
North East ICT Infrastructure Policy and Investment Framework Study

Technical Paper 6 Basis for Intervention

Final Version

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May 2006

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1. Purpose of this Document

- 1.1 This document is Technical Paper 6, the purpose of which is to set out EU and UK Government's approach and guidance on intervention, in general, and specifically with regard to telecoms/ICTs. The paper also provides examples of interventions in the ICT infrastructure arena, from elsewhere in the UK, wider Europe and globally.
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2. When can Government intervene?

- 2.1 Current policy indicates that the goal is to enable the market to deliver goods and services and that public sector should only intervene when the market is not working optimally. Any intervention should therefore be designed to enable the market to work optimally, rather than to replace/ displace the market, and should represent no more intervention than is the minimum required to achieve this.
- 2.2 In essence therefore, the primary rationale for intervention is one of 'addressing market failure'.

Market Failure

- Market failure is said to occur when market forces (i.e. demand and supply) **fail to provide the optimum allocation of resources** in an economy.
- In this situation, demand and supply do not produce an efficient price setting (i.e. price is either too high, usually leading to **underconsumption of a good or service such as broadband access**, or too low, leading to overconsumption).
- Under market failure, **allocative/Pareto efficiency is not achieved** – it is possible to make someone better off without necessarily making someone else worse off.
- In this situation the **government may wish to intervene** in the market mechanism to improve the welfare outcomes of resource allocation.
- The government's intervention, however, can trigger social costs (such as crowding out the private sector) as well as benefits, and if the former exceed the latter, **government failure** is said to occur.

Table 2-1: Types of market failure:

- **Assymetry of information** – the fundamentals are in place for a mutually beneficial marketplace transaction, but one or both parties are simply unaware of the benefits (e.g. consumers are unaware that ICT could help them access a service more easily, or companies are unaware that enough consumers wish to use a service for them to make a profit out of it).
- **Price too high/too low** – demand may be insufficient (market price too low), supply may be insufficient (market price too high) or the provider may have a monopoly on the technology (market price too high for consumers).
- **Lack of equity** – some sections of a population may have access to an affordable, high-quality service while others lag behind (e.g. the so-called 'digital divide' between rich and poor or rural and urban populations).
- **Demand-side and supply-side** – identifying the source of the market failure (whether the problem is fundamentally with the buyer or the supplier).

- 2.3 The '3Rs' guidance issued in May 2004 by ODPM attempts to distinguish between **market, distributional and institutional** failures in its advice on spatially-targeted public sector interventions. The former relates to specific failures of the market mechanism, while the latter two are used to identify pronounced spatial inequalities and inadequate actions of public sector authorities respectively.

2.4 With strategy formulation demanding a consistent, rigorous and comprehensive analysis of the topic in question, it is helpful to outline a framework for ensuring all potential sources of market failure have been considered. Table 2-1 provides a basic framework for this task, distinguishing between the most common types of ICT users, the broad links in the service provision chain and also demand- and supply-side issues. **This provides a useful link between the framework for overall strategy formulation and the evidence base presented here.**

Table 2-2: ICT Strategy Formulation Tool Market Failure Identification								
Deliverables								
	User Interface				Communication between Users			
Beneficiaries (User Groups)	Devices (Fixed and Mobile)		Device Content		Network and Transmission Services (Fixed and Mobile)		Global Content and Data Services	
	<i>Demand</i>	<i>Supply</i>	<i>Demand</i>	<i>Supply</i>	<i>Demand</i>	<i>Supply</i>	<i>Demand</i>	<i>Supply</i>
Residents					M	Current generation - L/M Next generation M/H		
Businesses					H	Current generation - L/M Next generation M/H L/M		
Public Sector					M	Current generation - L/M Next generation M/H L/M		

3. EU Guidelines on Intervention in ICT Infrastructure

General Approach of the European Commission to ICT Interventions

3.1 Probably the best general guidance (framework) for the justification and focus for intervention in the ICT arena is provided by the Commission in its 'advisory note' in relation to the use of Structural Funds¹. We suggest that this represents a comprehensive guide to the issues and principles, even if the area in question is not an Assisted Area.

Key Principles

3.2 Key principles set out in the paper include:

- Recognising that intervention in broadband infrastructure markets is required – 'the e-Europe 2002 Action Plan², agreed by the Heads of State and Government in Feira Council in June 2002 established that a priority for the Union is to ensure that less favoured regions can fully participate in the Information Society, recommending that new infrastructure and services across Europe may be supported with European funding, provided that public aid does not distort competition and ensures technological neutral investments'
- Recognising that broadband infrastructure must be widely available to all citizens, and at affordable prices – 'in 2002, the Seville Council adopted the e-Europe 2005 Action Plan that sets out a strategy to make broadband infrastructure widely available to businesses and citizens throughout the European territory at affordable prices, and also outlines the need to develop adequate content and services'
- Recognition that Information Society is key to economic development – 'in its guidelines for the structural funds programmes of 2000 – 2006, the Commission has identified Information Society as a key priority under structural funds interventions, with a strong emphasis on demand for services and applications, noting that Information Society has considerable potential for strengthening economic and social cohesion'
- Recognition that liberalisation alone is not sufficient, that there is evidence of market failure requiring intervention – 'major changes in the electronic communications sector e.g. the rapid pace of technological change, slow take up of broadband services, changes in the regulatory framework – make it necessary to rethink the role of public funding taking into account its strategic nature for economic development. After 'years of liberalisation' there is also clear evidence of inadequate geographic coverage, even in mature technologies such as GSM network'
- Recognising that investment costs are difficult to justify – 'the investment costs to meet present and future requirements for the development of the Information Society are often difficult to justify on purely commercial grounds. There is a risk that because the investment is potentially unprofitable, the underlying cohesion objective which underpins e-Europe 2000 of ensuring access for all, is put into question'

¹ Guidelines on Criteria and Modalities of Implementation of Structural Funds in support of Electronic Communications. Commission of the European Communities, Commission Staff Working Paper (Draft 2)

² e-Europe 2002. An Information Society for all – Action Plan p6.

- Recognising that its not just a question of broadband infrastructure, but that demand and content are also important – ‘the existence of high quality communications infrastructure is a key condition to enable citizens, businesses and administrations to exploit opportunities offered by the Information Society, but, the availability of such infrastructure may be irrelevant if adequate services and applications are not provided to end-users or if these lack the knowledge or ability to use them properly. A relatively weak content base, a generally low level of awareness about the benefits and opportunities of the IS, relatively high prices as well as scarcity of ICT skills are often common barriers in less favoured regions’
- Recognising that IS intervention must reflect regional and economic development priorities – ‘IS intervention must be linked to and determined by the development strategy for the region, and more specifically, infrastructure projects must be connected with the objectives of regional development i.e. economic growth, regional competitiveness and balanced distribution of economic activities.

Of Particular Note

3.3 Perhaps of particular note, the Commission advisory note states that

- ‘ infrastructure projects should be based on an analysis of regional needs and opportunities identified in consultation with economic and social partners, taking into account specific economic and institutional conditions as well as the pre-existing infrastructure (i.e. an inventory of existing infrastructure endowment before planning any new investment). Accordingly, public authorities, especially at sub-national level (regions and local authorities), will propose IS measures within national and regional programmes. They also have the responsibility to ensure that the investment measures are relevant to regional objectives and needs and that these measures are coherent with the overall economic development strategy as well as guaranteeing their economic sustainability’
- investment must be targeted towards areas that would otherwise be neglected under free market conditions, with the main focus being on rural and remote areas, which are not covered by adequate infrastructure, but, investment is also justified in areas where there is an absence of commercial incentives to invest into infrastructure networks allowing the advanced applications and services of general interest
- and, although regional aid is, in principle, strictly concerned with eligible areas under the Objective 1 and 2, investments can be financed outside of these areas to the extent that they are realised in contiguous areas (NUTS III) and comply with eligibility rules laid down in Reg (EC) No. 1685/2000

The Commission’s guidance on specific principles stemming from the above

Technological neutrality

3.4 The Commission advisory note states that ‘investments in electronic communications infrastructure must adhere to the principle of ‘technological neutrality’. Investments should not favour any particular technology, nor limit the technology choice. When a project involves the financing of a specific technology, or a dedicated infrastructure, the choice must be clearly justified on the basis of a cost-benefit analysis, taking into account possible alternatives for the provision of the service.

Open Access

- 3.5 The Commission advisory note states that 'financial support will be granted for projects which are consistent and in accordance with the new regulatory framework on communications networks and services as well as competition rules (state aids and antitrust). Compliance is key and must be accompanied by clear open access obligations. 'Open access' is defined as open infrastructure (i.e. dark fibre, ducts and masts) and equipment that is open to all operators and service providers. Specifically, the location and technical requirements of the points of access to the new infrastructure should not favour dominant operators nor give rise to distortions on other markets.

Specifically

- 3.6 Directing finance of installations and equipment which are not open to all, but are dedicated to one or more operators, does not qualify as funding of 'an open infrastructure project'
- 3.7 Funding of installations and equipment, dedicated to a specific final user may constitute State aid whenever such user is an undertaking, but this may be compatible under rules governing SMEs
- 3.8 The provision of services should respect the principles of transparency, non-discrimination, proportionality and least market distortion.
- 3.9 The above sets out the Commission's general policy regarding the importance of the IS to the economy and to social cohesion; recognition of key components of the IS; recognition that despite extensive liberalisation, market failure is evident, justifying use of structural funds to tackle these.
- 3.10 Insofar as the UK Government endorses these, this provides the framework for considering the need for and justification for intervention in the telecoms arena, and not just in broadband infrastructure but also in demand stimulation and service provision.

4. Options for Public Sector Intervention

4.1 Under the '3Rs' guidance issued by ODPM in May 2004, spatially-targeted public sector interventions should have two core aims:

- Improving **efficiency** (often making markets work better)
- Achieving a more equitable **distribution** of resources (improve quality of life for those in deprived areas and reduce inherent disadvantage)

The evidence base assembled in this work identifies numerous spatial priorities for intervention to reduce the **clearly evident ICT-related inequalities** – and to capitalise on the potential for ICT-based innovations to reduce other types of inequality – in particular areas.

4.2 It is now generally accepted, based on modern economic theory, that the options for public sector intervention in the field of broadband provision should always be assessed in the light of the impact upon competition (OECD, Oct 2003). That is, to create or stimulate a market for a particular service, in which private firms are willing and able to operate, would usually be seen as a positive outcome of intervention. **Investing directly in or subsidising the provision of infrastructure where a market for subsequent service provision does not exist would most likely constitute an example of government failure.** In the case of natural monopoly, where a single service provider is able to operate at a lower cost per unit than two or more firms could with identical infrastructure bases and demand structures, regulation may well prove to be the most efficient social outcome.

"Policymakers seeking to promote rapid, efficient broadband deployment should [consider strategies that minimize risks, namely] demand stimulation and aggregation, grant and loan programs, municipal initiatives fostering market entry and competition, and increased participation to the exchanges of best practices." (European Commission, Jul 2005)

a) Awareness-raising

to overcome information asymmetries where market forces would otherwise yield an optimal solution, including making residents and/or businesses aware of the benefits and thus increasing their willingness to pay

4.3 Raising awareness is necessary because ultimately it is the lag between the creation of knowledge and its adoption, and the rate of dissemination of new knowledge, that most directly affects the rate of technical progress and economic growth. The spread of new knowledge depends on its rate of adoption and diffusion, which in turn depends on **issues of individual motivation and the willingness to break with tradition** and assimilate new ideas (Thirlwall, 2003, p248/9).

4.4 These issues were particularly conspicuous in the Dutch town of Neunen, which has wholeheartedly embraced its new Fibre-to-the-Home (FttH) network through the operation of a co-operative stakeholder model. The new technology is generally accepted to have **united the local community** and yielded benefits across the generations (see case study below).

4.5 A specific opportunity this type of intervention in the North East comes in the development of rural ICT policy. A recent study from SQW (2005) confirmed that a **demand-side information-related market failure** exists in UK rural economies, with ICT developments having an extremely positive impact on productivity, turnover and growth in rural areas

where adopted, but with many firms, and micro-businesses in particular, unaware of both the benefits and where to find the necessary support and guidance to assist with implementation.

- 4.6 The 'Last Mile Technology' scheme in County Durham undoubtedly succeeded in part due to simply raising awareness of the benefits of broadband technology for residents, businesses and the community and voluntary sector. In this field, and particularly in rural areas, it is not merely leaflets through the post that are likely to trigger increased take-up but **actively visiting local communities, demonstrating the benefits** and generating positive word-of-mouth.

b) Bringing parties together (broking)

...to remove barriers to marketplace transactions

- 4.7 **IDB (Information, Diagnostic and Brokerage)** will be a customer-driven service providing access to business support solutions. These solutions will ultimately be provided by the private sector unless market failures are evident in the form of either the private sector not being prepared to provide a solution at a price the client is able to pay, or the solution is not being available in the region due to its specialist nature. In either of these cases the public sector will provide the business support solution.
- **Key priority:** The IDB facility will almost certainly need to provide specialist ICT support in the form of the account managers/brokers described in the Strategic Action Plan for Business Support. The nature of ICT support is so specialised that in order to add genuine value, **a dedicated business support unit within the IDB framework is essential** to providing the North East's businesses with the assistance they need to expand – creating jobs and wealth for the region – and to securing the key regional strategic objective of a higher rate of local business start-ups.

c) Subsidies and Gap Funding

where the private sector is faced with insufficient demand to be able to provide its service to a particular area at a cost-covering price

d) Direct Service Provision

where there is insufficient private sector incentive to provide the good or service, perhaps due to an inability to pay on behalf of consumers or a lack of appropriate benefits

- 4.8 The core motives for public sector intervention in the higher speed broadband market were outlined by Ofcom (2005) as:
- **Speeding up deployment** if the market delivers too slowly (although this may be expensive and potentially distortionary, and risks technological obsolescence e.g. ADSL2+)
 - Anticipating where the market will not supply, and **filling in the gaps** (although this can be difficult in identifying the precise boundary line).
- 4.9 Public sector intervention runs a number of risks, not least deterring private sector operators who **fear competing against a public operator – potentially a monopolist – with a lower cost of capital**. It must be 'proved', to the fullest possible degree, that private sector

operation in a particular market would be unviable. Ofcom (2005) suggested that this may be likely in the UK in the deployment of ducts and dark fibre.

Optimising the Intervention

Types of Intervention

There are a variety of types of action that public sector can take...

- 4.10 As part of our work preparing holistic ICT strategies for other sub regional partners, we have formulated an intervention matrix in order, to provide our clients with a clearer understanding of the different types/ levels of intervention available to public sector and partnerships in the telecomm network infrastructures sector.
- 4.11 Essentially, options for intervening in the telecomm network infrastructure market range along a spectrum from enabling to direct development; and they can be further divided with reference to whether they focus on demand-side or supply-side³ approaches.

Table 4-1: ICT Intervention Spectrum		
	Demand-side	Supply-side
Least 'degree' of intervention Lowest cost and risk to public sector + least potential for market distortion +greatest potential for v.f.m	Raise the awareness, enthusiasm for and ability (skills) to utilise ITCs	Assemble and disseminate information on demand to carriers
↓	Aggregate demand enabling groups of end-users to offer larger more secure revenue contracts to carriers in return for lower tariffs and accelerated infrastructure rollout (enabled by cross subsidy by the carrier) Stimulate inward investors with high bandwidth needs	Facilitate discussions/ negotiations/ tendering between customers/ end users and carriers Particularly manage the tendering/ procurement process through OJEC
	Gap fund end-users' training and equipment	Gap fund - either guaranteed tariff minimum's, and/or gap fund capex
Highest 'degree' of intervention highest cost and risk to public sector + most potential for market distortion + least potential for v.f.m	Create new entities that generate demand	Direct development of network infrastructure, which public sector may then operate or sell back to carriers

³ This is 'economics terminology' and makes the fundamental distinction between the 'type of action' in terms of what type of market failure the action is seeking to tackle. A 'demand-side' action is seeking to tackle market failings 'on the customer side'; a supply side action is seeking to address market failings regarding the industry (the supply chain).

- 4.12 Not all of these accord with current policy – EU, UK Government or EMDA’s. Current policy reflects several important principles.
- 4.13 The overall emphasis in the telecoms market place is one of deregulation in order to open national markets up to competition. Direct intervention in the supply chain is, in principle, contrary to this
- 4.14 Therefore the need for intervention has to be proven (e.g. through identifying a combination of market and institutional failure) – as we have done above.
- 4.15 Also, policy requires that no more than the minimum necessary level of intervention is undertaken e.g. this means that direct build of additional network is not acceptable where other actions can enable the industry to fill the gap.
- 4.16 It is also important that any intervention is in accord with the UK Government’s interpretation of state aid regulations (which although complex, in essence require that an intervention does not benefit an individual or select few businesses, creating unfair competition). This applies to carriers and to end-user businesses. Some businesses can benefit from a certain amount of direct assistance, the level being set by the de minimus thresholds in ERDF/Development Area regulations.
- 4.17 Interventions must also not result in disruption of the market place, e.g. result in discouraging future potential private sector investment or undermining returns on existing investment.
- 4.18 This makes for a complex set of considerations, but much guidance as to the appropriate form of intervention can be taken from the Government’s own actions and policy advice.

Aggregation rather than direct build

- 4.19 In sum, the Government’s preference is for ‘soft intervention’ that focuses on raising awareness, promotion, dissemination and facilitation, all designed to address ‘knowledge and information market failures’.
- 4.20 Where this is not sufficient, Government’s preference for the next level of intervention is for brokering and possibly underwriting ‘procurement’. This is reflected in the Government’s current public sector broadband aggregation initiative.
- 4.21 Rarely, is direct build (off site) likely to be acceptable.

On-site versus off-site

- 4.22 At this point, we need to distinguish between on-site and off site actions.
- On-site – this group of actions embraces those actions that can be undertaken at the level of an individual site (or cluster)
 - Off-site – this group of actions embraces those actions that can be taken at the level of the area, neighbourhood, district (e.g. the study area)
- 4.23 The principal reason for differentiating in this way is because of the different ‘actors’ involved.
- 4.24 At the level of the site it tends to be the land owner, the developer, the site manager, the occupier; at the area level, intervention is more complex and involves a variety of parties.
- 4.25 It is also generally easier to justify intervention in network build and ownership ‘on-site’ than off-site (e.g. within the cartilage of a site or redevelopment area, than off-site e.g. connection from the trunk or MAN to the site).

- 4.26 The usual starting point in any intervention therefore is to focus on getting appropriate digital connectivity infrastructure in place on the site first. This may be sufficient (in terms of removing barriers, delays and costs) to encourage carriers to connect sites up, even in some cases, in advance of demand
- 4.27 Only if this is not sufficient, is there need to consider some form of intervention 'off-site'
- 4.28 Although generally less problematic' on-site intervention is not entirely free of state aide and other intervention policy issues. The owner/ developer is entirely free to build any network they wish, on site (subject to planning, building and other technical regulations). But public sector is not free to subsidise this. Generally the same regulations that apply to general infrastructure subsidy, apply to telecoms infrastructure 4
- 4.29 For these reasons, it is still preferable to limit actions to 'soft intervention' but where assistance with direct build is required, or direct build itself, the justification needs to be linked to or the same as that for assistance with the general infrastructure and other build costs of the scheme.

On-Site Connectivity Interventions

- 4.30 The following table sets out possible on-site 'demand-side' and 'supply-side' interventions, from 'least level of intervention' (i.e. 1) to 'highest level of intervention' (i.e. 4), indicating priority.

Table 4-2: On-Site Connectivity Interventions (e.g. actions at the level of an individual site or cluster)		
	Supply-side (e.g. advanced provision of network infrastructure on site)	Demand-side (awareness raising, aggregation and promotion of demand from site, to carriers/ services providers)
1. Awareness raising	Communicate need for on-site network infrastructure; and advise on the specification of this, to site owners, developers, investors, occupiers (H)	Raise awareness of ebusiness and other broadband uses to occupiers, hence stimulating demand at the level of the site (H)
2. Facilitate negotiation	Assist site owner/ manager to procure on-site infrastructure (H)	Facilitate aggregation of site occupier demand and package up and offer to carriers in return for competitive tariffs and advance connectivity (H)

⁴ This is not the place to a detailed discussion on site infrastructure intervention issues but some key points are that public sector is limited in what it can do because of state aid and market disruption issues (e.g. concerns that public sector subsidy would benefit an individual developer and possibly a limited number of occupiers, providing unfair support; and/or that subsidy on one site would displace private sector investment in another). Initially, the principal form of intervention was in the form of 'direct development'; in the 80s this was paralleled by gap funding (top up subsidy) to developers to make a non viable scheme viable. English Partnerships was the principal gap funding agency, but following EU ruling, gap funding was suspended several years back and has only just recently been permitted again. Hence, direct development became the dominant form of intervention. This impacted the RDAs in particular. This is comparatively very costly and severely limited the number of projects it was possible to support. The level of gap funding now permitted is expressed in 'percentage of total cost' terms (the whole development cost, not just the infrastructure) and ranges from zero, to 30%, depending on which ward the development is in. As far as we have been able to ascertain, the Leicester wards in which the four flagship projects fall all have zero gap funding rating, suggesting that gap funding is not an option.

3. Gap funding	Gap fund site owner's costs of providing on-site infrastructure (M for business sites; build in development costs for public sector and regeneration projects) (H)	Gap fund proportion of carriers' capex regarding running circuits out to site (L)
4. Direct provision	Full funding and direct build out of on-site infrastructure (L for business sites; M for clusters and urban centre; build in development costs for public sector and regeneration projects)	Fully fund build out to carriers' PoPs (H for flagship sites, L for remainder) Establish site-level reseller, to procure bandwidth in bulk and resell to occupiers at much more competitive tariffs and more flexible packages (e.g. Sheffield Wired Workplace model) (H for sites/ clusters with sufficient group of high bandwidth users)

Note: H = high priority; L = low priority

Off-Site Connectivity Interventions

- 4.31 The following table sets out possible off-site 'demand-side' and 'supply-side' interventions, from 'least level of intervention' (i.e. 1) to 'highest level of intervention' (i.e. 4), indicating priority.

Table 4-3: Off-Site Connectivity Interventions (e.g. actions at the level of the area)		
	Supply-side (e.g. advanced provision of resilient MAN rings/ hub and spoke + tails to key sites/ nodes)	Demand-side (e.g. stimulating, communicating and boosting end-user demand)
1. Awareness raising	Communicate demand to carriers and service providers (H)	Raise awareness of all end-users (H) Programmes to support and advise on take up of eBusiness and other broadband applications (H) Programmes to assist in skills creation (H) Possibly create locally-specific 'killer application' (e.g. must have application that high proportion of end users can see the direct advantages of and seek to take up (L)
2. Facilitate negotiations	Assist carriers to assess demand and prepare business cases for their investment boards (M) Assist carriers to package up demand and secure contracts (L) Independent body/advisory services (H)	Package up and aggregate end user demand (H) Aggregate by end-user type – e.g. public sector, communities, business clusters/ groupings, clusters of sites (H) Or by area, ideally in conjunction with sub region or even at regional level if framework and structure is put forward by DTI/YF (H)
3. Gap fund	Provide contribution towards the capex (ducts-transmission equipment) for the required MAN infrastructure and local circuits (M) And/or provide contributions towards opex – e.g. subsidising tariffs to the	Establish a fund to contribute to the cost of purchasing hardware and software (H for disadvantaged groups; L for rest) And/or tariffs (as above) And/or training (H)

	carriers/ service providers, rather than subsidising end-users to pay these (L)	
4. Direct provision	Public sector or intermediary creates technical specification, commissions construction and then operates (design, build, operate) (L) Or puts a service level requirement out to tender – this is technology and design neutral, and the provider will probably operate in return for a long term annual lease or operational fee (L)	Create special projects that generate significant demand (H) Create an area-based reseller, similar to site level Sheffield Wired Workplace model (H)

Scoping the intervention required

4.32 In light of the above, we suggest:

- Considering separately what needs to be done (what can be done) to assist provision of connectivity infrastructure and services (in advance of demand) at the level of each site; and what needs to be done (what can be done) to assist provision of links from the nearest networks to each site (e.g. an on-site strategy and an off-site strategy’
- Formulating an intervention strategy that focuses on soft intervention, but where this is likely to be insufficient, that focuses on facilitating procurement (via an aggregation role possibly supported by an underwriting function). Only where this is unlikely to be insufficient, to consider supporting direct build, or direct build itself

5. Connectivity Interventions - examples of good practice

In the Region

Tees Valley broadband development

- 5.1 One NorthEast's Regional Economic Strategy has identified ICT as a key economic driving force and it identified a framework for action, including encouraging:
- Public and large private sector organisations to trade electronically;
 - Integration of ICT into urban and rural community regeneration programmes; and
 - Promotion of the North as an innovative centre for e-commerce
- 5.2 Building on the above strategy, the Tees Valley Broadband Infrastructure has been developed, which is a partnership between the Regional Development Agency, One NorthEast, the Tees Valley Partnership, Stockton on Line and local business leaders such as Huntsmans and Kvaerner Process Technologies.
- 5.3 Huntsman has led the development of Wilton as a centre of e-excellence providing support for a virtual chemical network and e-incubators in the process industries.
- 5.4 The network is run by a local partnership including Teeside University – the Virtual Reality Centre, Tees Valley Partnership, Stockton on Line and the voluntary sector. This investment has led to an upgraded (45Mb) broadband network covering around 17 centres across the Tees Valley.

Source: UK online, 2001

Derwentside District Council Broadband Strategy

- 5.5 Derwentside has used its own ICT department and ICT as a tool to drive economic regeneration. In the 1990s the Council proposed a plan to develop a broadband infrastructure covering the District to provide voice, video and data services. In 1996 a 155Mbit/s ATM based fibre network was procured to meet the demands of the Council, other public sector organisations and the wider community. Telewest was the primary supplier and the original investment of £4 million was financed from Single Regeneration Budget funds.
- 5.6 The achievements of the Council have been a result of a continuous process from 1995/1996. A business model was based on the need for economic regeneration in the area and the failure of the telecommunications industry to provide competitive telecommunications in Derwentside. The availability of services at a low cost has allowed several projects to be established which provide ICT services and Internet access to the community. As of September 2003, features which the broadband infrastructure in Derwentside can support include:
- Internet ICT within Derwentside County Council;
 - Internet access for Durham County Council libraries and schools;
 - A large number of community projects; and
 - 33 public access points provided as a result of community projects and a further 13 provided directly by Derwentside District Council in council offices.

Source: *The Country Side Agency, 2003*

Examples of good practice – wider UK

SEEDA Satellite Programme

- 5.7 The South East of England Development Agency (SEEDA) has been piloting a programme of low-cost satellite broadband access for small businesses, primarily in rural areas where ADSL is not available using the region's broadband fund. The key activities of the project are to reduce broadband satellite installation and first-year running costs for a single PC installation to the level of BT's Business 500 ADSL tariff.
- 5.8 SEEDA has commissioned Wired Sussex to provide promotional activities, administration, funding and information. The subsidised satellite offer is also being used as an incentive to attract SMEs to broadband awareness events to widen their knowledge of broadband-enabled applications and the benefits that they could offer to their businesses. SEEDA, Business Link and UK Online are actively promoting the programme at events across the region and offer ongoing ICT support to subscribers. The outcome of this project has been the supply of broadband services to rural businesses and leveraging this to deliver wider ICT support to them. The key implications of this case study for ONE NE are summarised in the bullet points below:
- Satellite is a viable entry-level broadband service for businesses and citizens living in rural/less accessible parts of Leicestershire;
 - The delivery of broadband supply projects in Leicestershire can be used to leverage wider ICT support – such as the effective adoption and use of e-business applications; and
 - Satellite is still regarded as the broadband delivery technology of last resort⁵ and should only be supported in Leicestershire in the absence of other solutions.

Wireless Solutions in Leicestershire

- 5.9 Although wireless solutions are technically attractive, they have traditionally failed commercially as they have been unable to deliver customer volumes to suppliers of commodity services such as voice or high bandwidth content. Leicestershire is served with a small number of specialist wireless suppliers and these are summarised below:
- Inquam UK is a privately owned company that bought the Dolphin Terrestrial Trunked Radio (TETRA) network, a specialist supplier of mobile radio services to utilities, local authorities and contractors. The new national radio for the police is also a TETRA based service. Coverage is near universal across the East Midlands;
 - Pipemedia is a Leicester based telecommunications company with its own co-location⁶ centre offering a range of internet services, voice and data services. It has wireless infrastructure in Market Bosworth, but take-up to date has been very low;

⁵ As it is asynchronous, suffers from high levels of latency and is likely to remain the most expensive broadband option.

- Pipex is now part of GXnet, the company that took over the Tele2 wireless network which has an access point in Leicester;
- Wireless Rural BroadBand (WRBB) is a recently launched wireless access provider, based in Stamford, planning to provide service to smaller users in rural areas of the East Midlands, including the eastern half of the County west of Leicester;
- Telephonic Wireless Media is a Leicestershire based reseller of wireless, one way and two satellite services.

5.10 In terms of geographical coverage, Map 4 shows the deployment of WiFi7 hotspots in Leicestershire and Wireless Rural BroadBand's (WRBB's) expected next generation broadband coverage in the sub-region in 2004, which is branded as Sunshine. It is anticipated that the Sunshine coverage will include most of the east of the sub-region, offering theoretical data rates of up to 24 Mbps over 10 kilometre footprints, using a wireless standard similar to that used at WiFi hotspots (the 802.11 family). However, it must be noted that Sunshine will operate in the unlicensed spectrum and may be prone to service issues with regard to interference and security.

Cardiff – free wireless broadband supplied by the community

- 5.11 Project Arwain was launched in Cardiff in 2002, and aimed to provide free wireless broadband access to residents of and visitors to Cardiff itself as well as **residents and businesses of depressed industrial towns in South Wales (including the former coalfield areas)** as part of the wider regeneration effort in these areas. The scheme provides an example of a 'community network' – that is, a network built and managed by an individual or a local community without major commercial involvement or any direct financial assistance from government.
- 5.12 The project used 802.11b wireless (WiFi) technology to offer broadband access to anyone in the vicinity of a transmitter with a wireless LAN card in their computer. This was made feasible by individuals, put in touch by a community awareness-raising scheme, offering surplus bandwidth (with the consent of their own internet service providers) from their home connections, and **setting up wireless nodes in their homes and offices to act as transmitters**. Street signage, indicating the presence of a wireless node in the local area, alerts potential users to the availability of a free connection.
- 5.13 The key advantages of the scheme are:
- Free wireless broadband made available, with speeds of up to 10Mbps possible (depending on the local internet backbone connection)
 - **No government funding required** (although Arwain was backed, in the form of a moderate publicity campaign, by the Welsh Development Agency)
 - Potential for greater community involvement and social cohesion
 - Addresses lack of commercial broadband provision (a probable market failure) in depressed or rural areas running the risk of becoming digitally excluded

⁶ A location built with resilient power and connectivity, air-conditioning and security to house computer servers for hosting, back-up, mirroring, data storage and disaster recovery.

⁷ Wireless Fidelity (WiFi) is a wireless local area network that uses high frequency radio signals to transmit and receive data over distances of a few hundred metres using the ethernet protocol.

- 5.14 Clearly, in order to secure these benefits, a basic understanding of the benefits of broadband technology – and possibly, in many low coverage areas, a willingness to engage in a short learning process to overcome any skill deficiencies – would be required for individuals to be willing and able to offer surplus bandwidth to other users as described above. This **emphasises the importance of demand stimulation and raising awareness amongst both residents and businesses**, but nevertheless the Arwain scheme provides a powerful indication of what is possible, with minimal government funding, given a degree of forward thinking within local communities.
- 5.15 It must be noted, however, that community network schemes have come in for much criticism, with the claim that they represent merely *"an interim solution in the absence of a strategic broadband scheme"* (Broadband Stakeholder Group, 2003) being a common example of this. Their ability to prove sustainable, in the long term, in the absence of government funding has also been called into question in some quarters.

Alston Cybermoor, Cumbria – confounding the market to make broadband available in rural areas

- 5.16 Alston Cybermoor provides an example of a scheme designed to bring the benefits of broadband to a small, rural locality with regeneration needs. The project involved deploying a wireless network, funded by grant aid, with the objective of connecting all 1,200 households, businesses and schools to broadband. Before deployment, the project aimed to develop basic IT skills so as to stimulate demand for the technology, and to increase the chances of the project delivering:
- Greater social inclusion;
 - Improved business productivity;
 - Higher ICT skill levels in the community;
 - Development of employment opportunities.
- 5.17 Cybermoor is a further example of a community project designed to provide high-speed broadband access in areas not covered by BT's ADSL network. The key difference with this project and many others, however, is that it is **operating as a commercial operation in its own right** and that it has a significant level of take-up (Broadband Stakeholder Group, Nov 2003). The 'company' operates as a social enterprise, reinvesting profits back into the business rather than allocating them to shareholders.
- 5.18 Alston Cybermoor – key facts:
- Cybermoor is a company limited by guarantee, with all subscribers becoming shareholders;
 - Major 'shareholders' are local schools and the County and Parish Councils;
 - The wireless network was procured from several suppliers – Cumbria and Lancashire Education Online (CLEO) is the backhaul provider, a leased line from BT strengthens the connection and Gaia Technologies is the distribution network provider;
 - Project initiated by Voluntary Action Cumbria;
 - All capital and deployment costs met with grant aid – major sources were the Department for Education and Skills (DfES), the North West Development Agency (NWDA) and Cumbria County Council (CCC);
 - Network has 12 transmission points to serve Alston and surrounding areas

- 5.19 The project achieved a 26% residential take-up rate by late 2003, compared to the national average at the time of just 9%. Despite some problems with the signal strength in adverse weather conditions, users almost universally report high levels of satisfaction with the technology, claiming that it has **succeeded in raising quality of life, social cohesion and business productivity** (Countryside Agency, Sep 2003). It is again important, however, to note the role played by publicity and awareness raising in achieving high take-up rates, with Gaia Technologies distributing leaflets informing residents and businesses of the benefits of the new technology and both the NWDA and CCC launching moderate publicity campaigns with a similar aim.

South West Regional Development Agency – taking the initiative and ‘Connecting SW’

- 5.20 As with most Regional Development Agencies, SWRDA identified ICT as a key enabler in its economic development strategy, unlocking the potential for entrepreneurship, productivity enhancements and social inclusion. A key obstacle to the uptake and usage of ICT in the region was identified as a **lack of knowledge on the part of residents and businesses (particularly SMEs)** as to how to use them to derive the maximum possible benefit in terms of either productivity or quality of life. A number of sub-regional and local initiatives were set up in a bid to increase up-take and usage of ICT – largely by raising awareness through marketing and raising skills through training – under the banner ‘Connecting SW’.
- 5.21 According to the DTI Broadband Fund Evaluation Report (2005), the interventions into the broadband market by SWRDA and ONE have been relatively similar. This makes analysis of the outcomes of these interventions particularly rewarding for this study.
- 5.22 SWRDA launched the ‘Connecting SW’ initiative primarily to align the aims and objectives of both itself and the 7 sub-regional partnerships in the South West of England around the ICT and broadband agenda. Also included in the scheme are business support organisations and local authorities, which aim to contribute to the three key outcomes of:
- Helping SMEs harness the productivity benefits of ICT;
 - Enabling flexible working practices through digital technologies;
 - Applying ICT for knowledge-sharing and organisation and collaborative working.
- 5.23 Within the ‘Connecting SW’ umbrella brand there are a number of individual programmes, including:
- i) Broadband4Devon*
- 5.24 Broadband4Devon, since its launch in November 2003, has provided independent advice on the use of IT to over 5,400 local businesses in Objective Two areas. One of its key programmes is Catalyst4Growth, which provides advice on where technology could be used to improve efficiency within small- and medium-sized organisations (up to 250 employees), how investment returns could be maximised and how a company’s longer-term strategy might be built around ICT. The direct aims of the scheme, which is currently scheduled to run until September 2006, are to **increase firms’ productivity and consequently their contribution to the region’s GVA**. Subsidies to support investment are also available to firms depending on their level of spending.
- 5.25 Broadband4Devon is staffed by a team of 22, including 8 specialist ICT advisors. A number of success stories are evident, particularly with smaller, specialist businesses which would often

not be associated with cutting-edge ICT systems. As one example, Riverford Organic Vegetables, a fresh fruit and vegetable home delivery service serving the south of England, was **provided with a subsidy covering 40% of the cost of an online payment system – making implementation costs affordable yet avoiding the costly and risky exercise of full subsidisation where demand is unproven** – and was assisted in setting up an 'Extranet' to integrate the databases of the company's 19 franchisees. Since Riverford began working with Broadband4Devon, it has negotiated some 20 new franchises in the East Midlands and has announced plans to expand nationally.

ii) ActNow, Cornwall

- 5.26 ActNow, backed by Objective One funding, offers advice and financial support to the self-employed and other small businesses across Cornwall. It aims to ensure not only that businesses have access to broadband, but also – in an effective demand stimulation exercise – **that they have the knowledge and skills to make the most of it** by providing guidance on applications such as virtual private networks, videoconferencing and internet telephony and wider Customer Relationship Management (CRM) issues. Support is delivered via email, telephone or personal visits to company offices by trained advisors.
- 5.27 According to a study by Ekos Consulting (Mar 2004) for SWRDA, **90% of ActNow businesses reported efficiency gains and 76% reported direct economic benefits** since they became involved in the scheme.
- Over two fifths (43%) of ActNow businesses with staff working regularly from home attributed the home-working to broadband. With the lowest rate of frequent home-working in the UK, the North East may well look to broadband to increase the scope for efficiency gains from remote working (although this is clearly not a direct proxy for profitability and competitiveness).
 - Almost two thirds (63%) of ActNow businesses said their working practices had completely or partially changed as a result of broadband. Changes included:
 - Improvements to internal/external communications;
 - Improvements to knowledge-sourcing/researching;
 - Less use of post/telephone;
 - Improvements to understanding of competitors.
 - Of those ActNow businesses whose staff used the internet for learning, 84% said that broadband had either partially or completely enabled it. This **emphasises the potential, via broadband, for upskilling through e-learning**. With a relatively low proportion of workers employed with qualifications equivalent to NVQ4 and above, this again seems to present an opportunity for the North East.

iii) Wiltshire and Swindon Smartplace

- 5.28 The Wiltshire and Swindon 'Smartplace' project is the first of its kind in the South West outside of an assisted area. It aims to increase broadband take-up and usage amongst communities, businesses and learners in the local area, partly through the provision of advice, guidance and training and partly through the support of community projects to enable access in locations out of range of BT's ADSL network. **E-Business grants of up to £1,000 are also available for local SMEs**; around £100,000 will have been paid out by March 2006.

- 5.29 The Smartplace scheme appears to have been a success. In terms of increasing broadband availability, it has achieved a 99.8% coverage rate across the Wiltshire and Swindon area, and **a third of residents have now taken up the technology in their homes**. Community access schemes in local libraries and schools have also helped to spread awareness of the benefits of broadband, with two mobile 'experience centres' helping the cause further by offering free access and basic training.
- 5.30 **E-learning 'pods'**, comprising a computer, desk and chair, training software, cash grant towards broadband access and telephone support services have also been allocated to businesses with between 5 and 250 employees, and have helped to upskill employees in management capabilities, languages, specialist trades and IT skills. The scheme's focus on e-Learning is notable as it **emphasises the importance of developing useful and practical applications of broadband**, rather than simply focusing on delivering universal access.

London's "e-Start for Business" project – leading regeneration through an SME-focused ICT initiative

"Targeting SMEs, in particular those located in less prosperous areas, ensures widespread diffusion of ICT within the regional economy, stimulating productivity growth." (HM Treasury, 2005)

- 5.31 The scheme, focused on providing training and advice to SMEs, **aims to increase firstly take-up and equally importantly usage of broadband technology amongst smaller firms**. A particular target of the initiative is driving productivity amongst businesses owned by minority groups in the capital, although in principle any business in London can benefit. The scope of the scheme is broad, with sales and productivity enhancements coming as a result of improved marketing and customer feedback as well as direct cost control, account management and supply-chain communication.
- 5.32 Guidance and support is delivered via a package of one-to-one interactions, seminars, workshops and computer-based training. Given that 94% of North East SMEs surveyed by SMART Partnerships (2005) expressed their willingness to attend a one-day training course following the survey project, and the strong SME focus demanded of the Regional ICT Strategy by much of the current evidence base, **there certainly seems a market for a similar initiative in the North East**. Such a scheme – perhaps focused primarily on rural SMEs instead of minority ethnic or religious groups as in London – may well merit serious consideration.

Broadband Procurement and Distribution Vehicles

Sheffield Wired Workplace

Background

- 5.33 The Wired Workplace (W2) project has helped to establish a sustainable platform for offering IT network and Internet services to knowledge-based enterprises in three "managed workspace" locations in Sheffield: Sheffield Science Park, Sheffield Technology Park and the Workstation/Sheffield Media and Exhibition Centre. Together they have approximately 110 business units of various sizes, with a very high occupancy rate.

- 5.34 The Wired Workplace (W2) is built around a group of 'managed workspace' and company-owned buildings that are cabled throughout, and linked to each other and to the Internet via leased lines and other network technologies. W2 also runs a number of servers to provide its services. It currently serves over 200 enterprises, most of whom employ less than 10 people. The Wired Workplace project grew out of successful regeneration projects that were supported by European funds.
- 5.35 The first project was called NEO (Networking Electronically) and was based on providing free dial-up connections to the Internet. Based on the high level of demand demonstrated in that project, it was realised that the most cost-effective way to link a geographically concentrated cluster of businesses to the Internet was to wire up all their offices, and then have them all share a permanent leased line connection to the Internet via these wires. As the Wired Workplace project neared its end, the Wired Workplace Company Ltd (W2Co) was established to maintain and develop the network services.

Objectives

- 5.36 The Business Model focuses on the strategies that W2Co should adopt to ensure its continued viability and growth beyond the initial "pump priming" stage. These are:
- Identify further steps required to consolidate the W2 service and establish it on a secure footing.
 - Explore and assess critically the options for extending and enhancing W2 services.
 - Provide a model that could be applied in the context of other managed workspaces for knowledge-based SMEs.

Type and Use Of ICT: Types of Support Offered

- Internet Connection – full ISP service, via Internet to the office, or dial-up when you're away from the office.
- Web hosting – web space for the site is included in the basic charge, with support for scripting and extensions provided for an additional charge.
- Email discussion lists – they host discussion and announcement lists for clubs, workspace managers, professional service companies and government – you can administer your own online forums securely over the web.
- User support – telephone and email support, plus the option of call-out support for subscribers based around Sheffield's Cultural Industries Quarter area.
- Connecting your building – they are extending the Wired Workplace network from its base in Sheffield's Cultural Industries Quarter, using leased lines and wireless connections.

Resources (Apart From ICT)

- 5.37 The Wired Workplace Company Ltd is company limited by guarantee, meaning that it is run on a not-for-profit basis. The company is a joint venture between:
- DJ Associates.
 - Fretwell-Downing Education Ltd.

- Sheffield Media Exhibition Centre Ltd.
- Sheffield Science Park Ltd.

5.38 Each of these entities owns 25% of the company.

Activities

5.39 Wired Workplace has installed a high quality electronic communications network, comprising Local Area Networks in each of the three locations, and network bridges between them. Every office has a socket on the W2 network. This enables both integrated communications between all organisations participating in Wired Workplace and access to (and from) the Internet.

5.40 To its clients, W2 provides:

- Direct links both to the Internet and to all Wired Workplace members- Instant availability, 24 hours a day.
- No additional costs for extra use (up to specified high ceilings, above which extra charges may be levied).
- Access to world-wide email and web browsing- Space for mounting Web pages- Access to shared services within Wired Workplace - e.g. high quality printing facilities.
- Notice boards and conferencing- Use of ISDN lines within offices.
- W2 provides 24/7 flat-rate Internet services for small businesses: Its customers enjoy 'always on' leased line Internet connectivity (sharing a 2 Mbit connection) for a flat rate charge of as little as £15 per month. This model is currently being popularised by providers of ADSL services: Wired Workplace has been offering it since 1997.

The Bristol Creative Technology Network (BCTN)

5.41 The Bristol Creative Technology Network (BCTN) was developed in the late 1990s as an experimental broadband access network by Bristol University and Telewest, as part of the National Creative Technologies Initiative (NCTI).

5.42 The project developed a high-speed digital network based on optical fibre, implemented with Bristol University's existing high speed infrastructure and the optical fibre network of the local cable operator, TeleWest. Media production and storage facilities at the Universities were supplied by Silicon Graphics and a media server located at Bristol University was used for storing video material. A network of workstations helped to run specialist software for the creation of a wide range of content including 3D animations.

5.43 In addition to the local loop, provision was been made for enhanced Internet connectivity and a high bandwidth link to London. The latter link could then be used to jump to a number of other high bandwidth networks around the world, allowing the transfer of video and audio information to similarly equipped facilities worldwide.

5.44 On the technical side of the project, it was important to understand how to make the most effective use of the networking infrastructure. The member of video and audio streams being carried must be maximised, while ensuring that the data is delivered within real-time constraints, delivering video frames and audio streams on time.

- 5.45 Traffic patterns were measured to assess demands on network capacity so that Telcos could apply appropriate tariffing for media use. This measuring was also required to help media companies optimise their use of emerging broadband networks.
- 5.46 Regular reviews of organisations using the network were undertaken to identify how they could potentially work together on commercial projects, both on and off line, in order to produce models to form the basis for software aimed at supporting virtual company activities.

Welsh Development Agency Model - FibreSpeed

- 5.47 In July 2002 the Welsh Assembly Government (WAG) launched the Broadband Wales Programme, with the aim of ensuring that the whole of Wales enjoys the benefits of being able to access affordable broadband. The Welsh Development Agency (WDA) is delivering a number of important elements of this programme, one of which is FibreSpeed, a £60 million project to provide 10+ Mb/s (going up to gigabytes) connectivity for business and academic use. The key objectives behind this are speed and affordability. The fact that there are fewer Points of Presence in Wales has resulted in high distance-based charges from the incumbent operator, BT.
- 5.48 The South East of England has been used as the tariff benchmark for the FibreSpeed project because it has the most competitive infrastructure in the UK and a pricing matrix will be put in place with a cost structure that uses the generic South East benchmark.
- 5.49 There are 50 business parks and strategic locations across Wales, both greenfield sites and locations that are already established. There will be an operator-independent infrastructure that will connect these sites. This will provide the “backbone”, i.e. an onsite and national network infrastructure interconnection point for carriers, giving access to all sites (comprising approximately 2,500 businesses) to bridge the barrier of capital costs for other licensed operators in Wales.
- 5.50 One of the key issues of FibreSpeed that is of importance to a broadband SPV at Leicester Science Park is State aid. The WDA visited the European Commission in November 2004 and then notified the Department of Trade and Industry about FibreSpeed. At the time of writing the WDA is still waiting for a decision. However, State aid approval is expected to be approved and points of note here include:
- It would be an Open Access Network and would be of carrier-class standard, therefore BT cannot argue that it is not up to standard.
 - The owners of the infrastructure would be the WDA and WAG and there has been some private sector interest in providing funding for the infrastructure. Moreover, the only cost to the WDA is the investment required to put the infrastructure in place, which could be needed for a single operator anyway.
 - A management company would operate and manage the infrastructure, with an open and transparent interface with carriers – the key point here is that the company would not be involved in any service provision to end users, therefore it would not be distorting the market. The management company would simply be providing a platform that any carrier can use, with no benefits to any other carrier. The concept is to put competition in place through the infrastructure and then leave it to the market to provide services.

- 5.51 There are currently 217 open access or fibre to home projects across the European Union, meaning precedent is not just limited to the UK – the FibreSpeed project should therefore pass as acceptable State aid.

Examples of good practice – Europe

Nuenen – universal access sparks creativity across generations

- 5.52 Part of the Dutch Kenniswijk project – a government initiative to encourage the private and public sectors to start deploying Fibre-to-the-Home (FttH) networks for high-speed broadband – a comprehensive network of cables were laid to provide **15,000 residents (in 8,000 homes) of the municipality of Neunen, near Eindhoven, with super high-speed broadband (up to 100Mbps), telephony and TV services.** The business model involves individual households joining a co-operative society which owns and funds the network, so no government funding is required and the once-prohibitive private sector investment risk is eliminated.
- 5.53 **A similar initiative may well merit consideration in a North East market town,** which would have sufficient 'rurality' to warrant the investment and yet sufficient population to maximize the potential gains from community service provision and increased social cohesion. The well-designed interventions of the Dutch public sector – **demonstrating commitment through investment yet going out of its way to stimulate private sector activity and encouraging both innovative community projects and entrepreneurship** – have almost certainly been a key driver of the rapid growth in national broadband penetration rates since 2001 that may well see the country overtake Korea as the world leader in this respect by the end of 2005.
- 5.54 The results of the Neunen 'experiment' have been quite dramatic, with around a hundred innovative projects having been started – from video consultations with family doctors to virtual interactions with bank staff, and from live transmissions of church services for the infirm to the entertainment advantages of ultra-quick movie downloads and high-definition TV – **within three months of the original provision of infrastructure.** These have had effects from giving firms back their competitive edge (not least the local bank, which had been losing customers to larger internet-only operations) to increasing social inclusion, with impressive usage rates amongst the elderly and an unprecedented rate of business start-ups amongst retirees.
- 5.55 The Neunen example: key facts:
- **Project took 6 months from start to finish,** thanks to co-operative attitude of municipality (who quickly granted digging rights) and enthusiasm of residents (who expressed the interest to enable private firms to justify their investment)
 - **Dutch Ministry of Economic Affairs contributed E6.4m (£4.4m) in subsidies** (E800 to each of 8,000 homes), having understood the potential gains in terms of inward investment, social cohesion and no doubt external publicity
 - **Subsidy paid directly to the housing corporation,** ensuring that households got free service for the first year – after this, households make monthly payments to their preferred operators
 - Free initial service meant that households were given the incentive to trial the technology, **overcoming confidence and knowledge barriers** that could have damaged take-up and usage

- **Broadband speeds can be upgraded from 10Mbps to 100Mbps** simply by adjusting the electronics, making video telephony and other services easily available as soon as they become commercially viable
- **The E800 subsidy per home is less than half of the real cost** – the rest is funded by the housing corporation and private investors
- **Substantial marketing also necessary to secure commercially viable penetration rates** – this was handled by the network owner
- 'Open network' system is used, meaning that households are free to choose their internet or cable provider – this means **the benefits of competition (namely lower prices and better service) are evident**, with consumer sovereignty reinforced
- **High-speed broadband capacity increases investment appeal of town**, creating wealth and employment and modernizing industrial structure, bringing local economy in line with market demands

Sweden – Next Generation Broadband

- 5.56 The Swedish Government has committed to spend £680 million by 2004 to provide broadband network access to 98% of the country's towns and villages, including those in rural areas. The state has also committed to building a national broadband network through a telecommunications subsidiary of the national electricity grid operator (SVK). The network is scheduled to be completed by 2005, will be operated independently and will be open to all telecommunications service providers that want to lease dark fibre.
- 5.57 It must be noted that to date these projects have been slow to progress due to a lack of demand for broadband services and the Swedish Government is currently assessing ways of stimulating demand for broadband.⁸ Broadband subscribers in Sweden also have the possibility of tax reductions where the cost of a broadband connection exceeds £540. The outcome of this project has been the development of near-universal next generation broadband coverage in Sweden, despite very low population densities in many areas of the country. The key implication of this case study for Leicestershire is summarised in the bullet points below:
- 5.58 The key lesson learnt is that broadband supply projects in the North East need to be complemented with demand-side interventions as the Swedish projects at the beginning suffered from a 'build it and they will come' mentality.

Alternative Networks – Sweden

Rivermen and the Norrsken Network

- 5.59 Rivermen is a network management firm that provides services over the Norrsken Network to the north of Stockholm. The region served by the Norssken network has a population of around 270,000, the majority of whom live in the southern part of the region. A number of city networks were already established, but there was a need for connectivity to Stockholm and for control of the infrastructure to be in the hands of the city network operators. In order to achieve this, the Norssken backbone network was constructed, providing access via 23

⁸ Consultation with Arne Granholm, Swedish Ministry of Industry.

connection nodes. The network is 52% owned by the local authorities and provides connectivity for operator independent services to communities, the health sector and the education sector. Educational resources such as Video on Demand are delivered to schools in the area.

- 5.60 The implementation of the Norrskan network represents a considerable achievement, the total length of the fibre ring is over 1,000km. Construction has been executed using a variety of techniques including conventional trenching, thrust boring and directly burying cable and blown fibre tubing. The regulatory and licensing regime in Sweden appears to be very flexible and it is doubtful that the same attitudes would be seen in the UK. Despite this note of caution however, the existence of the Norrskan network proves that the implementation and operation of open access networks over a relatively wide geographical area is eminently achievable.

Examples of good practice – global

South Korea – Next Generation Broadband

- 5.61 The government of South Korea is firmly supporting the broadband revolution that is occurring in the country. The government has clearly stated its goal of making South Korea one of the most advanced information economies in the world. Under a 10-year plan, the administration intends to channel \$30 billion of investment in the country's IT infrastructure and over \$10 billion of this investment will be used to deliver VDSL (Very high bit rate Digital Subscriber Line) or fibre to over 80% of the South Korean population by 2005 (facilitating data rates of 20 Mbps).
- 5.62 One of the key drivers of the uptake of next-generation broadband services in South Korea has been Voice-Over-IP, a tangible 'killer application' that end-users both understand and value. Although the South Korean government is allocating significant financial resources to the deployment of next-generation broadband, it must be noted that the geographic concentration of the majority of the population in high-rise urban apartment blocks has been instrumental with regard to the overall feasibility of the programme. The outcome of this project has been to develop South Korea as a world leader in the deployment of next generation broadband infrastructure and the key implications of this case study for the North East are summarised in the bullet points below:
- 5.63 Many countries such as South Korea are looking ahead to next generation broadband (10 Mbps+) and the North East needs to look beyond ADSL/SDSL in order to achieve this; and
- 5.64 South Korea's centralist approach to the deployment of broadband cannot be replicated in Leicestershire as the sub-region needs to act within the UK policy framework of encouraging competition and lobbying the dominant suppliers.

Contrasting broadband strategies of Korea and Japan

- 5.65 Both the South Korean and Japanese governments have been very active in pushing broadband uptake within their respective countries.
- 5.66 In Korea a long-term plan for broadband infrastructure was drawn up in 1995. Under the plan multiple firms, each offering different access and pricing structures, are allowed access to the loops of local public telecom operators. The competition this policy engendered has led to South Koreans enjoying some of the lowest Internet access costs in the world. Subscriptions

are mainly via ADSL lines, accounting for roughly 63% of the market in 2001. South Korea currently leads the world in broadband connections per head.

- 5.67 Japan, like South Korea, also implemented a broadband infrastructure in the mid-1990s with a heavy emphasis on supplier competition and the unbundling of NTT's access loops. However, unlike South Korea, Japan has chosen to develop a fibre-optic loop, predicting that fibre, and not ADSL, will be the future of high-speed communications. In promoting the fibre option the Japanese government has forced suppliers to ensure the interoperability of their services in return for tax breaks designed to stimulate investment.

South Korea – reaping the benefits of broadband for all

- 5.68 South Korea, according to the OECD's June 2005 statistics release, boasts **the highest rate of broadband penetration (24.1%) of all developed nations**. In 2004 no other OECD country had yet reached the rate achieved by South Korea in March 2002 (19.1%), although it was anticipated that the Netherlands could potentially achieve 24% by the end of 2005 if its rapid rates of broadband take-up (helped by revolutionary initiatives such as the widespread deployment of Fibre-to-the-Home technology in Neunen, analysed below) were maintained.
- 5.69 In general, South Korean users generate a high demand for wireless multimedia services via the internet, and three operators have been granted licences to offer services from the country's new 'Wi-Bro' (Wireless Broadband) network currently set for launch in April 2006 (Informa Telecoms and Media, Sep 2005). **This illustrates the willingness of the private sector to provide a service given sufficient consumer demand, and indeed the potential of competition to drive innovation** given the corporate strategy of one provider, KT, to use Wi-Bro as its primary growth engine and a lever to regain competitiveness relative to a larger rival.
- 5.70 It is useful, in setting aspirations and subsequently in planning how to turn them into reality, to identify the key success factors in the Korean 'model' and assess the extent to which they may be replicated in both the UK and the North East.
- **Ambitious government targets and strong leadership:** the Korean Ministry of Information and Communication, in its 2002 *Internet White Paper*, set a new broadband objective for the delivery of 20Mbps to the home by 2005. Extensive funding of infrastructure deployment was also clearly required, but the deregulation of the communications sector also played an important role, alongside two tactics described earlier in this report:
 - *Provision of subsidies to low-income households for the purchase of PCs and broadband access* (there is a continued high concentration of low earners and income inequality in parts of the North East).
 - *Provision of free IT training to enhance computer and internet literacy* (much of the North East evidence base identifies a need for training, particularly for residents of deprived or rural areas and SMEs).
 - **Geography and Demographics:** dense housing patterns mean that network providers are able to deploy infrastructure in a cost-effective manner (substantial economies of scale are available). The fact that 80% of South Koreans live in densely populated urban areas illustrates the suitability of the country to commercially viable infrastructure deployment, and also explains why regions such as the North East of England are vulnerable to so-called 'market failures' in this respect.

- **An equitable pricing structure:** it was recognised by the Korean government that to deliver universal take-up, broadband access would need to be affordable for middle-income households. Competition drove prices to a level deemed affordable to the vast majority, but the state was prepared to intervene to keep prices low if this had not occurred. The implication is perhaps that, since cost represents a key barrier to adoption, **'artificially low' prices may be required**, in the absence of competition, in the early stages of deploying a new technology if sustainable demand is to be generated.
- **The 'PC Bang' phenomenon:** a large number of privately-run 'PC Bang' centres (similar in concept to internet cafes) helped stimulate demand and develop applications, such as online games, that encouraged broadband take-up and demand for other online services (such as home finance) as ICT became ingrained into everyday lifestyle.
- **The emergence of clear user benefits:** a lack of awareness of the benefits is frequently cited as perhaps the most obstructive barrier to ICT take-up, and lessons should almost certainly be learned from the ability of the Korean public and private sectors to stimulate demand for "*education and entertainment*" via ICT through the demonstration of clear user benefits.

Source: DTI/Brunel University (Oct 2002)

Australia – tackling digital exclusion in developed countries

- 5.71 The Australian example is useful in illustrating the fact that the 'digital divide' is far from purely an inter-country phenomenon between developed and emerging nations. Australia, ranked sixth in the world in internet penetration in 2005, suffers from the problem in the form of clear intra-community divides along a number of lines, with the **'digital exclusion' of many groups often exacerbating existing social exclusion issues**. Recent research found that those on a) low incomes, b) without a higher education, c) living in rural or remote areas, d) aged over 65 and e) with a mother tongue other than English were significantly less likely to be online.
- 5.72 A literature review by Blard (2005) argues that the digital divide in developed countries is now an issue of "*social inequalities, literacy, content and skills*" rather than merely access to information, since **access does not necessarily equate to effective use**. The lesson for an ICT strategy in a developed country is that not only must network coverage be extended but also:
- Skill capacities must be strengthened;
 - Content must be created to stimulate demand through the working of the market;
 - Community initiatives, whether in schools, workplaces or dedicated community centres, must work to stimulate digital inclusion through developing both ICT skill levels and content relevant to people's lives.

Conclusions – intervention good practice menu

- 5.73 The case studies fall into two broad types:
- Those providing area-based interventions (e.g. backhaul).

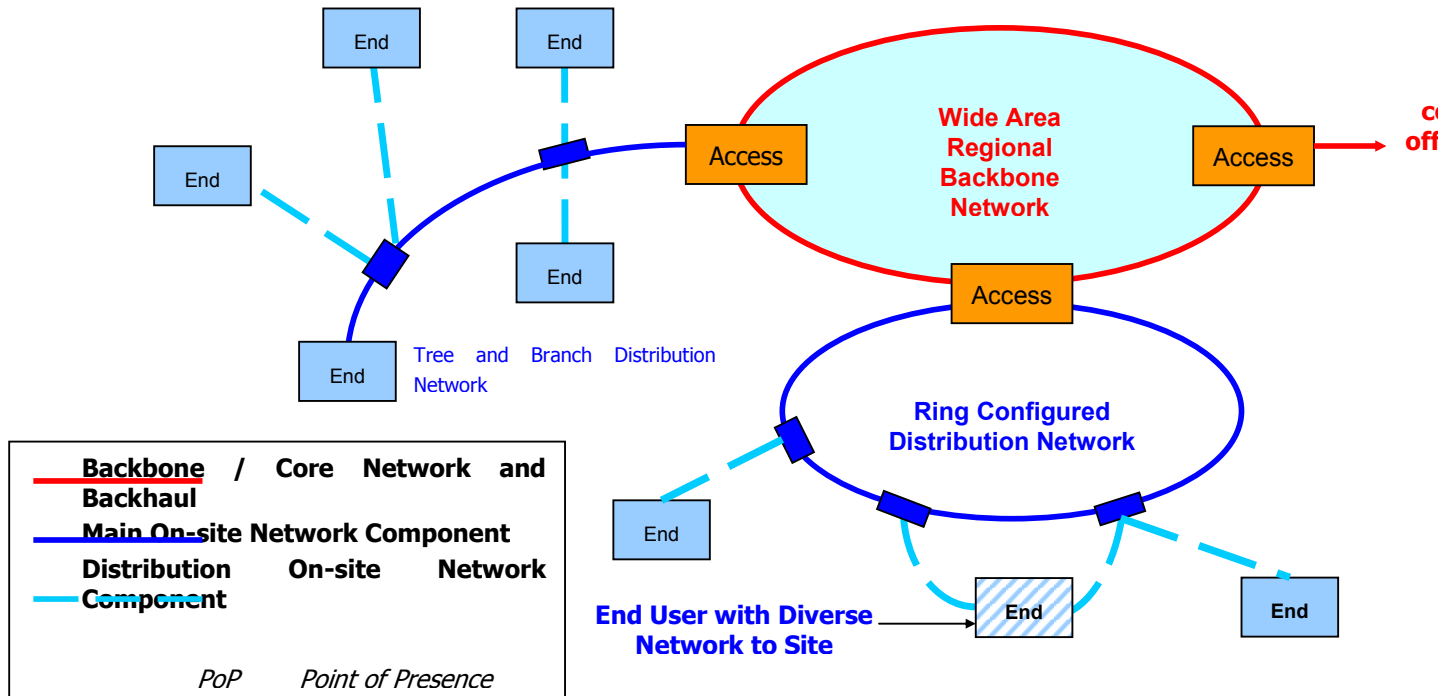
- Those focussing intervention on a particular site, cluster, neighbourhood or other micro geography.
- 5.74 The latter are the most directly relevant to this study. Key lessons from these are:
- Support, handholding and assistance are as important, if not more important than the provision of broadband itself. The support has overlaps with (can combine) elements of economic development and training support.
 - BT's decision to DSL enable 99% of the UK by the end of 2005 pulled the rug from under the feet of those projects focussing on provision of DSL. There is still however clear evidence of market failure regarding high capacity/ more advanced services. Hence, the focus of projects needs to be on providing 'specialist services' that fall outside of the domain of, and that are not supported by DSL e.g.:
 - High capacity.
 - Low or zero contention.
 - Flexibility – ability to peak and to experiment with very high capacity at certain times.
 - Specialist forms of transmission.
 - Support in accessing and/or developing bespoke applications and services.
- 5.75 Regarding procurement, the most effective tool appears to be aggregation (e.g. bundling up of end user retail requirements and placing (underwriting) a wholesale order from the most competitive carrier. This allows the carrier to make the business case to cover any capital costs and at the same time, allows the project to avoid direct investment in public realm network. Its domain therefore is primarily 'on-site' and 'in-building'. This approach avoids the project as being seen to 'interfere' in the carriers' market and is also seen to 'leave the issue of building, running and maintaining' off-site network to the carrier market place.
- 5.76 Some of the lessons from the 'area-based' case studies are helpful also:
- State aid issues remain important – it is essential to formulate an intervention that minimises the impact and 'is in accord with the spirit of the treaty'. Discussion and support from SAPU is very helpful and early discussion with DG Comp is recommended.
 - Focus (and restrict) benefits to SMEs.
 - However, interventions in the backhaul arena are likely to be far more contentious that projects focussing on a single site or micro cluster (like a Science Park).

Welsh Assembly Government Broadband Wales initiative and Welsh Development Agency Fibrespeed Project – and - Scottish Enterprise ATLAS project

- 5.77 Use suitable typology that distinguishes between external backhaul, regional backhaul, and local access - across region generally but with specific focus on the agreed target areas.
- 5.78 For the purpose of providing access to broadband services, areas where shortfalls exist will be identified and included in strategic plans to address specific issues. Where the identified areas need distribution network infrastructure, i.e. connection to customer premises, network can be ground based or radio based as appropriate to local requirements and physical conditions.

- 5.79 The distribution network, whether deployed to serve a general geographic area, a community or a business development can be regarded as “on-site” and will provide bandwidth connectivity to support the delivery of broadband services. The on-site network will be terminated in customer premises and on an aggregation point of presence (PoP) which will house the on-site network transmission system electronics and allow access to external networks. In order to provide external connectivity that enables service providers to deliver broadband services to end users connected to the on-site network, the on-site PoP needs a backhaul connection to other network or service PoPs.
- 5.80 Backhaul capacity will be required from all concentration and aggregation points such as DSLAM units and fibre multiplexer installations. In the case of DSLAM equipment, the equipment owner, i.e. BT or a Local Loop Unbundling Operator, will need to provide backhaul connectivity of sufficient capacity to support the aggregated bandwidth of the end user connections subject to contention limits.
- 5.81 Backhaul infrastructure provides connectivity from on-site networks to points of presence on regional and national backbone network infrastructure. The national backbone network can be regarded as an inter-regional connection that carries traffic between points of presence across the UK. National backbone networks have been built by BT and other operators such as Cable and Wireless, Surf and FibreNet.

On-site Network Configurations with Off-site Connectivity Through Backhaul PoP



- 5.82 Support mapping with qualitative analysis of what we expect to be available (drawing in particular on SM's work for Ofcom).

- 5.83 This is largely covered by sections 3.3 and 3.4
- 5.84 Availability of bandwidth will depend upon the degree of competition in the region and sub-regions.
- 5.85 Developers of new residential and business developments in the UK have traditionally regarded the installation of telecommunications infrastructure as secondary to the other utilities i.e. Gas, Water, Electricity. The introduction of competition into the UK telecommunications market has done little to change this situation, especially for areas outside the dense urban and commercial centres. The UK still has large areas where BT is the only network provider.
- 5.86 One of the main reasons for this situation is that, on almost all new development sites, BT installs duct alongside main and distributor roads and into all new buildings in order to meet their Universal Service Obligation (USO) to provide fixed voice services. This duct is also used by BT to provide optic fibre cables to provide high bandwidth services.
- 5.87 The duct is wholly owned by BT and, upon adoption by the local Highway Authority, occupies space in the public highway. This duct is not shared with Other Licensed Operators (OLO). As a result of continual network deployment to meet USO obligations BT has a near ubiquitous duct and cable network in the UK. The only way operators can currently access BT network infrastructure is through Local Loop Unbundling.
- 5.88 OLOs have no USO obligations and provide network only where customer revenues ensure a suitable return on capital investment in new infrastructure. An OLO will rarely install duct speculatively on a new development and even where new customers are identified infrastructure is only installed to serve those customer sites requesting service.
- 5.89 Alternatively they must rely on the developer having installed some suitable pipes to new buildings or install their own infrastructure. This involves digging up new roads, footways and hard landscaping. The OLO also has to build out backbone connectivity to the site, both activities are disruptive, time consuming and expensive.
- 5.90 Where pipes and inspection chambers have been provided, they are not always suitable for the provision of telecommunications cables, especially optic fibre. In addition, developers seldom provide multiple pipes on the site to all buildings and this means that telecom operators are forced to share pipes and inspections chambers, a situation that they would prefer to avoid for security and operational reasons.
- 5.91 The majority of residential and business developments in the UK have only BT network infrastructure serving all customer sites. Some residential developments will have Cable TV service as well as BT. Established urban areas will have BT, Cable TV and probably some deployment of alternative network providing business customers with leased lines or similar services. Network infrastructure on business developments will be primarily BT with some network deployment by OLOs to serve customer sites that request service.
- 5.92 The current commercial situation is that the high value, high revenue business sectors rely heavily on telecommunications services to operate and, when choosing a prospective site to locate, the availability of competitive telecommunications services is a key priority. Consequently, it must now be recognised that site developers, public and private sector, need to include telecommunications in the provision of utility infrastructure and that, due to the nature of telecom networks, a deployment strategy for the site must be created in order to meet the needs of telecom operators wishing to provide customer services to the development.