to have significant market power or to be dominant in the markets in which such services are provided. BT can already provide multi-megabit services to the premises, and has wholesale offers including partial private circuits. The change in architecture increases the degree of pre-provisioning of fibre in the access network and hence alters the cost of delivering service.
- BT may not be regulated to provide dark fibre, since it will not have comprehensive fibre coverage for some time. Moreover, BT has to be able to establish a business case for fibre in the local loop, and this may be difficult to achieve if it is immediately required to release dark fibre to other operators. Therefore, a requirement for the provision of dark fibre may cause BT to abandon its proposal to upgrade its infrastructure.

4.7 Implications for new developments in Kent

There is a vibrant retail market for voice and data telecommunications services in the UK. Outside major conurbations, this is largely based on the use of infrastructure provided by BT, NTL and Telewest. Any service provider that wants to put in place an alternative access infrastructure needs to take account of competition at a retail level, since this competition, will to some extent limit the share of the market that is available.

BT is in an excellent position to implement access infrastructure in new developments in Kent & Medway. It has a comprehensive trunk network that covers the sub-region. It can extend access either by building new exchanges or by increasing the size of existing exchanges.

BT's 21st Century Network programme means that it can implement fibre in the local loop when it considers business conditions are appropriate, and when OFCOM has given regulatory approval. BT will need to assess the impact of the 2004 Telecommunications Review on its business before it can finally proceed.

While it is likely that some new developments will be cabled with fibre from 2006, BT has indicated that fibre implementation will be relatively slow. However, it is likely that competitors to BT will be able to purchase capacity on such fibre at regulated wholesale prices in the medium term.

The present arrangement where there is competition in the retail markets for broadband services and telephony services should continue after BT starts its migration to fibre.

Therefore there are the following possibilities for a second operator working in an existing or new development.

1. Provision of an independent infrastructure using fibre or copper cabling through a duct system provided while development is taking place or after the development is completed.
2. LLU based on BT's copper infrastructure.
3. Wholesale DSL.
4. Wholesale bandwidth rental in a new development where fibre has been implemented.
5. In the long term, rental of dark fibre in the access network.

The absence of widespread access to trunk network capacity within Kent & Medway means that in many places there is no possibility of gaining competitive advantage from access to low cost backbone services. A competitor to BT in access therefore has the following options.

1. Use BT's circuits to its nearest point of presence within the region. This approach can be used by C&W / Bulldog, Neos, NTL and Telewest who all have the backbone capability in Kent & Medway.
2. Use BT's trunk network to gain access to its nearest point of presence outside the sub-region (probably in Docklands). This approach would have to be used by other operators including Easynet who is in areas adjacent to west Kent.
3. As an extension of (1) or (2) above, the service provider can progressively extend its backbone network to new developments. In this case, it can either delay build in new developments until it has provided a low cost backbone, or it can implement new developments using BT's trunk network for access, and then replace when more economic to provide its own network. However, where fibre is not present now, it will probably not be economic to build a new fibre network to support demand in those areas. To do otherwise would require a strategic investment in a fibre backbone in the more rural areas of Kent & Medway.

Nevertheless two factors hinder investment in Kent & Medway by second tier service providers.

1. The continued financial weakness of much of the telecommunications sector. Of the operators and service providers in Kent & Medway, it is only BT, C&W and Easynet that are sufficiently secure financially to be able to invest in local infrastructure. C&W, Easynet and NTL have signalled the intent to invest in local infrastructure elsewhere in the country mainly through LLU. However, there will be an emphasis on maximizing return on capital employed and this will largely focus investment activity on dense urban areas.
2. The uncertain long term regulatory environment. The Telecommunications Review will clarify the regulatory environment for BT and other service providers in the short and medium term. However, over the 20 years of competitive supply of telecommunications in the UK, we have seen that regulation may change from being more to less encouraging to competition. Any service provider, including BT, will have to take account of the regulatory risks arising during that period. These regulatory risks will reduce the attractiveness of any market to a second tier service provider.

5 ANALYSIS OF OPTIONS

5.1 Geographic options

A competitor to BT in Kent & Medway can work at a number of geographic levels.

5.1.1 *Individual development only*

The service provider would provide services on a single development. It is most likely to build its own infrastructure for the development. The property developer might assist by providing ducts.

Typically, service provision to individual developments is a tactical opportunity for a relatively small scale telecommunications service provider. Typically, such a service provider has a prospective customer on a site, or sees the whole site as the beneficiary of services that it can provide by purchasing a single leased circuit back to an existing point of presence. The service provider is able to offer lower cost services through arbitrage, taking account of the differences in tariffs from mainstream telecommunications operators for small amounts of capacity and large amounts of capacity, and the savings in rental that can be achieved through purchasing a leased circuit with high installation charges and low rental. A service provider establishes a small PoP on the development and offers a variety of services from a multi-service access unit. It can do this through fibre, copper cable or wireless. The Sota development at the Kent Science Park at Sittingbourne is an example of this approach.

5.1.2 *A local exchange area or adjacent exchange areas*

The service provider would provide services over the area of a whole exchange or a number of adjacent exchanges, including new developments as well as existing developments. It might do this in a number of ways:

- by procuring wholesale services from BT
- by unbundling local loops provided by BT
- by building its own infrastructure
- Through a combination of own infrastructure for particular customers and LLU.

Service provision over a whole exchange area enables the cost of establishing a local PoP and backhaul facilities to be scaled across a larger number of customers than are available on a single development. A service provider may use the development as a catalyst for establishing a PoP and providing service in an exchange area. Alternatively, it might decide to establish a position in an exchange and then deliver specialised differentiated services to particular developments in the area.

In established areas of an exchange area BT and other service providers would already have established a presence. Any new operator seeking to build infrastructure would need to compete with these operators. In established areas, therefore, a new operator is likely to start with high value customers who are seeking new services, and therefore would be most likely to offer broadband services, and particularly broadband business services.

The business case for a local exchange area is highly dependent on volume. Scale economies favour large exchanges and rule out smaller exchanges as loss making. Scale economies arise particularly in backhaul, but there is also scale in the provision of broadband equipment on site.

Scale economies become more apparent as the level of capital expenditure necessary to service an area grows. For small exchanges, and for operators with low market share, wholesale services are likely to give the best returns. For larger exchanges, and for operators that believe that they can achieve a high market share, or who intend to differentiate themselves from BT, LLU is likely to give the best return.

We do not believe that to build a new infrastructure is viable for established areas, except to provide high capacity links (in most cases to business or public sector premises) because of the significant investment and the time taken to achieve high market share. The cable companies, NTL and Telewest, and their precursors failed to achieve financial success, and other alternative infrastructure providers, particularly fixed wireless access providers have also failed.

In new build areas, there is the possibility of building a new infrastructure in addition to the wholes option and LLU. This is most apparent in commercial new build, but may be possible in residential areas as well. In these areas, no second tier operator or service provider will have become established, and this means that there is the possibility of greater market share than in established areas. Such new build can build on the scale economies derived from provision of service to a whole exchange area that gives the second tier operator the possibility of establishing a PoP in the area and scale in backhaul facilities.

5.1.3 Kent as a whole

The service provider would put in place a backbone network that would enable it to compete with BT at a backbone level as well as in access. It would do this through a combination of leasing circuits where available, and building infrastructure where it is not available. It would use the backbone to provide access to individual developments and local exchange areas as required.

Backbone services represent a major cost item for projects covering an individual development or a local exchange. The cost of such services are distant and volume dependent and there are very significant economies of scale. As a consequence of these two factors, it is common practice amongst service providers to extend coverage gradually. Service providers such as Global Crossing, C&W and NTL are in a position to build out from existing PoPs. Other service providers, and particularly those that are interested in individual developments only, would focus on locations close to London, since this is where they will have capacity. We have already seen this with Sota and their telco partners Neos who have created a PoP at Sittingbourne. Once such a PoP is established the circuit back from the PoP can generally be exploited to carry traffic from PoPs established further out, with only a small additional cost.

We believe that most locations in Kent & Medway are probably within 25Km or even 15Km of a backbone network access point, but not necessarily of an extant point of presence. This is probably as good as can be found in most areas of the country, except for the centres of cities and some areas of the Thames Valley. Provision of access for developments or exchanges may be provided over such distances using high capacity circuits rented from BT or NTL fibre, or using a microwave link. In the extreme, a dedicated 15Km fibre link can be installed for about £300K.

In our discussions with service providers, it was apparent that they were not necessarily aware of the opportunities arising from the Thames Gateway or the Ashford developments. We recommend the opportunities are publicised to companies that may be interested in providing backbone networks in Kent & Medway and who may look at provision of services on new developments.

5.2 Framework for analysing options

We have analysed the business case for the exchange area option, making assumptions about the availability of a Kent & Medway regional backbone. We have not determined the business case for

a regional backbone, since this would be dependent on access. As described above, we would expect a service provider to lease infrastructure on the best terms available.

Furthermore we have not analysed the business case for individual sites. This would be highly speculative given the differences in conditions applicable to each site.

However, we have modelled a number of scenarios with the exchange area model. These are:

- The Thames Gateway
- The Sittingbourne exchange only
- The Ashford urban area

Each area is a hybrid of new build happening over a protracted period and established developments. As indicated above, different assumptions have to be made about service take up by a second operator for new build and established developments.

In established developments, we have assumed that there is a certain level of churn and the availability of LLU gives rise to an immediate opportunity.

In new build, a second tier operator does not have to overcome the base of customers established by the incumbent. However, they have to overcome the time lag in customer acquisition arising from the protracted build period.

5.3 Build – fund – operate model

5.3.1 Options considered

Our modelling considered a hybrid version of a build – fund – operate model. Table 5-1 shows a number of options for sharing the responsibilities and actions in such a model for building infrastructure and service provision in a telecommunications environment.

	Telco BFO²⁹	Telco build	Developer build	Developer BFO
Developers		Fund	Build / Fund	Build / Fund / Operate
Telecommunications suppliers	Build / Fund / Operate	Build / Operate	Operate	
State		Fund	Fund	

Table 5-1: Possible commercial models

Our modelling considered options the following BFO options.

1. A **pro**-active build option where infrastructure was funded and built in advance of development and operated by the second tier operator (in practice the ducts would be laid on behalf of the operator by the developer as current practice indicates);

²⁹ BFO - Build, Fund Operate

2. A **retrospective** build option where the second tier operator built the local infrastructure as the development was completed, and funded and operated the network.
3. A **LLU** option where the operator exploits BT's infrastructure to provide service on site. It is assumed that a fibre based service would be priced at the same level as a copper based service despite the considerably higher bandwidth available over a fibre.
4. A **developer** or state funded option where a duct infrastructure is funded by the developer or the state and leased on an economic lease to all telecommunications operators, including BT, in so far as they require service on non-discriminatory terms. Ducts would be installed by the developer but cabled by the operator. Service would be provided by the operator.

All the options assume that the second tier operator would use LLU to provide service to established areas of an exchange.

5.3.2 *Service provider wholesale and retail revenue*

In new areas, the second operator gets a share of the wholesale facility rental and a share of retail service provision. Thus in new areas, the second operator provides LLU in competition with BT, and provides voice, internet and other services in competition with all other service providers. The model assumes that the second operator receives around 50% of wholesale revenues and a share of retail revenues that starts at 20% and declines as customers churn to other service providers.

In existing areas, the second operator has no wholesale revenue, but is in competition with other service providers for retail revenues. As a new service provider in the area, its share of retail revenues starts low, but rises to 20% through time as customers churn from other service providers onto its network. We are, therefore assuming that LLU gives it some advantage in retail sales, or it is one of the major ISPs that would expect near 20% market share of the retail market.

5.3.3 *Revenue model for the developer*

In the retro, pro and LLU options, the revenue model for the developer that we have considered is simply one where the developer builds on behalf of the service provider and passes on costs. We have assumed, in these options, that there are no scale economies from serving multiple service providers.

However, in the last option, where the developer finances, builds and operates a duct infrastructure, we have made more complex assumptions in revenue and cost modelling. This option allows an operator to build a duct infrastructure speculatively, and allows it therefore to build in the least cost manner. It also allows it to sell this infrastructure in a number of different ways. In our modelling, we have assumed that it is only intent on cost recovery. This means that the benefits are largely passed onto the service providers, and in analysing the options, the results demonstrate. The service providers face lower charges, and therefore they make an earlier and larger return on investment. We have assumed that cost recovery is spread across two service providers only. These assumptions are largely consistent with state funding of the duct infrastructure, since it is assumed that the state would at the most wish to break even on its funding.

Other options are possible. First, the developer may want to obtain a share of the value from the ducts that it has installed. There are major economies from laying ducts for multiple service providers at the same time. Multiple ducts can be laid in the same trench, and the cost of the ducts themselves is relatively small in comparison with the costs of the trench. Therefore, the overall cost per duct, and hence per service provider is lower than it would be if each service provider laid its own ducts. The developer could speculatively build with the intention of making a return based

on the difference in cost to the service provider of self build and developer build. Then, if more than one service provider purchased ducts, the developer would make a return on its investment.

In all cases, BT, as the universal service provider would require ducts to provide service on the development. Therefore, the developer can always expect BT to require ducts. The developer may be able to interest a second service provider to build telecommunications facilities on its development using the ducts provided.

We assume that rental or sale of ducts to service providers would be done on a non-discriminatory basis. This would indeed be necessary if the ducts were state funded.

5.3.4 Modelling duration

The model considered a twenty year period from 2005. As property development is forecast to continue in the Thames Gateway and Ashford areas over the entire period, the model cannot be considered to be a steady state model. Several of the options reached a point during this period in which they have paid back their initial investment. This means that they became self financing, and in the event of completion of a development, would yield cash that could be used for other purposes. This state is true for both the service providers and the developers. Thus, the developers, if they were intent on building duct infrastructure, could look to that infrastructure being cash generating on completion of the development if the developer continued to own them.

5.3.5 Developer provided telecommunications services

We did not evaluate the option where a developer would provide service on site. This is no different in practice from a service provider doing this. In general, we do not believe that this option meets KMEB's objective of competitive supply of service to a development. Indeed, it is inferior to the position elsewhere in the country because this option is unlikely to provide the opportunity for competitive supply of services, including ISP services, carrier pre-select etc that we have seen has been successfully achieved elsewhere. Moreover, it would be difficult to sustain since it would require continued technical resource to maintain and support the service. On a small scale, this is difficult to provide economically with adequate cover, and would therefore need to be outsourced to a technically proficient organisation.

5.4 Results of the analysis

5.4.1 Thames Gateway

The Kent & Medway area of the Thames Gateway Project covers most of the districts of Dartford, Gravesham and Swale and most of the Medway area. It contains 18 BT exchanges with another, Bluebell Hill, close to the boundary and having most of its subscribers in the area. We have made an approximation of the numbers of homes and jobs in the area from the 2001 census information bearing in mind the district data does not map exactly to the Thames Gateway boundaries.

The number of homes and jobs in 2001 are 209,709 and 232,064 respectively. We have applied linear growth rates over 15 years in line with the data used for transport planning by the Department for Transport (see Appendix 4). The medium range growth applied was 1.29% per annum for housing and 3.81% per annum for jobs over the 15 years giving an increase of 44,486 – homes and 174,555 jobs. We believe the growth rate discrepancy is derived from only the homes in currently planned developments being included the figures.

	Infrastructure Build		Service Based (LLU)	Developer Funded
	Retro	Pro		
Project Net Present Value (NPV)	68.6	81.7	88.3	87.3
Revenue (20 Years)	564	564	553	564
EBITDA Margin	67.1%	66.7%	51.8%	60.5%
EBIT Margin	42.6%	48.1%	50.3%	48.4%
IRR	19%	22%	34%	30%
Payback Year	2014	2013	2010	2011
Number of Years	9	8	5	6
Peak Funding Requirement	26.5	22.6	12.4	14.0
Capex (20 years)	122	87	14	57
Number of Infrastructure Providers	2	2	2	2
Total Number of Service Providers	7	7	7	7
Retail Market Share – Total Exchange Area	17.8%	17.8%	17.8%	17.8%
Retail Market Share – New Developments	17.2%	17.2%	17.2%	17.2%

Table 5-2: Thames Gateway service provider outcomes

For the Thames Gateway area, the retro-active infrastructure build delivers a 19% return, and positive NPV, assuming an achievement of 17-18% market share in a market of seven service providers. The pro-active infrastructure build requires less capital spend, a lower peak funding requirement. Rate of return is slightly greater and payback is advanced by one year.

In contrast, the use of LLU in new developments has a much lower capital expenditure, but gives rise to a continuing operating cost associated with payment of unbundling charges. Moreover, it does not give rise to wholesale revenue from other service providers, since this would go to BT. Nevertheless, payback is quick and the rate of return is high. This would appear to be the most attractive option for any service provider. With a fibre build by BT in the Thames Gateway, it would also enable a wide variety of innovative services to be provided by a competitor service provider. Therefore, we believe that this is the most attractive approach overall. There would be little to be gained for the consumer, residential or business, in encouraging investment in an alternative fibre infrastructure if BT provided fibre, yet there would be a capital requirement of around £100m, over 20 years to provide that infrastructure. Finally, the developer funded scheme reduces the capital expenditure faced by the service provider, but gives rise to additional expenditure by the developer. This approach would considerably reduce peak funding requirements and improves the return on the service provider's investment

Table 5-3 shows the Thames Gateway funding requirement from the perspective of the developer or third party that intervenes to fund and operate a shared infrastructure on new developments.

Shared infrastructure provision	£M
Peak Funding Requirement	23
Total Revenue	53.3
Total Capex	(42.4)

Table 5-3: Thames Gateway funding requirement for the shared infrastructure provision option

In the Thames Gateway, the provider of the shared infrastructure would be subject to a peak funding requirement of circa £23m, with total revenues from service charges paid by suppliers totalling £53.3m over the 20 year period. The total capital expenditure during this period would be some £42.4 million.

5.4.2 Ashford (Urban only)

The Ashford Development Area is the existing township of Ashford and the immediate surrounding area planned for extensive development over the next 30 years. It has one major exchange and a single smaller exchange. An approximation of the numbers of homes and jobs in the area has been made from the 2001 census information bearing in mind the district data does not map exactly to the development area boundaries.

The number of homes and jobs in 2001 is measured at 37,305 and 42,577 respectively. We have applied linear growth rates over each 5 years period over the next 30 years from the Ashford Overarching Plan. Growth rates vary but are projected at approximately 2% per annum over the thirty years giving an increase of 30,780 homes and 27,810 jobs. The financial modelling is only for the first 20 years of the project.

	Infrastructure Build		Service Based (LLU)	Developer Funded
	Retro	Pro		
Project Net Present Value (NPV)	0.9	4.6	12.8	7.7
Revenue (20 Years)	88	88	84	84
EBITDA Margin	59.7%	57.3%	38.7%	27.4%
EBIT Margin	12.7%	18.0%	35.9%	23.2%
IRR	0%	4%	21%	12%
Payback Year	N/A	2022	2014	2017
Number of Years	N/A	17	9	12
Peak Funding Requirement	13.7	12.3	2.3	3.4
Capex (20 years)	50	38	4	7
Number of Infrastructure Providers	2	2	2	2
Total Number of Service Providers	7	7	7	7
Retail Market Share – Total Exchange Area	20.0%	20.0%	20.0%	20.0%
Retail Market Share – New Developments	22.7%	22.7%	22.7%	22.7%

Table 5-4: Ashford service provider outcomes

Ashford presents a problem financially to entrant suppliers. Neither of the alternative infrastructure build, fund and operate models are financially viable. Intervention by a developer or

3rd party in shared infrastructure provision generates a positive return but well below standard investment parameters. This intervention would require circa £4m of capital to service the peak funding requirement.

The LLU option provides the best return, although this is still below a level that would be acceptable to service providers. As a consequence of the poor return, the number of years required to deliver a payback is longer than would be acceptable.

Table 5-5 shows the funding requirement for a shared infrastructure option. We do not believe that this by itself would be sufficient incentive to the service provider to encourage provision of services in the Ashford area.

Shared infrastructure provision	£M
Peak Funding Requirement	4
Total Revenue	18.8
Total Capex	(15.3)

Table 5-5: Ashford funding requirement for the shared infrastructure provision option

Overall, we would recommend the support of LLU in Ashford if this may be undertaken under state aid rules.

5.4.3 *Sittingbourne*

The Sittingbourne area of the Thames Gateway Project is the Laser 3.0 definition of Sittingbourne urban area. It has one major exchange and five much smaller satellite exchanges. We have made an approximation of the numbers of homes and jobs in the area from the 2001 census information bearing in mind the district data does not map exactly to the Thames Gateway boundaries.

The number of homes and jobs in 2001 is measured at 44,331 and 48,753 respectively. We have applied linear growth rates over 15 years of 0.86% per annum for homes and 3.30% per annum for jobs over the 15 years giving an increase of 6,110 homes and 30,602 jobs. We believe the growth rate discrepancy is derived from only the homes in currently planned developments being included the figures.

	Infrastructure Build		Service based LLU	Developer Funded
	Retro	Pro		
Project Net Present Value (NPV)	4.0	7.1	11.8	9.3
Revenue (20 Years)	88	88	87	87
EBITDA Margin	60.6%	60.2%	46.7%	41.2%
EBIT Margin	26.6%	34.3%	44.8%	38.3%
IRR	11%	15%	30%	24%
Payback Year	2017	2015	2010	2012
Number of Years	12	10	5	7
Peak Funding Requirement	7.9	6.5	2.4	2.7
Capex (20 years)	23	17	2	3
Number of Infrastructure Providers	2	2	2	2
Total Number of Service Providers	7	7	7	7
Retail Market Share – Total Exchange Area	17.8%	17.8%	17.8%	17.8%
Retail Market Share – New Developments	17.2%	17.2%	17.2%	17.2%

Table 5-6: Sittingbourne service provider outcomes

Sittingbourne delivers an 11% IRR, building out retroactively. This can be improved to 24% with developer intervention in funding, building and operation of shared duct and street furniture infrastructure.

Shared infrastructure provision	£M
Peak Funding Requirement	3
Total Revenue	9.6
Total Capex	(6.8)

Table 5-7: Sittingbourne funding requirement for the shared infrastructure provision option

This intervention requires an investment of £3m in capital (see Table 5-7).

Nevertheless, the LLU service based model again delivers superior returns at 30%.

5.5 Comparison with other estimates

5.5.1 Cable & Wireless

Cable and Wireless have estimated exchange unbundling costs. A summary of their analysis is shown in Figure 5-1. This analysis essentially covers the cost of providing a service, and does not include sales and marketing costs or customer support costs. Moreover, the ARPU is high, at £55 per month and related to a business offer and not a residential offer. The costs here should be contrasted with BT's wholesale DSL offers. For the service which includes an equivalent set of costs, IPStream, the "per subscriber" wholesale rental is in the range £14.10 per month to £57.92 per month.

It should be noted that the number of users is dependent on penetration of broadband and the market share of the broadband market that operator has. No operator has more than 18% of the retail broadband market. Making the case for 2008, when we anticipate 50% of households and small businesses will have taken broadband services, the largest ISP could therefore expect to have 9% of the lines on any exchange. Thus, the break even for LLU is for exchanges with around 3500 residential telephony subscribers or a smaller number of business subscribers. The actual break even point will depend on expectations regarding service take up. On exchanges with fewer than 3500 subscribers but with a lot of business users requiring high capacity or symmetrical links, it is advantageous to use LLU. On exchanges with more than 3500 users, provided the ISP can expect 18% wholesale broadband market share, it could be advantageous to use LLU.

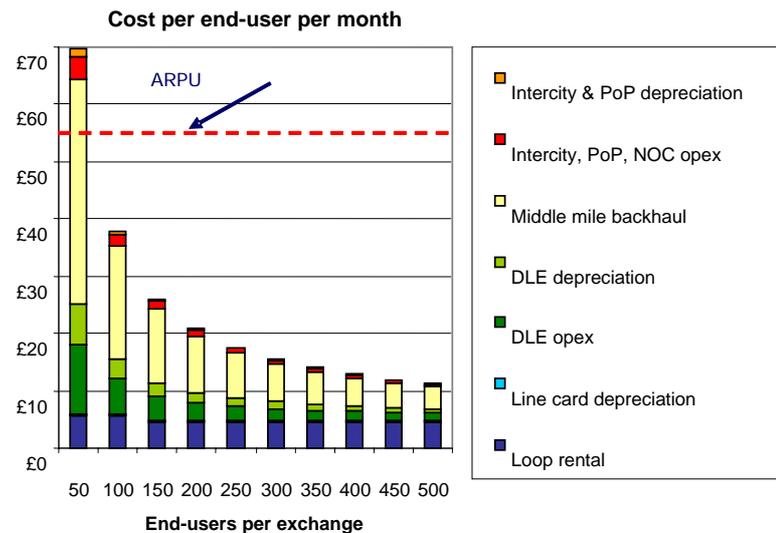


Figure 5-1: C&W view of the cost of LLU unbundling by number of end users at an exchange³⁰

5.5.2 NTL³¹

NTL has undertaken a similar analysis to C&W and has concluded that the break even point for LLU is around 300 customers per exchange. This fits with the conclusion drawn above. NTL indicates that the cost per exchange is between £100-200K depending on customer numbers. At these costs it represents a favourable comparison with hybrid fibre coaxial cable networks (HFC) that would ordinarily be installed by a cable operator, since HFC would be build for all homes targeted whereas LLU would be implemented only for customers. The breakdown of costs identified by NTL is shown in Table 5-8.

³⁰ Service Provider Implications From Extended LLU, XchangePoint European Peering Forum, John Johnson, Sales Director, Bulldog Communications, July 2004

³¹ NTL, 2004

	£
I. FIXED COSTS	50,000
BT Charges	40,000
Site Preparation (1)	10,000
BES Connection (2)	30,000
Other costs (3)	10,000
II. SEMI FIXED COSTS	51,000
DSLAM (4)	47,000
Equipment Installation	4,000
III. VARIABLE COSTS	16,000
BT Charges (5)	8,000
DSLAM (6)	4,000
Other (7)	4,000
Total per exchange (excl. shared)	117,000
Allocated shared cost per exchange (8)	30,000
Fully allocated capital per exchange	147,000
Customers per site	336

Table 5-8: Breakdown of costs in LLU for an exchange with 336 customers

Notes:

1. Includes all site setup, equipment and servicing
2. Backhaul Extension Service -BES 1000 (Mb) for triple play
3. Includes test head and equipment installation
4. DSLAM costs increase at intervals according to number of customers on exchange (e.g. at <337, <721, <1,105)
5. HDF and Tie Circuit costs based on increments of 100 lines; 2 * 100 tie circuits for 100 customers on shared loop MPF
6. Management license per port
7. Further test head and Internet Service Provider costs (allocation of ntlworldcosts)
8. Test head server, network management system, broadband remote access server and IP groomer costs.

The NTL and C&W costs have been compared with ones used in our model and are similar other than the backhaul costs. The NTL and C&W assume a metropolitan exchange area with correspondingly lower backhaul costs. The actual backhaul costs for an exchange depend on its proximity to a serving network and the density of enabled exchanges.

5.6 Implications for competitive supply of telecommunications services in Kent

All new developments in Kent & Medway will have access to competitive retail supply of telephony and broadband services. Without further investment, they will not necessarily have access to leased lines from multiple suppliers and differentiated broadband services such as high speed or symmetrical services. Telecommunications in Kent & Medway will therefore be relatively more expensive than in London and other urban areas. The lack of differentiated services and higher charges may have an effect on the local property market. For example, the availability of high speed broadband links from Easynet in Orpington may encourage companies to locate there rather than in nearby Swanley. Moreover, the lack of high speed consumer

broadband may discourage residential take up in Thames Gateway, which in itself is in competition with eastern areas of London and other areas in the South East.

We believe that the most appropriate method of providing alternative supply of highly differentiated services is for KCC, Medway Council, SEEDA and KMEB to:

1. Encourage local loop unbundling
2. Encourage BT to provide fibre in the local infrastructure for new developments and where it is recabling the local infrastructure.
3. Work with OFCOM to require the fibre equivalent of LLU, which is probably a bitstream service over fibre, and to encourage ISPs and others to make use of this service.
4. On new developments, there is the possibility of funding development of infrastructure to enable competitive supply. However, if BT lays fibre, this approach will ultimately duplicate resources unnecessarily.

Competitive supply of telecommunications services will require the following actions by KCC, Medway Council, SEEDA and KMEB.

6. Active marketing of Kent & Medway to telecommunications companies to overcome the lack of awareness of development areas, particularly in the Thames Gateway areas, around Ashford, the strategic sites and the technology and knowledge clusters.

The following service providers should be involved:

- a. LLU providers: C&W / Bulldog, Easynet, who are now adjacent to Kent & Medway, and therefore in a strong position to extend LLU into Kent & Medway, NTL (although they are clearly involved already in Kent & Medway) and Wanadoo (France Telecom) who have announced the intention of undertaking LLU and are one of the largest ISPs.
 - b. Neos Networks, who provide some services into Kent & Medway
 - c. Sota and other ISPs that would be interested in individual sites
 - d. Energis and Colt.
7. Encouragement of LLU in the larger exchange areas, and adjacent exchanges, particularly where new development is taking place. We believe for large exchanges that LLU can and will be beneficial to the operator. Nevertheless, there is competition for the use of scarce capital, and specific opportunities may help a LLU vendor make the case in Kent & Medway. Such opportunities may include local authority or other public sector service requirement or a large private sector user locating in the exchange area and committing to use the LLU provider for services.
 8. Provision of ducting or fibre for exploitation by service providers in new commercial development through Section 106 of the 1990 Town and Country Planning Act or otherwise. Provision of ducting in residential development is not necessary since LLU or fibre sharing is the most appropriate option.
 9. Liaison with BT to encourage the supply of state of the art infrastructure into new developments in Kent & Medway.

In addition, competitive supply of telecommunications in Kent & Medway would be encouraged by the use of public procurement to stimulate new PoPs on existing backbone networks, LLU on particular exchanges and selective extensions of backbone networks to increase coverage across Kent & Medway.

Local authorities are major users of telecommunications and in Kent & Medway often voice a level of frustrations at the lack of infrastructure on which the various telecommunications and ICT services can be delivered. They should publicise procurement cycles inviting early information on possible local solutions.

6 COMMERCIAL MODELS FOR COMPETITIVE SUPPLY OF TELECOMMUNICATIONS

6.1 Overview

Section 5 identified three geographic options for provision of service by a telecommunications operator:

- The provision of a backbone network across Kent & Medway as a whole;
- The provision of service to individual buildings within a local exchange area or a number of adjacent exchange areas;
- The provision of services to individual buildings within an individual development.

These options are, to some extent, dependent on one another. Thus an operator with a backbone in Kent & Medway is able to provide services within an exchange area or to an individual development. An operator that provides services within an exchange area will be able to provide services within a specific development within that area. Moreover, any operator that wishes to provide access within an exchange area or even on a specific development will require a backbone network to carry the traffic back to a point where it can exchange traffic with other operators. For Kent & Medway, this peering point is likely to be in Docklands.

The implication of the linkage between these three geographic options, and the relative scarcity of alternative infrastructure in Kent & Medway suggests that there is a need for some coordination in the provision of services within the region between policy makers for the region, the executive arms of local government and SEEDA, the developers and telecommunications operators.

The commercial models proposed here are intended to provide a framework for such coordination within the context of a policy for the region for the provision of telecommunications services. This Section proposes such a policy statement for consideration by Kent County Council and Medway Council as an adjunct to the Kent & Medway Structure Plan. This section also proposes:

- A subregion-wide commercial model to enable improvements in backbone networks across Kent & Medway to support competitive supply of access services;
- An Area wide commercial model for competitive supply of access services in single exchange areas or multiple adjacent exchange areas in Kent & Medway;
- A Business Park Model for the competitive supply of access services into individual developments across Kent & Medway.

Each of these commercial models identifies the value to the local authority and the community that it serves, the developer and the telecommunications operator. It highlights the roles and responsibilities of each of these parties, and proposes the form of relationships between them.

6.2 Policy statement

The Kent & Medway Structure Plan, published in a Deposit Edition, defines a series of developmental objectives for Kent & Medway. In summary, these objectives promote Kent & Medway as a location for high value knowledge and ICT intensive businesses and as an attractive place to live. The Plan specifies spatial development objectives including locations for new and replacement housing provision and employment, locations of strategic importance for business and industrial use, and locations for technology and knowledge clusters.

Business and social activities are increasingly reliant on excellent telecommunications facilities and services. Therefore the Structure Plan entails widespread availability of such telecommunications facilities and services to achieve many of its objectives.

Kent & Medway, like the UK more generally, has a competitive market in telecommunications services. There is competition in mobile telephony, in long distance and international calls and in internet and other data services. However, there is little competition in the means of accessing these services, the local loop infrastructure that provides the connection from individual buildings to the public telephone network, the internet and other services. In Kent & Medway, local loop facilities and access services that give access are provided mainly by one operator, BT, and in limited areas by Telewest and NTL. In many parts of the region, this lack of competition has restricted the range of services available, particularly those high performance services that will increasingly be needed by knowledge and ICT intensive businesses and homes. Lack of competition has also reduced the possibility of innovative pricing and price based competition.

The competitive supply of access services on business parks, in new and existing housing developments and in other urban areas will promote richness and diversity in the available telecommunications services, and attractive pricing of those services. Competitive supply of access services will therefore have a major part to play in ensuring the availability of excellent telecommunications services.

With regard to telecommunications facilities and services, the principal objectives are:

1. For all new business and residential development in Kent & Medway to have, from the start, access facilities that will be able to provide the telecommunications services needed by business and in the home over the next thirty years as far as these can be predicted.
2. For developed areas of Kent & Medway to have access facilities upgraded in a timely manner so that they too meet the developing needs of business and the home in a timely manner.

Support will be given for innovative competitive supply of state of the art access facilities and services in new developments in Kent & Medway, and for competitive use of access facilities through local loop unbundling and sharing of fibre where it is installed.

This policy recognises the special role that local authorities have in stimulating competitive supply. Local authorities and other public sector organisations in Kent & Medway will therefore be requested to take account of the objectives of competitive supply of state of the art access facilities and services when procuring telecommunications services for their own use.

6.3 Kent and Medway wide model

6.3.1 Purpose of the model

The objective of the Kent & Medway model is to ensure that all areas of Kent & Medway are within economic reach of a point of presence on more than one backbone network.

BT provides high capacity circuits over relatively short distances – a circuit comprising two local ends within an exchange area and an inter-exchange link of 25Km at speeds of 10, 100 or 1000Mbit/s. These links can be used to provide access from a particular site or exchange area to a backbone network either provided by BT or by another carrier. Often such links are lower cost than the equivalent microwave if such a microwave link is possible. PoPs need to be provided across Kent & Medway that would enable such circuits to be established from specific areas, developments or large company premises.

The principal issue is the availability of demand to make such a PoP profitable.

6.3.2 *Local authority*

Value Proposition

The availability of PoPs will stimulate the provision of competitive access facilities in specific exchange leading to the development of area wide and site schemes.

Roles and responsibilities

The availability of backbone infrastructure will generally be advanced through area schemes or because of requirements to service local authority or large companies in Kent & Medway.

Local authorities should therefore:

1. Collect and collate requirements for services across Kent & Medway and inform telecommunications service providers and operators including requirements from public sector organisations and large companies that may require backbone networks in Kent & Medway. Determine overall requirements arising from new developments and from LLU and other area wide schemes.
2. Use public sector procurement to encourage the development of new PoPs in Kent & Medway.

Relationship to other parties

1. Develop relationships with NTL, Telewest and other operators to establish PoPs in exchange areas where they are already providing CATV services to service businesses within those areas, and to allow other operators and service providers interested in LLU to exploit their networks for backbone services.
2. Coordinate interworking between potential LLU service providers and backbone network providers.

6.3.3 *Telecoms Operators and Service Providers*

Value Proposition

- Extension of reach to support existing customers.
- Diversity of routes enabling improved reliability of service which is of particular value to the ICT and knowledge centric business sectors to be attracted to Kent & Medway.
- Provision of backhaul services to new large Kent & Medway based customers.
- Provision of backhaul services for LLU and other area wide and business park schemes.

Roles and responsibilities

Roll out a network of PoPs in conjunction with the supply of services into new developments, LLU schemes in existing exchange areas, the provision of sub-regional networks for public sector organisations and large companies.

Relationship to other parties

N/A

6.4 Area wide model

6.4.1 Purpose of the model

The purpose of the area wide model is to ensure that in specific areas of Kent & Medway the access infrastructure is sufficient to meet the developing needs of residential and business customers. The model reflects the general condition that only one access infrastructure can generally be afforded except in dense business districts. Nevertheless, we believe that it is important to ensure that competition in the provision of services should be promoted to ensure a wide range of services is provided at the lowest possible prices.

The model has short term and medium term development objectives. In the short term, the objective is to introduce competition into the supply of services through local loop unbundling in conjunction with the supply of fibre links to individual businesses within the same exchange area. The introduction of local loop unbundling enables an operator or service provider to establish a point of presence within an exchange area. Local loop unbundling can then be used to offer leased line services, data services, broadband and VoIP into small and medium sized and some larger enterprises. The point of presence would give the service provider the opportunity of additional fibre circuits to sites with large volumes of traffic within the exchange or to nearby business parks (See Section 6.5).

In the medium term, the objective is to introduce a fibre infrastructure into new business and residential developments consistent with BT's 21st Century Network architecture. The provision of the fibre infrastructure would give new developments state of the art facilities that would be sufficient for a protracted period of time. This infrastructure could be provided by BT or another operator who had sufficient funding. Whoever provides the infrastructure should offer wholesale services over the fibre local loop to allow competitive supply of services. Given the imminent development in the Thames Gateway and Ashford, there is the possibility of an early implementation of this second objective that would ensure that housing and businesses in these developments received state of the art infrastructure.

Service providers that undertake local loop unbundling are interested in areas that generate large amounts of traffic for the minimum cost. As a consequence, service providers will be attracted to exchange areas where there is substantial traffic to be obtained not only from local loop unbundling but also from other sources, such as local authority sites, schools, libraries and other education facilities, NHS facilities and other public sector organisations, and business. Therefore, part of this model is to use the buying power of local government and public sector agencies and other organisations to stimulate local loop unbundling and provision of alternative infrastructures.

In residential schemes, suppliers of fibre access or local loop unbundlers will need to establish a triple play offer comprising telephony, internet and multimedia services to maximise the return on their investment. The model should therefore encourage the provision of such services through partnerships between the telecommunications operator or service provider and companies offering multimedia services such as Video Networks.

6.4.2 Local authority

Value proposition

With reference particularly to the Structure Plan policy objectives, this proposition will:

- Ensure that all new residential developments in Kent & Medway have access infrastructure sufficient to meet anticipated requirements for social and economic use over the next twenty years.
- Improve opportunities for employment in financial services, professional services, other knowledge based and IT-centric industries within Kent & Medway.
- Improve the value of individual business parks through the provision of competitive infrastructure.
- Increase the opportunity for the location of knowledge based and IT-centric businesses within individual business parks.
- Improve home-working prospects within Kent & Medway, thereby reducing road usage and usage of other transport infrastructure, and thereby reducing environmental impact of new developments within Kent & Medway.

Roles and responsibilities

1. Maintain information about the supply of telecommunications services into individual exchange areas. This information should include the availability of DSL services including symmetric DSL, the availability of fibre in the local loop and the closest network nodes for the supply of leased lines.
2. Define area-wide requirements for telecommunications services, including requirements from major developments, public sector organisations and large companies either already present or likely to locate in the area.
3. Continue to monitor the digital divide between rural and urban areas. Encourage and potentially fund DSL and wireless schemes to cover pockets of deprivation.
4. Facilitate the collection of information about pockets of demand in areas where operators other than BT are not currently providing access services.
5. Define obligations under Section 106 of the 1990 Town and Country Planning Act on developers to provide ducting systems for competitive supply of telecommunications services on new developments.
6. Take account of the potential to stimulate the development of telecommunications facilities for public use when procuring telecommunications services for local authority use.

Relationship to other parties

1. Inform developers about available telecommunications services.
2. Inform telecommunications service providers about prospective developments, giving the developer and development characteristics, and timescales for build out.
3. Possibly fund duct systems within new developments with the intention of supply of such duct systems to telecommunications operators in a non-discriminatory manner.

6.4.3 *Developers*

Value proposition

The availability of competitive supply of telecommunications services in an area will allow competitive supply to individual developments in the area, thereby increasing their value.

Roles and responsibilities

None.

Relationship to other parties

Inform local authority of telecommunications requirements and suppliers arising from individual developments.

6.4.4 *BT*

Value proposition

- Enhanced reputation through the delivery of state of the art local infrastructure.
- Defence against differentiation from alternative operators.

Roles and responsibilities

Commission local loop infrastructure consistent with area requirements set by the local authority.

6.4.5 *Other telecommunications operator / service provider*

Value proposition

- The telecommunications operator will increase its access to the Kent & Medway market, which should generate a return of its own, but in addition, it will:
- Increase revenues and hence returns from any existing investment in a Kent & Medway backbone network.
- Establishment of a base in a local area for the provision of services to high value public sector customers and business customers on business parks.

Roles and responsibilities

1. Recognise telecommunications demand opportunities in Kent & Medway.
2. Develop progressive roll out plan for Kent & Medway combining LLU and alternative infrastructure provision on new developments.
3. Implement the roll out plan.
4. Market availability of services within Kent & Medway to property developers and local authorities.

6.5 Business park model

6.5.1 Purpose of the model

The purpose is to introduce highly differentiated and innovative services via state of the art access infrastructure on particular business parks.

An additional access infrastructure would be introduced on a business park by the business park owner or another operator. This alternative infrastructure would provide additional and higher performance services or services at a lower cost than provided by BT.

The application of this model should take account of the comprehensive set of business services provided by BT and the possibility of service based competition for telephony and data services. The implementation of this model should therefore be used to provide specific advantage on particular business parks associated with the needs of financial services, professional services, knowledge based and IT-centric businesses on the park.

6.5.2 Local authority

Value proposition

With reference particularly to the following Structure plan policy objectives: FP1, FP2, FP3, FP4 and FP5, this proposition:

- Improves opportunities for employment in financial services, professional services, other knowledge based and IT-centric industries within Kent & Medway.
- Improves the value of individual business parks through the provision of competitive infrastructure.
- Increases the opportunity for the location of knowledge based and IT-centric businesses within individual business parks.

Roles and responsibilities

1. Maintain information about the supply of telecommunications services into areas that are zoned for business use. This information should include the availability of DSL services including symmetric DSL, the availability of fibre in the local loop and the closest network nodes for the supply of leased lines.
2. Facilitate the collection of information about pockets of demand in areas where operators other than BT are not currently providing access services.
3. Define obligations under Section 106 of the 1990 Town and Country Planning Act on developers to provide ducting systems for competitive supply of telecommunications services on new developments.
4. Provide non-discriminatory funding for the provision of infrastructure in areas of special need.

Relationship to other parties

1. Inform developers about available telecommunications services.
2. Inform telecommunications service providers about prospective developments, giving the developer and development characteristics, and timescales for build out.

3. Estimate funding requirements for infrastructure provision, seek tenders for infrastructure provision.
4. Provide funding.

6.5.3 Developer

Value proposition

The provision of facilities for a second and subsequent telecommunications operators and service providers will lead to greater diversity in the supply of telecommunications services and of the services themselves. This should result in the development being attractive to knowledge based and ICT focused businesses and will lead to:

- Improvement in the value of the development;
- More rapid occupancy by high value clients.

Roles and responsibilities

1. Assess the telecommunications requirements for the end users of the site.
2. Identify sources of telecommunications services for the development and the characteristics of those services.
3. Where the development does not have easy access to a competitive supply of telecommunications services, consider inviting a service provider to build an infrastructure for the business park in competition to BT.
4. Encourage the preferred telecommunications service provider(s) of flagship tenants to sell their services more widely on the development through joint marketing arrangements.
5. Nevertheless, reserve space for the collocation of telecommunications plant and equipment including the erection of secure premises and street furniture by several telecommunications service providers.
6. Establish overall agreement including any demand commitments from developer, wayleave planning and incorporating clients' requirements for alternative supplies including entertainment.
7. Plan duct installations to a standard acceptable to the incumbent provider. Include ducting for up to four other service providers.
 - a. Consult with incumbent and interested alternative service providers on design and specification of the network infrastructure and access mechanisms to be implemented.
 - b. Agree with incumbent and interested alternative service providers on-site plant requirements including secure premises and street furniture. Reserve plant space for alternatives.
8. Where possible keep ongoing relationships with potential service providers.

Relationship to other parties

1. Communicate telecommunications requirements to the local authority so that the requirement can be aggregated with other requirements for the area as a whole.
2. Inform potential service providers about the potential requirement early in the development of the site. Indicate the size of the opportunity for service providers.
3. Shortlist and agree terms with one or more alternative service providers. Terms should include the infrastructure to be provided by the service provider, the process for installing infrastructure, the dates when they start to provide services and the services to be provided, and agreement on joint marketing of telecommunications services. While early provisioning may be lower cost, it does not necessarily lead to the highest return on investment for the service provider. Therefore, while ducts may be laid during the development of the site, it is likely that operators will provide infrastructure only when letting is underway.³²
4. Rent or sell collocation space on site for telecommunications plant and equipment.
5. Rent or sell ducts to alternative service providers.
6. Maintenance of ducts until sale or until adopted by local authority or the service provider.

6.5.4 Telecommunications operator / service provider

Value proposition

A second tier telecommunications operator or service provider will be interested in providing facilities on a business park if it enhances revenue generation from its backbone network and local area facilities.

Therefore interested service providers will be those with nearby backbone infrastructure and those with a large customer or prospective large customer on the business park.

Roles and responsibilities

1. Build out of telecommunications infrastructure across the business park using available ducts where possible.
2. Marketing, sale and support of telecommunications services on the business park.

³² Customer Premises Equipment (CPE)

Any new technology to be deployed to premises, in particularly fibre in the form of PONs (Passive Optical Networks), as opposed to copper cable, will require Customer Premises Equipment of a different nature to a normal telephone termination point. Due to the nature of fibre termination, this should be planned as an integral component of all applicable premises.

This device will be powered, variable in specification depending on the nature and size of the building and have a cost considerably higher than the both the older type of termination device and also higher than the cost of a similar device being deployed in the later phases of the development. The cost of such a device is currently still fairly high but as volumes increase the price will drop to very affordable levels, similar to current cable, satellite and freeview set top boxes.

Relationship to other parties

1. Purchase/rental of ducts and collocation space from the developer.

ANNEX 1: KENT AND MEDWAY STRUCTURE PLAN, POLICY OBJECTIVES

This Annex determines requirements for telecommunications services arising from the Kent & Medway Structure Plan: Deposit Plan, September 2003.

1 POLICY FP1: EMPLOYMENT LAND PROVISION

1.1 Structure plan statement

(a) Priority will be given to developing sites in Kent with planning consent or identified in local plans for financial and professional services, business, industrial and warehousing uses (Use Classes A2/B1-8) as at 2001.

(b) In addition new land should be identified as follows:

In Medway at least 20 hectares for a wide range of employment uses including the knowledge and technology sectors as part of mixed use development at Chattenden/Lodge Hill;

At Canterbury City up to 10 hectares to provide specifically for knowledge and technology uses linked to the education sector in Canterbury;

At Herne Bay-Whitstable up to 10 hectares to ensure a continuing supply of land for the relocation and expansion of local firms and to attract inward investment to the coastal towns;

In Shepway provision of up to 20 hectares to improve choice and support inward investment;

At Ashford further employment land up to 40 hectares will be provided to give support, for the longer term, to its role as a regional growth point based on balanced employment and housing growth;

(c) Accordingly the total provision for net additional floorspace provision for financial and professional services, business, industrial and warehousing uses will be:

Local Authority Area	Net Commitment at 2001 (000's sq.m)	New Provision	Total 2001-21 (000's sq. m)
Ashford	592	140	732
Canterbury	161	70	231
Dartford	892		892
Dover	512		512
Gravesham	435		435
Maidstone	129		129
Sevenoaks	84		84
Shepway	162	70	232
Swale	938		900
Thanet	304		304
Tonbridge & Malling	316		241
Tunbridge Wells	74		74
KCC Area	4,599	280	4766
Medway	505	70	575
Kent	5,104	350	5,341
North Kent	2,770	70	2,802
East Kent Triangle	977	70	1,047
West Kent	474		399
Channel Corridor	883	210	1,093

1.2 Implications for telecommunications services and infrastructure

Financial and professional services, business, industrial and warehousing all require access to excellent telecommunications services. Financial and professional services will require access to specialist data and knowledge networks. Industrial and warehousing uses will require access to corporate data networks and ebusiness systems. These systems are increasingly near real time, with requirements for bulk data transmission and near 100% availability. Diversity in supply of telecommunications access will be a requirement for larger companies. This requirement is likely to become increasingly critical during the life of the plan.

Availability of telecommunications infrastructure to support such requirements will be a requirement of all sites in Kent.

2 POLICY FP2: LOCATION OF NEW OR REPLACEMENT EMPLOYMENT LAND

2.1 Structure plan statement

Proposals for employment and business development other than (a) those already identified in adopted local plans or (b) at the specific locations identified in Policy FP4 (b) or identified pursuant to Policy FP6, should be located in, or adjacent to, principal urban areas where they are easily accessible by a choice of transport. Such proposals should be attractive to the market place.

2.2 Implications for telecommunications services and infrastructure

Such developments may be some distance from existing local exchanges. There may therefore be difficulty in providing 2Mbit/s broadband services at these locations. Developers should seek provision of an alternative infrastructure to ensure low cost contended telecommunications access at greater than 2Mbit/s per subscriber on their sites from the beginning of 2005, rising to speeds greater than 200Mbit/s by 2020. Those sites that are intended to support knowledge based industries may require up to 2 Gbit/s by 2020.

3 POLICY FP3: LOCATIONS OF STRATEGIC IMPORTANCE FOR BUSINESS, INDUSTRIAL OR DISTRIBUTION USES

3.1 Structure plan statement

In contributing to the provisions of Policy FP1 the safeguarding and implementation of the following strategic employment locations will have priority:

Ashford: Eureka Science Park

Ashford: Orbital Park

Ashford: Waterbrook (Sevington)

Ashford: Cheeseman's Green

Dartford: North Dartford (including Fresh Marshes)

Dartford: Crossways Business Park

Dartford: Eastern Quarry

Dartford/Gravesham: Ebbsfleet Valley

Dover: Land at Richborough

Dover: White Cliffs Business Park

Shepway: Shearway Business Park : Folkestone

Shepway: Link Park: Lympne

Swale: Neatscourt: Queenborough

Swale: Lappel Bank : Sheerness

Swale: Ridham Kemsley

Swale: Eurolink: Sittingbourne

Thanet: Eurokent

Thanet: Manston Park

Tonbridge and Malling: Kings Hill*

Medway: Kingsnorth and Grain

Medway: Rochester Airfield

3.2 Implications for telecommunications services and infrastructure

Each of these sites should have access at rates specified in Section 3.2 above.

4 POLICY FP4: LAND FOR TECHNOLOGY AND KNOWLEDGE CLUSTERS

4.1 Structure plan statement

A “cluster” has been defined as “a geographical concentration of inter-connected companies, specialist suppliers, service providers, firms in related industries and associated institutions”. “Technology” and “knowledge” industries include those which rely on new research, scientific, professional or technical understanding, and do not include everyday financial and business services.

The UK Competitiveness White Paper (DTI 1998) emphasised the importance of promoting the expansion and creation of “clusters” or networks of “knowledge driven” industries. This objective is found in national guidance and regional strategies.

Policy RE9 of RPG9 states that high value activities should be encouraged, including the provision of sites close to universities. Policy FP1 includes provision for such a new site at Canterbury for “knowledge and technology uses linked to the education sector” which is important in the City.

High quality proposals for the intensification or expansion of established key employers and/or institutions in the technology and knowledge sectors will be supported at the following locations unless there are exceptional and overriding environmental impacts which cannot be adequately mitigated:

(a) a new site at Canterbury linked to the University (pursuant to Policy FP1);

(b) expansion of technology and knowledge activities at:

- Fort Halstead (Sevenoaks District);
- Horticultural Research Institute (HRI): East Malling; Kings Hill;
- Pfizer and land in the Sandwich Corridor at Richborough;
- Sittingbourne Research Centre;
- Rochester Airfield ;
- Chatham Maritime.

(c) the expansion, in situ, of other key employers in the technology and knowledge sectors.

4.2 Implications for telecommunications services and infrastructure

Each of these sites should have access at rates specified in Section 3.2 above, with the prospect of contended access at speeds greater than 10Mbit/s per business in 2005 rising to 1Gbit/s by 2020.

5 POLICY FP5: PREMISES FOR SMALL FIRMS

5.1 Structure plan statement

Encouraging small firms by providing them with suitable premises is an important part of economic strategy because of their growth potential, particularly in new economic activities and because they contribute to 'home grown' employment growth. Support for them should include providing premises in inner urban areas which are accessible to the local population on foot and by public transport. Except where businesses are located inappropriately the loss of existing employment land in general should be resisted particularly where it fulfils an important role for local firms and sectors of the economy which are strong.

Premises for small firms will be provided:

- (a) within larger industrial estates;
- (b) within new mixed-use developments;
- (c) as part of clusters of similar economic activity (pursuant to Policy FP4);
- (d) through the development of small infill sites; and
- (e) through the conversion or alteration of suitable existing buildings.
- (f) through the protection of existing employment land

Development at these locations should demonstrate good accessibility from the primary or secondary route network.

5.2 Implications for telecommunications services and infrastructure

Small firms will require contended broadband services of 512Kbit/s in 2005 rising to 10Mbit/s in 2020. This service will be required universally.

6 POLICY FP6: DEVELOPMENT OF EMPLOYMENT USES IN RURAL AREAS

6.1 Structure plan statement

Provision for small scale business development (B1-B8) and service industries should be made within, or adjoining, the built up area of rural service centres (identified on the Key Diagram) or of larger villages that can provide a sustainable form of development. Development should be appropriate to the scale of the settlement and without detriment to its amenity, character or setting. In this context small scale live/work units may be acceptable.

No provision for business development will be made elsewhere in rural Kent except where:

(a) it involves the re-use, adaptation or redevelopment of an existing building, as covered by Policy SS7(ii) ; or

(b) it is required for the expansion of an established business and/or for the processing, storage, distribution or promotion and research concerning produce from Kent agriculture, horticulture or forestry; and

- o good access can be provided to the primary road network and bus or rail services; and
- o there is no overriding environmental objection.

In respect of these provisions the role of the Kent Agricultural Showground at Detling is recognised as important and as requiring enhancement so as to promote more widely the land based economy of Kent and the region.

All business development supported within the terms of this policy should have no unacceptably adverse impact on the local transport network and will be subject to the restriction of subsequent expansion if in conflict with the policies of this Plan.

6.2 Implications for telecommunications services and infrastructure

The restriction to larger villages implies that most of such development will be in areas that currently have broadband services. Businesses in these areas will require services as specified in Section 5.2.

7 POLICY FP7: FARM DIVERSIFICATION

7.1 Structure plan statement

Conversion, alteration or re-use of existing farm buildings to support agriculture, horticulture and forestry based on Kent, or other locally sourced produce, will be permitted where the traffic and environmental impacts are acceptable and it is demonstrated that the proposal is:

(a) necessary for the efficiency or viability of an existing business or required for a new agriculture, horticulture or forestry business; or

(b) a suitable small-scale non-agricultural use which secures the viability of a farm.

New small-scale buildings for the above purposes may be permitted if no existing buildings exist which could be converted, and there are no overriding environmental constraints.

All such proposals should be supported by a business case or farm plan which demonstrates effective management of the farm in the long-term.

7.2 Implications for telecommunications services and infrastructure

Farms will increasingly require access to broadband services to provide easy access to markets for their services and suppliers. Absence of broadband services may preclude farming activity and an ability to re-use existing farm buildings for other purposes.

8 POLICY FP8: PROTECTION OF AGRICULTURAL LAND

8.1 Structure plan statement

a) In order to protect the long term productive potential of agriculture, development of agricultural land will only take place when there is an overriding need identified in the Development Plan which cannot be accommodated within the major/principal urban areas, rural service centres or on other previously developed land;

b) Best and most versatile agricultural land (DEFRA Grades 1, 2 and 3a) will be protected from development unless:

- there is no alternative site on land of poorer agricultural quality; or
- alternative sites have greater value for their landscape, biodiversity, amenity, heritage or natural resources; or
- the land proposed for development is more accessible to infrastructure, the workforce or markets than the alternatives.

8.2 Implications for telecommunications services and infrastructure

None.

9 POLICES FP9 – FP12 – TOURISM RELATED

9.1 Structure plan statement

9.1.1 Policy FP9: Sustainable Tourism Development

Development of tourism facilities, such as accommodation and visitor attractions, will be supported if:

(a) they are designed to a high standard which enhances their setting and the attraction of Kent as a tourist destination; and

(b) there are clear economic advantages to Kent; and

(c) there are no adverse environmental impacts or such impacts are capable of being adequately mitigated; and

(d) they reduce dependence on the private car and access is possible by a choice of means of transport, particularly by public transport, cycling and walking; and

(e) equal access is provided for all social, economic and cultural groups and to people with disabilities.

9.1.2 Policy FP10: Tourism development and regeneration

New tourist attractions and the upgrading of existing tourism facilities in, or near to, town centres at the major/principal urban areas will be supported where they assist regeneration and cause no harm to the environment or to the amenity of nearby residential areas.

Priority will be given to such development:

- within the Kent part of the Thames Gateway;
- at the coastal resorts of the East Kent Triangle and Shepway;
- at Ashford.

Proposals for new buildings or for the refurbishment of buildings of historic interest, particularly in “clusters”, for arts or cultural use will be supported where they cause no environmental harm.

Environmentally related tourism initiatives will be encouraged.

9.1.3 Policy FP11: Tourist accommodation

(a) Sites will be identified in town centres and within urban areas for the development of high quality tourist, business and conference hotels and for budget hotels;

(b) Proposals which would result in the loss, without replacement, of good quality accommodation at the coastal towns will not be permitted unless there is overriding economic advantage to the area from the development;

(c) The conversion or extension of existing buildings to provide small hotels, bed and breakfast or self catering accommodation will be permitted provided this causes no harm to the local environment;

(d) the improvement of touring and static caravan and camping sites will be permitted if the development benefits the local environment.

9.1.4 Policy FP12: Major Tourism/Visitor Attractions

Proposals for major tourism/visitor attractions in Kent of national or regional significance will be encouraged. All such developments should be of an exceptionally high standard of design and landscaping.

The priority for the location of such development is within the urban areas of Thames Gateway, Ashford or the coastal towns of east Kent.

The location, and associated land take, of proposals outside the principal urban areas will require exceptional justification and should demonstrate that the development:

- is capable of bringing major benefits to Kent’s economy; and
- will make an important contribution to diversifying and upgrading the tourism and visitor attractions in the county; and
- is well related to the passenger rail and primary road networks; and
- is located so as to minimise its impact on the environment including landscape, wildlife, the best and most versatile agricultural land and areas of archaeological and historic importance; and
- incorporates satisfactory provision for mitigation of adverse impacts on the locality.

9.2 Implications for telecommunications services and infrastructure

Major tourist attractions, conference centres and principal hotels require broadband connections. These can be expected to be equivalent to a large business centre, requiring fibre based access to telecommunications services.

10 POLICY FP13: DEVELOPMENT AT THE STRATEGIC NETWORK OF TOWN AND DISTRICT CENTRES

10.1 Structure plan statement

Town centres in Kent fulfil different roles according to the size and composition of their retail 'offer' and the other services which can be found there. The hierarchy identified by this Plan is set out below. It is closely related to the overall settlement hierarchy set out in Table SS1 (Chapter 2), but in this instance distinguishes the relative functions of centres within larger urban areas (e.g. the Thanet Towns).

Bluewater is an established out-of-centre shopping development with a **regional** catchment extending across much of Kent and into London and Essex. Turnover and other measurements indicate that there are four sub-regional centres in Kent, which provide a wide range of comparison shopping and other services and have extensive catchment areas. They command higher rents and have greater potential for investment.

A distinction can be drawn between the **principal town centres** in each District, which provide shopping, local government and other services, and **district centres** which serve smaller urban areas, or parts of urban areas or are at the centre of rural catchments. The principal town centres offer greater physical capacity and investment potential. In terms of total retail turnover there is little difference between some of the middle ranking principal town centres and the larger district centres but the former offer a wider range of services.

This hierarchy of centres will generally be maintained. The county's sub regional centres will be supported and strengthened, especially Maidstone and Chatham which require major new investment and which lie within the wider catchment of Bluewater. The principal town centres within North Kent need to strengthen their roles as retail and service centres for their expanding communities.

The role of regional, sub regional, principal and district centres forming the strategic hierarchy of retail and service centres in Kent, as identified on the Key Diagram, will be safeguarded. Development proposals which enhance the quality, range and choice of shopping and/or expand or diversify service, business or leisure activities will be supported.

Development should achieve a high standard of design and enhance the visual quality, functioning and environment of a centre.

Local authorities will:

- (a) include policies in Local Development Documents to support the retail function of these centres including the allocation of suitable sites or areas for retail and/or mixed use development to meet identified needs;
- (b) identify measures to improve the environment and functioning of centres including pedestrian priority zones and networks and public transport access and interchange arrangements;
- (c) pursue measures including, where necessary, compulsory purchase to make town centre sites available for planned development.

Table FP4: The Strategic Network of Retail Centres in Kent & Medway

Regional Centre				
Bluewater				
Sub Regional Town and City Centres				
Ashford	Canterbury	Chatham	Maidstone	Tunbridge Wells
Principal Town Centres				
Dartford	Folkestone	Sevenoaks	Sittingbourne	Westwood (Thanet)
Dover	Gravesend	Tonbridge		
District Centres: (1) Urban District Centres/Other Town Centres				
Broadstairs	Hempstead Valley	Margate	Rochester	Southborough
Deal	Herne Bay	Rainham	Sheerness	Swanley
Faversham	Hythe	Ramsgate	Strood	Whitstable
Gillingham				
District Centres: (2) Rural Service Centres				
Borough Green	Hawkhurst	Lydd	Staplehurst	Westerham
Cranbrook	Headcorn	New Romney	Sandwich	West Malling
Edenbridge	Hoo St Werburgh	Paddock Wood	Tenterden	
Local Centres: To be defined in Local Development Documents				

10.2 Implications for telecommunications services and infrastructure

Retail requires online services for credit/debit card verification, and retail management applications. ICT is particularly important to the retail sector. An increasing dependency on ICT to enhance the customer experience in the retail environment can be expected.

Regional, sub regional, principal centres will require very high capacity infrastructure to support multiple retailers.

District centres will require high capacity telecommunications infrastructure to support more limited customer experience and a smaller number of outlets.

The distribution of retail centres will continue to follow the overall settlement hierarchy. The telecommunications infrastructure necessary for that settlement hierarchy should take account of the developing retail sector requirement.

11 COMPARISON GOODS SHOPPING

11.1 Structure plan statement

11.1.1 Policy FP15: Development for core comparison goods shopping

- (a) Proposals for core comparison shopping should be accommodated at town or district centres in Kent.
- (b) Development of comparison goods shopping in the sub-regional and principal town centres will be supported, particularly at Maidstone, Chatham, Ashford and Folkestone.
- (c) The scale and character of development at Canterbury should not prejudice investment in, and strengthening of, the principal town centres in East Kent and development of Ashford as a sub regional centre.
- (d) Any development at Bluewater should not prejudice investment in, and strengthening of, the sub regional centres of Chatham and Maidstone nor conflict with the role of principal town centres in North Kent as the prime focus for local retail, service, cultural and leisure facilities.
- (e) Development of a new mixed use town centre for Thanet at Westwood, adjacent to and integrated with existing major retail provision, and incorporating up to 25,000sq.m of gross retail floorspace will be supported.

11.1.2 Policy FP16: Development of bulky comparison goods retailing

- (a) Where it is demonstrated that the need for bulky goods shopping cannot be met at town centres development should be located with existing major out of centre retail developments. Planning conditions restricting the character of retail sales to bulky goods will be applied.
- (b) At existing out of centre retail locations guidance will be provided to define the limits of retail use, improve pedestrian circulation and secure better access by public transport.

11.1.3 Policy FP17: Development of large food stores

Proposals for large new food stores should be located at town or district centres.

Local Development Documents will identify where new or improved convenience shopping, which cannot be accommodated within town or district centres, is needed:

- o to make good deficiencies in existing provision; or
- o to meet new requirements associated with major new residential communities including the Strategic Development Locations identified by this Plan.

11.1.4 Policy FP18: District and Local Centres

Small scale retail and service provision at the urban and rural district centres (as identified on the Key Diagram), and at local, neighbourhood and village centres identified within Local Development Documents, will be supported where it will underpin the role, vitality and viability of such centres.

11.2 Implications for telecommunications services and infrastructure

As for Policy FP14.

12 RESIDENTIAL DEVELOPMENT OBJECTIVES

12.1 Structure plan statement

12.1.1 Policy HP1: Housing Provision and Distribution 2001-202

Provision for housing for 2001-2021 will be made in accordance with the following quantities:

	Dwellings (net)					
	2001 - 2006	2006 - 2011	2011 - 2016	2001 - 2016	2016 - 2021	2001 - 2021
Ashford	3,500	5,000	5,500	14,000*	6,000	20,000*
Canterbury	2,100	2,100	2,000	6,200	1,500	7,700
Dartford	3,900	4,000	4,500	12,400	3,100	15,500
Dover	1,600	1,600	1,300	4,500	1,000	5,500
Gravesham	1,400	1,500	1,500	4,400	1,100	5,500
Maidstone	2,300	2,200	2,000	6,500	1,800	8,300
Sevenoaks	800	800	800	2,400	700	3,100
Shepway	1,800	1,500	1,400	4,700	1,200	5,900
Swale	2,500	2,500	2,500	7,500	2,000	9,500
Thanet	1,700	1,700	1,700	5,100	1,500	6,600
Tonbridge & Malling	2,200	2,100	2,100	6,400	1,900	8,300
Tunbridge Wells	1,500	1,400	1,100	4,000	1,100	5,100
(KCC area)	25,300	26,400	26,400	78,100	22,900	101,000
Medway	3,500	3,900	4,100	11,500	3,600	15,100
Kent	28,800	30,300	30,500	86,600	26,500	116,100

NOTES TO POLICY HP1

The quantities in Policy HP1 include all forms of housing development providing self contained dwelling units for permanent accommodation and relate to net increases to the housing stock after 31st March 2001 i.e. net of demolitions or other losses from the housing stock.

In order to secure the overall average annual rate of provision for the 2001/2016 period the quantities for the three phasing periods to 2016 are cumulative i.e. any surplus or shortfall from the early periods of the Plan are carried forward to subsequent periods. Provision for 2016-2021 is subject to review in the light of monitoring and a further review of RPG9.

For the purposes of implementing Policy HP1 housing provision will mean the expected net dwelling capacity of planning permissions and allocations in previously adopted or deposited development plans which were outstanding at 31st March 2001 (including dwellings then under construction) plus the planned net dwelling capacity on sites subsequently released or to be

released for development through allocations in development plans and planning permissions. The assessment of the level of provision in relation to Policy HP1 will also allow for:

- (i) the expected contribution from sites below the site size threshold adopted for the identification of development plan allocations; and
- (ii) the expected contribution from other windfall sites involving previously developed land.

12.2 Implications for telecommunications services and infrastructure

New and existing areas will require broadband services to be available at the prevailing rates.

ANNEX 2: MODEL ASSUMPTIONS AND DATA SOURCES

In modelling the various scenarios in Kent & Medway we have looked for the most reliable and accurate sources of growth projections allied to the currently available base data. The two factors we have chosen for measuring growth are houses and jobs.

The base quantity of housing and employment for any district is available from the Office of National Statistics based on the 2001 Census returns which matches the start point for most available growth projections. We also have available figures for companies and households by exchange area derived from the work already undertaken for KCC.

The growth figures used have come from the following sources:

Thames Gateway

The source chosen are the figures from the ODPM as used by the Department for Transport for the transport planning in the Thames Gateway. These have the advantage of being split by identifiable local area. Unfortunately the TG area does not map on to the district data but the DfT have addressed this problem by using Laser 3.0 areas for their planning which do map.

Source DfT - Transport and Development in the Thames Gateway Phase 2

Appendix C: Homes and Jobs Projections

Table 6 - Additional employment to be relocated to Thames Gateway by industrial sector, 2016 mid growth, mid-growth low employment and Do Nothing Extra scenarios (Source: ODPM zonal action plan for Thames Gateway - pro-rata adjusted data)

Table 7 - Dwellings Growth: all scenarios, 2002-2016

The growth in jobs and houses both have three alternative scenarios. The models allow the use of any combination of each of the three projections. The medium growth projections have been used in the financial cases.

The breakdown of the data into Laser 3.0 areas allows the modelling of individual urban areas within Kent & Medway and identification of the BT exchanges from the KCC Survey. This allows the separation of Kent areas from the rest of the Thames Gateway and modelling of areas such as Sittingbourne.

Ashford

The source chosen are the figures from the Ashford's Future – the Overarching Report, December 2002 Section 3.4 Sustainable Growth Options

Once again there are three alternative scenarios for jobs and house growth. As an additional factor the growth is projected over 30 years with different projections for each 5 year period. The growth is dependent on major civil engineering projects and involves a slower growth in early years than in later.

Company growth projections

As we expected we have not found any detailed data on company sizes in the county or the districts. As there is little data on this for current companies it is not surprising that there is none in future projections. The company figures used assumes that there are on average small, medium and large companies with average employees of 3, 50 and 200 employees. The companies are

assumed to occur in a ration of 100:10:2. This gives a close correlation on numbers of companies with the data that is available for Kent & Medway.

This formula that has been used by us before and gives a good correlation in areas where company data is available.

ANNEX 3: GLOSSARY

ADSL	Asymmetric Digital Subscriber Line. A means of providing broadband over the local loop where download capacity is greater than while in most cases allowing normal telephone services to continue to be provided. One of a family of Digital Subscriber Line standards and technologies that offer alternative broadband service characteristics and performance levels.
ARPU	Average Revenue Per Customer.
Backhaul	A means of bringing the Internet to a point of presence (PoP) in the community
Bitstream	Wholesale shared data service on a suppliers network
Broadband	Definitions of Broadband differ but the following definition has been used. A telecommunications service that provides at least 512Kbit/s instantaneous download capacity and 256Kbit/s instantaneous upload capacity with sufficiently low latency to enable timing dependent VPN services to be provided. The service may be <i>contended</i> (dedicated to a single user) or <i>uncontended</i> (shared between several users). If it is contended, average download capacity experienced by the user should exceed 80% of instantaneous bandwidth.
Capex	Capital Expenditure
Carrier preselect	A mechanism for choosing and using alternative carriers for telephony services over the incumbents local connection
CATV	Cable Television
Fibre	Fibre optic cable used for data transmission.
Datastream	BT's wholesale DSL product aimed at larger ISPs and data communications service providers.
DSL	Digital Subscriber Loop. Generic term for a range of technologies providing data services over telephone lines.
DSLAM	Digital Subscriber Line Access Multiplexer, equipment at a central location, usually an exchange, that links many customer DSL connections to a single high-speed line.
EBIT	Earnings Before Interest and Taxes
EBITA	Earnings before interest, taxes, depreciation, and amortization
Exchange	A BT local exchange
Fixed voice	Telephone services carried on a "fixed network", one that connects nodes that are at a specific, unchanging location, to be distinguished from mobile services.
GDP	Gross Domestic Product. A measure of the size of the economy of a particular territory.

Gross Fixed Capital Formation	This consists of additions to the assets of producers of tangible reproducible goods which have an expected lifetime of use of one year or more.
GVA	“Gross value added” is the value of output less the value of intermediate consumption. It is a measure of the contribution to GDP made by an individual producer, industry or sector.
HDTV/High Definition TV	High-definition TV. A television display standard that doubles the 525 lines per picture to 1050 lines and increases the screen aspect ratio from 12:9 to 16:9. This aspect ratio creates a television screen that is shaped like a movie screen
IPStream	Wholesale broadband internet access on BT's network specifically aimed at smaller ISPs
IRR	Internal Rate of Return. The interest rate that makes net present value of all cash flow equal zero. If the IRR is greater than the required rate of return, then the NPV of the cash flow will be positive at the given rate of return.
ISP	Internet Service Provider usually providing service over DSL but also over other access technologies.
kbit/s or Kbps	A measure of speed or instantaneous capacity of a telecommunications channel of 1024 bits per second, where a bit is one unit of information. 1024 kbit/s is equal to 1Mbit/s.
LES	LAN Extension Service. A BT product that is typically used by ISPs and multi-site businesses for extending LANs between sites. It is available at speeds of 10, 100 and 1000Mbit/s over distances up to 25Km. It requires a suitable infrastructure to be available, and this may preclude its use in some areas.
LLU	Local Loop Unbundling, whereby another telecommunications operator or service provider is provided with access to the copper twisted pairs used for connecting a customer's premises to the local exchange. Access may be shared with the incumbent operator that owns the local loop or may be dedicated to the other operator.
Local loop	The circuit between the consumer premises and the nearest location in a telecommunications operator's network that provides call processing functions (such as switching). The local loop is generally made from twisted copper wire, but may be made also from fibre optic cable or aluminium wire. In some cases, the local loop is provided by wireless.
MSAN	Multi Service Access Unit. This is a device that allows the distribution of several services over a copper or fibre access network from a single backbone network. It carries high-speed data, Ethernet, video and broadcast TV, as well as traditional voice telephony.
Mbit/s or Mbps	A measure of speed or instantaneous capacity of a telecommunications channel of 1024 kbit/s, where a bit is one unit of information.
NPV	Net Present Value. The present value of a future series of payments and receipts taking account of a specified rate of return. In this project, a rate of return of 15% has been used.
ODPM	Office of the Deputy Prime Minister

OFCOM	Ofcom is the independent regulator and competition authority for the UK communications industries, with responsibilities across television, radio, telecommunications and wireless communications services - Replaced Oftel, the Radiocommunications Agency, the Broadcasting Standards Commission and the Independent Television Commission in 2003.
PABX	Private Automatic Branch Exchange
PoP	Point of Presence. A building or location where access to physical telecommunications infrastructure can be connected.
SDSL	Symmetrical Digital Subscriber Loop. DSL service with upstream and downstream data rates the same.
SME	Small or medium enterprises. Typically less than 200 employees (medium) or 50 (small)
Trunk network	The network that connects major locations with one another.
VOD/Video on Demand	Video On Demand. A public service that allows a viewer to download and view a TV programme or film at a specified time or immediately on request.
Voice services	“Voice” services are telephony based telecommunications services, to be distinguished from “Data” services, which have been concerned up until recently with communication between computers. The distinction between voice and data services is increasingly blurred by the use of data services to carry telephone calls.
VPN/Virtual Private Network	A private network established over a public network service in such a way that the nodes on the private network can be addressed only from other nodes on the private network.
Wireless	Radio, visible light or infrared spectrum used for telecommunications purposes. Specific wireless “bands” have particular characteristics that make them advantageous for particular uses. Some wireless bands are licensed by OFCOM to particular users. Other bands are not licensed and may be used for any legal purpose, within technical limits specified by law or regulation. So called unlicensed bands may be used to provide some public services and private networks.