

# Broadband in rural areas

Best practice study





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# Broadband in rural areas

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# Synopsis

This report is the result of a review of 13 early community broadband projects in England. The purpose of the review was to identify best practice activities by communities, local authorities and individual businesses to overcome the lack of broadband services in villages, small towns and rural business parks. The report is in three sections. Section A summarises the findings. Section B reviews each of the projects, while Section C provides background information about funding, technologies and service providers.

The present availability of broadband is expected to grow from 67% of households in March 2003 to 80% in one to two years, as BT extends its broadband services into an increasing number of exchanges. However, even with this higher coverage, around half a million prospective rural broadband subscribers would be left unsatisfied. Other than major national telecommunications operators like BT, ntl and Telewest, activity to provide broadband service can at best be described as piecemeal. As a consequence it is up to communities to encourage supply of broadband in their locality.

Local authorities, local education authorities and regional broadband consortia have been forced to build networks to deliver telecommunications services for their rural offices and to provide broadband services to schools in the absence of suitable infrastructure from telecommunications operators and service providers. Some of these networks have grown beyond their initial user base and are now providing services to small and medium sized businesses and consumers. The Communications Bill is altering the law in this area in recognition of this local authority role.

Some communities have taken action themselves to provide broadband services. While these projects are generally not as advanced as those in the public sector, they are a beginning. The early community projects are now beginning to provide services to users.

Funding for community broadband projects has been provided from a number of sources, such as the DTI's UK Broadband Fund and the Market Towns

Initiative from the Countryside Agency. Regional Development Agencies and local authorities may continue to be a source of funding.

The way in which projects are funded imposes a structure on community organisations and their interaction with suppliers. Ultimately community organisations may supply services themselves or act as a facilitator for the introduction of a service provider into a particular community. On the one hand, the service provider contracts with users to provide service. On the other hand, the service provider, with the encouragement of a community organisation, contracts with users. Whichever approach is adopted, community organisations also have a role in the provision of IT services that lead to increased levels of interaction and cohesion within the community. Community organisations should be incorporated to achieve these ends and incorporation is essential if they are to procure or provide services.

There is a considerable amount of practical experience now in the stimulation of demand. There is less experience of building community organisations and acquiring or delivering services. However, experience suggests approaches to the development of the organisation, the roles that fall within its capability and the roles that should be shouldered by a service provider dependent on available resources and expertise.

There are particular areas, such as network design, implementation and operations, customer support and administration, that may be best carried out by a suitable service provider. However, specific objectives, such as the development of Information and Communications Technology capacity in the community, may lead the community organisation itself to carry out these roles. Alternatively, there may be a compromise position in which the community organisation takes on those roles consistent with its objectives, yet passes on remaining roles to a service provider.

# Section A

## Best Practice

### Terms of reference

While most urban centres now have broadband services, recent research for government indicates that a large proportion of rural England cannot expect to gain affordable access to broadband services in the next few years. Government has acknowledged this problem and has developed policies to stimulate broadband rollout in rural areas. Particular actions have included the sharing of telecommunications infrastructure between public sector organisations, grants for small businesses to deploy satellite services and the Broadband Fund to support broadband projects across the UK.

Despite these actions by government, individuals and communities need to act if broadband is to become widely available in rural areas. This guide has been prepared for individuals and organisations that want to provide broadband services for their communities.

The guide is based on the experience of a selection of early community broadband projects. The selected projects are rural or have a significant rural element. Some have been completed (that is they are offering broadband services) and some are still in the implementation phase. Some are public sector oriented and some are private sector focused. The projects were selected to cover a wide range of technologies, types of organisation used to deliver the services and funding sources.

Section A of the guide is a distillation of the experience gained in these projects in terms of the organisation requirements and activities necessary to deliver a community based broadband service. Section B describes the projects in more detail, while Section C provides detailed material of a more technical nature in three annexes: funding sources, descriptions of broadband technologies for community network and commercial backhaul network providers.

Information about the projects was collected in face-to-face meetings with the major stakeholders -

the project sponsor, the project champion or manager, other facilitators and users or potential users of the service. The meetings considered the objectives of the project, how it was organised and funded, the activities involved in obtaining service, business planning and analysis and customer related activities. All of these aspects are covered in this report.

A workshop with public sector bodies was held to augment the project visits. This workshop was concerned to identify issues that were not likely to be raised in the projects. Questions considered in the workshop included community opportunities associated with broadband networks, broadband applications, constraints on use, the role of government agencies in promoting supply of broadband services, contractual arrangements between the parties, and funding sources.

### Rural broadband projects

Rural broadband projects have originated in a number of ways. Under the auspices of the National Grid for Learning (NGfL), regional consortia of local education authorities (LEAs) have set up broadband networks for schools which in some cases also provide services to libraries and other public sector organisations. Examples of these networks include the East of England Broadband Network (E<sup>2</sup>B<sup>N</sup>) and the East Riding of Yorkshire Council (ERYC) broadband network. They provide a backbone for rural telecommunications which extends over a wide geographic area. At the same time they provide local Points of Presence in each school and therefore in each village and town in the area covered.

Because of this ability to provide telecommunications services into a community, the NGfL networks have been considered as the first step in providing community networks by some people. The Cumbria and Lancashire Education Online Network (CLEO) has established itself in this way, as have some of the other NGfL networks. CLEO provides internet access services to a number of community networks including two considered here

- Edenfaster and Alston Cybermoor. It links each community network to a commercial internet service provider, while at the same time providing services to schools and other bodies.

At the opposite extreme to these regional or county-wide public sector projects are those that are targeting the private sector in specific communities. These projects have originated with local pressure groups or under the influence of very strong local project champions. Examples of these networks include the Kingsbridge broadband network in Devon, Bredon Hill in Worcestershire, Edenfaster, Alston Cybermoor and Cambridge Ring North East (CARNET). All of the above, with the exception of Kingsbridge, have subsequently received backing from their respective regional development agencies (RDAs). Kingsbridge has sustained itself without public funds.

These networks have been focused primarily on the needs of small and medium sized enterprises (SMEs) and consumers, although they can and do sell services to schools and other public sector organisations.

Derwentside District Council and Milton Keynes Council have also built community networks. These share some of the characteristics of private sector projects. These projects, and Buckfastleigh in Devon, funded by the South West Regional Development Agency, have been set up in the first place to provide services to a broad range of public sector customers, but services are also offered to SMEs and even consumers within the areas covered.

Finally, there is the South East England Development Agency's (SEEDA) project to promote satellite broadband for single organisations without broadband in areas with no alternative provision. This a variation on the Remote Area Broadband Inclusion Trial (Rabbit) national scheme which promotes satellite broadband by grants. These schemes seem valuable in the absence of any community scheme or service from an established broadband supplier.

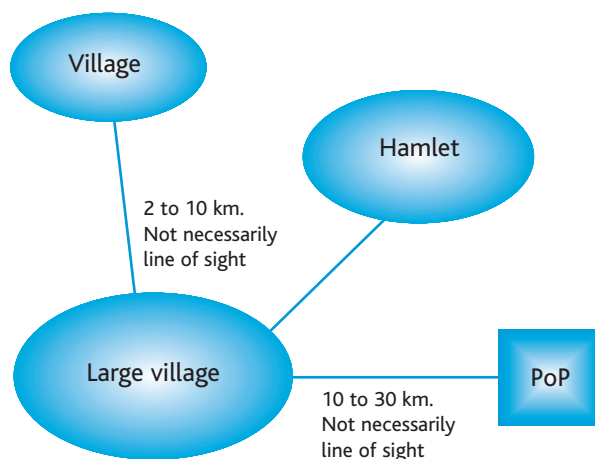
### Community characteristics

Rural communities vary considerably in size and characteristics. Figure 1 identifies the kinds of

community this guide addresses. Most of the case studies in this guide cover areas with the characteristics shown. Projects like Alston Cybermoor, Edenfaster and Bredon Hill cover areas around larger villages or small towns, with smaller villages and hamlets close by. These villages may be some distance from a town with good telecommunications services and a Point of Presence (PoP) for the internet. Together these villages will have a number of primary schools, village halls and pubs. The larger village will probably have a doctor's surgery and shops, and it may have a post office. The hamlets are typically a cluster of houses and business premises around a farm. However, they may be independent business parks, like New Greenham Park, near Newbury, which is built on Greenham Common, a former Ministry of Defence site.

Such communities are unlikely to have broadband, either because their broadband enabled BT exchange is too far away for service to be provided, or because their exchange has yet to be enabled.

Some towns are themselves without broadband services. Kingsbridge, Buckfastleigh and even parts of Milton Keynes do not yet have coverage. Whilst much of this guide applies equally to towns as to villages, it is likely that BT will provide services in towns within months, particularly if a registration campaign is organised (see Section C, Annex 2).





<p><b>Village and surrounding area</b></p> <ul style="list-style-type: none"> <li>• 10 sq km (1,000 hectare)</li> <li>• 1,000+ properties</li> <li>• Overall density -1 property per hectare</li> <li>• Coverage by 2+ GSM networks</li> <li>• No coverage by UMTS networks</li> <li>• Power lines and telephone lines above ground in some parts</li> <li>• No CATV or ADSL coverage envisaged</li> </ul> <p><b>Hamlet</b></p> <ul style="list-style-type: none"> <li>• Less than 20 properties</li> <li>• All properties within 2 hectare</li> <li>• Mix of residential and farm, small commercial / industrial / retail</li> <li>• Typically a farm with outhouses</li> </ul> <p><b>Village</b></p> <ul style="list-style-type: none"> <li>• 0.5 sq km (50 hectare)</li> <li>• 20-500 properties</li> <li>• 1-15 properties per hectare</li> <li>• Mix of residential and farm, small commercial / industrial / retail</li> <li>• One public building eg. village hall</li> <li>• Pub</li> </ul> <p><b>Large village</b></p> <ul style="list-style-type: none"> <li>• &lt;2 sq km (200 hectare)</li> <li>• 500-2000 properties</li> <li>• 8 properties per hectare</li> <li>• Mix of residential and small commercial / industrial / retail</li> <li>• Pub</li> <li>• Village Hall</li> <li>• Village shop</li> <li>• Primary school and/or library</li> <li>• 2Mbit/s to school and library</li> <li>• Post office</li> <li>• Doctor's surgery, NHS Net</li> </ul>
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Figure 1: Characteristics of many rural communities

## Definition of best practice

The guidelines here are intended to lead to provision of a broadband service with the following characteristics:

- It meets end user needs for broadband services.
- It is low cost: it requires a minimal funding requirement and recurring costs are sufficiently low to enable pricing to be in line with typical consumer and business broadband charges.
- It is quick to implement: taking into account the whole process from initial feasibility and demand estimation to the supply of services to individual users.
- It provides a sustainable service irrespective of changes in the local community.
- It exploits available services, where possible, for backhaul and local distribution.
- It minimises risk to customers, suppliers and intermediaries through use of exemplar contracts and funding models.
- It provides an environment to train individuals involved in the project.

In practice, the ideal approach is to identify an experienced service provider willing to offer service to a community. The service provider, even BT, will ask for a committed group of users to reduce its investment risk. Once implemented, the service should then be provided with the minimum of effort on behalf of the community. In addition, it is likely to be funded in full by the supplier and the supplier will be able to use existing customer support services and internet connections. As a consequence this approach minimises risk to all participants.

It is only when this approach fails should a community seek to provide a bespoke network – built to meet the needs of the community. This guide focuses mainly on what to do when a bespoke network has to be built.

## Current state of broadband implementation in the UK

### Commercial broadband services

The major suppliers of commercial broadband services are BT and the cable network operators ntl and Telewest. BT offers a variety of services, but its main offer is based on Asymmetric Digital Subscriber Line technology (ADSL) which provides broadband services over normal telephone lines. ntl and Telewest mainly offer broadband services over their cable TV networks using 'cable modems'. These technologies are described in Section C, Annex 2.

BT, ntl and Telewest have made a lot of progress in rolling out broadband services across the United Kingdom since the beginning of 2002 when roll out started in earnest. By March 2003, cable modem service coverage had reached 43% of households while ADSL coverage had reached 67% of households. It is unlikely that cable modem coverage will be important in rural areas, but ADSL will be.

BT's roll out plans include a large number of exchanges that cover rural areas. The roll out of ADSL is a major investment and one that is not risk free for BT. In order to minimise this risk, BT has put in place a registration scheme for prospective broadband subscribers. This gives BT an understanding of demand by telephone exchange that it can use in planning its roll out programme. The scheme currently covers exchanges that reach about 80% of all households. An exchange in the scheme gets ADSL when the number of registrations reaches a pre-defined 'trigger level' which varies by exchange. Registrations for a lot of exchanges have reached their trigger levels, and recently BT has helped achieve this result by revising trigger levels downwards.

In contrast with BT and the cable operators, wireless service providers and satellite service providers have relatively few subscribers. Only one wireless service operator, Firstnet, gives reasonably wide coverage of the UK, although this might change with the licensing of new frequencies that is currently underway. Firstnet has chosen to serve relatively densely populated areas of the country, and its service is therefore not available in many rural areas.

There are several satellite service providers, and the nature of satellite transmission means that all areas of the country are covered. These services are valuable for small numbers of users or a single subscribing organisation in rural areas. However, they are perceived to be expensive, and are expensive in real terms, relative to the cost of ADSL or a cable modem service. In addition, satellite services are not appropriate for all applications because of the delay inherent in the service. Overall, satellite services have not sold in large volumes, possibly because they are not sufficiently marketed despite government schemes.

### Demand for services

The roll out of ADSL in particular is matched only by the rapid take up of services. In May 2003, there were more than 2 million subscribers to broadband services, 14.5% of the 13.75 million internet subscribers, and 20.7% of internet subscribers who are in areas covered by broadband services (Source: OFTEL<sup>1</sup>).

Despite this success, the gap in service provision, which is apparent mainly in rural areas, represents around 875,000 potential subscribers. There will be over half a million latent broadband internet subscribers, even when BT can provide service to 80% of all households at present penetration levels<sup>2</sup>.

### Community broadband services

A community that wants broadband services is faced with a major choice. Should it build its own community broadband network, or should it try to obtain a service from BT or an established Internet Service Provider (ISP)?

<sup>1</sup>OFTEL Internet and Broadband Brief, June 2003; [www.oftel.gov.uk/publications/internet/internet\\_brief/broad0603.pdf](http://www.oftel.gov.uk/publications/internet/internet_brief/broad0603.pdf)

<sup>2</sup>Assuming that the demand for broadband internet services in areas that are not served currently is proportionately the same as in areas that are served currently.

In Bridgnorth, Advantage West Midlands (AWM) supported a registration campaign run by a local champion, Martin Edwards. The purpose of the 101 Registration Campaign was to build a database of prospective broadband users in order to stimulate interest from potential broadband suppliers. When the campaign started, there were 190 registrations against a trigger level for the exchange of 750 subscribers. AWM announced a tender underwriting 30 connections and requested tenders from 34 suppliers.

A public meeting was held with the local MP. A marketing campaign was carried out in local newspapers and as a result, registrations increased to 280. At the same time, BT reduced the trigger level for the Bridgnorth exchange to just 315, a level that AWM believed to be attainable. Ultimately, the trigger level was reached, BT has delivered a broadband service to Bridgnorth and AWM has been able to deploy its broadband expertise to run projects in other areas.

There is nothing to be lost from running a registration campaign where the trigger levels for the exchange(s) covering a community are realistic. Even where they are not, there are numerous examples of registration campaigns, like Bridgnorth, that have coincided with a lowering of trigger levels to meet the level of registration achieved. The result is often that BT will implement a broadband service for the community at its own risk. It will then continue to provide services and customer support to individual subscribers without continuing community involvement.

### **Community broadband networks**

The alternative to a commercial broadband service is a community broadband network like the ones that have been implemented in places like Buckfastleigh, Kingsbridge, in rural areas near Cambridge (CARNET) and at Alston Cybermoor. Such a network covers businesses, residential users, public sector organisations and voluntary sector organisations within the community.

A community network can be built by a community organisation, a local authority or a service provider on behalf of a community organisation.

Before setting out on the path of building such a network, there is still a need to mount a registration campaign. However, instead of using the registrations to obtain service from BT, the database of prospective subscribers is used to interest an ISP in providing the network, or to justify the provision of a network by the community itself.

Bredon Hill chose to seek tenders from interested service providers. In Bredon Hill, a campaign to identify prospective users was carried out through public meetings, articles in parish magazines, a website and personal networking in a community of some 5,000 people. This marketing activity resulted in a significant number of interested users. As a result, tenders were requested from a number of ISPs and others for a broadband network. This has resulted in an ADSL service provided by an ISP.

In Derwentside, the local authority built a district-wide network to support the delivery of its own services and by extension to provide services to the public. This has benefited not only Derwentside but also other authorities in the area that have been able to make use of the network.

Milton Keynes has taken a similar route and is planning to provide broadband services to organisations in both the public and private sectors. Private sector services will be offered by selling services at wholesale rates to ISPs, thereby avoiding any distortion to the market.

Local authorities often have skills available for such projects. For the community itself to build a network is more difficult since it requires a high level of IT and telecommunications skill that is not always available in the community. Kingsbridge was one community where such skills were available from an employee of a local web design company. The member of staff used some of his spare time to build and manage a local distribution network<sup>3</sup> and, in addition, used the web design company's internet connection to provide the backhaul<sup>4</sup> from the community network to the internet.

<sup>3</sup>A distribution network: a means of distributing the service from the Point of Presence to subscribers in the community.

<sup>4</sup>Backhaul: a means of bringing the internet to a Point of Presence in the community.

A community network is by its very nature bespoke. However, there are some companies that are beginning to develop products and services that are aimed at the market for community networks. One such company, Invisible Networks, was responsible for building the CARNET network, bringing together the demand forecasting, design, implementation and support skills, distribution network technologies and backhaul services necessary for a successful result. Other companies concentrate on individual elements. More generally, many ISPs are interested in delivering community networks and networks for business parks. However, in all cases, community network builders are reactive. They expect a community to ask them to tender for a service. They do not actively seek communities that require services.

### Regional networks and regional broadband consortia

One of the main reasons that rural broadband services have yet to be deployed universally is the cost of backhaul from the Point of Presence in the community to the internet. The economics of telecommunications are governed by the very large economies of scale that occur. High volumes of traffic cost relatively little more to carry than low volumes. Small rural communities do not provide sufficient traffic to achieve scale economies and have the additional cost disadvantage of being a relatively great distance from a Point of Presence where internet services are available. Unit costs for rural community networks are therefore high and they often make provision uneconomic at prices that are based on urban levels of supply and demand density.

In addition, there is little competition in the supply of services in rural areas. Generally, the only supplier of note is BT, although individual locations may benefit from a second supplier. Lack of competition also leads to higher prices for telecommunications services and particularly backhaul services.

Organisations in the public sector, and particularly in education, have responded to this problem of high cost of provision by aggregating traffic from a number of sources. This aggregation

can result in scale economies that reduce the cost of backhaul and internet access for the participating organisations.

Regional broadband consortia have been established by the Department for Education and Skills (DfES) in part to provide such networks for schools and other educational establishments. Cumbria and Lancashire Education Organisation (CLEO) network delivers the internet to schools and other education establishments across Cumbria and Lancashire. It was built and is managed with support from the University of Lancaster using funds from the National Grid for Learning (NGfL). It is a prime example of how a consortium in a region with poor telecommunications infrastructure can aggregate sufficient demand to provide a service capable of reaching the furthest reaches of the region at a reasonably low cost.

The increasing requirement for broadband services in the public sector and the shortfall in supply of broadband services to the private sector and to consumers in rural areas has led to proposals for regional and sub-regional networks that, like CLEO, offer services to both the public and private sectors. Many Regional Development Agencies (RDAs) are intent on building such networks to cover areas of their regions where backhaul is a problem, offering services to government departments, local authorities and public institutions, such as schools, hospitals and emergency services as well as the private sector. A replacement network for CLEO in Cumbria, financed by the North West Development Agency, is intended to provide a sub-regional network that supports both public and private sector requirements.

## Principal players and their roles

The development of a community broadband network needs the support of a number of individuals and organisations. These include, at the very minimum, representatives of the community itself, a leader or project champion from the community and prospective suppliers. Community initiatives may need funding and advice from other agencies, including the local authority, regional development agency and organisations, such as UK Online for Business.

### Project champion

Most of the projects reviewed during this study have a prominent and active project champion. These individuals vary considerably in their motivation and expertise. The project champions for Bredon Hill and Alston Cybermoor were motivated by the need to improve ICT support and particularly to provide broadband services to ensure that organisations in their communities were not disadvantaged. The champions in these communities are not ICT professionals, but are aware that other parts of the country have better communications services and that the relative attractiveness of their area is diminished by the non-availability of broadband services.

In contrast, the project champions for Kingsbridge and Derwentside are ICT professional staff that have a vision of the opportunity that good communications would bring directly to the community or through the improved availability of local authority services.

In CARNET, there are two sets of project champions. The CARNET community organisation is responsible for stimulating the demand for services in the area and the directors of Invisible Networks set up a service company that could satisfy the demand. Together, they developed a framework for providing a broadband service into the community. In Edenfaster, these two roles are combined in one project champion, with technical skills, who is both stimulating demand and developing a framework for provision of service in the area.

The project champion is usually a member of the community that wants broadband. The champion will usually have considerable drive and be well connected within the community. He or she will be instrumental in stimulating the community to seek service actively.

The project champion does not have to have technical skills. However, awareness of the technology options and access to skills are important. Apart from specific personal traits, however, they tend to have:

- Partnership building skills, ie. the ability to coordinate and manage a formal or informal community organisation, including some business management skills.
- The necessary presentation skills to represent the community with potential funders, other facilitators and suppliers.
- Excellent contacts within the community, local authorities and local business organisations, for example, the local chamber of commerce.
- A vision of the impact on the community and on individual organisations that broadband will bring, with some understanding of how it may be provided.
- Commitment, dedication and determination.

The principal roles that the project champion will need to adopt are:

- setting initial objectives;
- engaging community involvement in the project;
- promoting the scheme with facilitators and funders;
- encouraging user take-up;
- publicising the scheme more generally.

The roles of project champion and project manager are often carried out by different people, although this is not always true. Lindsey Annison in Edenfaster is acting both as project champion and manager. However, Daniel Heery at Alston Cybermoor has taken on a project manager for deployment indicating the pressures of fulfilling both roles.

The role of the project champion depends on his/her skill sets. Although there are cases of project champions continuing to drive projects through to the delivery stage, this is not thought to be a typical model of future schemes. The demands on a single person adopting both champion and manager roles are considered too great and hence undesirable.

### Project manager

The project manager is responsible for day-to-day running of the implementation project. He or she will need to report to the community organisation, where one exists, but may be employed by any one of a number of organisations (Table 1 gives examples from the case studies).

Project	Employer
CARNET	The supplier, Invisible Networks
Kingsbridge	The project champion - voluntary
Edenfaster	The leader of the community organisation
Alston Cybermoor	The leader of the community organisation
Bredon Hill	A consultant contracted to the Regional Development Agency AWM – the funding organisation

Table 1: Project manager employment

The project manager is responsible for planning, monitoring progress against the plan, identifying and managing resources, managing costs and risks.

Project management may not be a full time role, but will require regular progress meetings and timely intervention to overcome specific problems.

### The community organisation

Many of the case studies involve community organisations. The roles that the community organisation adopts are many and varied and depend to a large extent on the support obtained from other organisations. The CARNET community organisation is quite typical in the roles that it carries out. These have included, at various stages of the project:

- defining objectives and scope for the community network;

- partnership building; indeed it may be considered to be the embodiment of partnerships;
- aggregating demand;
- local promotions;
- developing community value added services;
- fund raising;
- procurement;
- contracting with suppliers and users
- recruiting a project manager and other resources;
- managing suppliers, where it is the contracting entity;
- provision of customer support.

Individuals from the community organisation will need to take responsibility for such activities. A management group with members taking responsibility for partnership building, promotions, fund raising, procurement of services and contract management should be defined. This may need to meet regularly. The management group will need to agree a chairperson, who will then take on the project champion's activities.

The skills required from members are generally business oriented rather than technical, unless the community organisation itself decides to implement a network instead of procuring a service.

The community organisation may be informal, provided that it is not to be a contracting entity.

However, CARNET, like most community organisations, operates as a 'not for profit' organisation (ie. a company that does not distribute profits) set up as a company limited by guarantee under the Companies Act 1985<sup>5</sup>. The members of the company were the organisations that had an interest in service delivery - subscribers, funders and suppliers.

As an incorporated community organisation CARNET was able to procure using normal commercial practices rather than public procurement rules. This gave it significant levels of flexibility in negotiating and contracting with

<sup>5</sup>Such organisations may be 'Social Enterprises' - a business with primarily social objectives whose surpluses are principally reinvested for that purpose in the business or in the community, rather than being driven by the need to maximise profit for shareholders or owners. Buckfastleigh Broadband Ltd has been used as an example of a Social Enterprise.

suppliers. It also meant that it was able to procure relatively quickly.

CARNET procured a broadband service on behalf of its members. Edenfaster, in contrast, is building a network having been forced down the self-build route because a commercial service was not available. However, the Edenfaster project team believes that the process of building a broadband network and infrastructure can generate benefits in the form of social cohesion and development of ICT skill within the community. Edenfaster, therefore, has acquired the technical skills for designing, implementing and managing the network. In addition, it has taken on the roles of customer support and billing necessary to maintain services to its customers. Ultimately Edenfaster will also be fully responsible for marketing and sales activities associated with acquiring new customers.

Bredon Hill, Edenfaster and Alston Cybermoor believe that one of the main roles of the community organisation is to develop community resources available over the broadband service. Bredon Hill is interested in providing a portal or website giving access to local craft industries which have difficulty in placing themselves on the internet. Both Edenfaster and Alston Cybermoor are acting as laboratories for the development of local services – a portal for community activities and local businesses, video streaming to broadcast local events, security on demand for premises, agricultural applications to overcome movement restrictions, tourist services and others. Alston Cybermoor lost internet access for a period of two months, although the local distribution network remained working. While frustrating, members of the community reported that the local network and portal were of considerable value by themselves.

### The role of suppliers in community broadband services

There are essentially three ways of supplying community broadband services:

- Service provision: an extension of a service that is available elsewhere to the community. An example is the provision of a broadband services to Bridgnorth by BT in response to the

registration campaign there.

- Network provision: the development of a network designed specifically for the community. Invisible Networks provided a network for CARNET. Cable and Wireless did the same in E<sup>2</sup>B<sup>N</sup>.
- Equipment supply: the provision of network equipment and basic telecommunications services to a community. In this case, the community organisation has to build the network, install equipment and run the service. This was the route taken in Kingsbridge and with CLEO.

The supplier will typically undertake the following roles, if it is providing a service or a network:

- demand estimation;
- network design;
- network implementation;
- network management;
- sales to end customer;
- customer registration, user installation;
- customer support;
- billing.

If the supplier is providing equipment only, the community organisation will need to take on these roles and will need to provide staff with the technical competence and time.

### The Regional Development Agency

RDAs, like the North West Development Agency, Advantage West Midlands and SEEDA, are pursuing two sets of objectives associated with broadband. The first is concerned with aggregation of public sector demand to be carried over a regional backbone to achieve a lower cost and more effective provision of bandwidth to communities. The second is concerned to stimulate supply in areas not covered by BT, ntl or Telewest. In the West Midlands, AWM has procured a broadband network to aggregate public sector traffic across the region and is setting up a company to manage this network. In Cumbria, the NWDA is developing a network to improve telecommunications services in the Lake District for private sector and public sector customers. In the South East, SEEDA is planning a Coastal Broadband

Superhighway to provide telecommunications services for both the public and private sectors in areas that are presently not well covered.

Some RDAs are continuing to finance community broadband projects as well. SEEDA is funding projects via county councils and directly.

The RDA is therefore central to the development of many community networks. It may provide funds and may be able to identify prospective public sector customers for networks. It may also be a provider of project management and other resources. Ultimately it may provide backhaul network services for community networks.

### The roles of local authorities

Derwentside District Council is notable in its provision of broadband services, first to deliver its own services into the community and latterly to provide services to businesses within the District.

Derwentside's project is in line with the Local Government Act 2000 and the new Communications

'The Local Government Act 2000 has added a new factor in the form of a general power for principal local authorities to do anything intended to promote or improve the economic, social or environmental well being of their areas. Although this power is subject to express restrictions, limitations and prohibitions in other legislation, it greatly extends local authorities' vires. The well-being power can be used in substitution for any existing statutory power, and such use removes implicit restrictions from biting on the well-being power. This in effect allows local authorities to extend the scope of their activities as long as they are of the opinion that the action they are taking promotes or improves well-being. The guidance on the use of the power makes clear that local authorities can enter into a variety of arrangements with other bodies provided that those arrangements promote or improve local well-being. For principal local authorities Section 2(1) of the 2000 Act provides a broad power to act where those authorities wish to further community well-being'.

(Source: [www.local-regions.odpm.gov.uk/consult/bestvalue/index.htm](http://www.local-regions.odpm.gov.uk/consult/bestvalue/index.htm))

Office of the Deputy Prime Minister, Working with others to achieve Best Value.)

Bill that was introduced into the House of Commons in November 2002. This Bill provides powers for district councils and borough councils to invest in the provision of public services within and beyond their area.

Derwentside used regeneration funds in an area of economic deprivation to develop its network, provide public access points and provide a network to North Durham Healthcare Trust, neighbouring Wear Valley and Teesdale District Councils and Gateshead libraries and schools, as well as to Derwentside's own offices and schools. It provided services to SMEs through Northern Infomatics and improved the availability of ICT skills through an ICT apprenticeship scheme.

Milton Keynes is aiming to emulate Derwentside to provide broadband networks in areas where services are not currently available.

While not all district and county councils will build broadband networks for use by the consumers and business, a number will help with broadband projects. This help may be financial or practical. Wychavon District Council's Economic Development Manager, Phil Merrick, organised Market Towns funding to establish the feasibility of broadband networks in villages in the Evesham area. In addition, he introduced the project to Advantage West Midlands, the RDA that ultimately funded the project.

### UK Online for Business and Business Link

UK Online for Business is a DTI-led partnership between industry and government that helps all businesses make the most of their investment in information and communication technologies. Business Link is the national business advice service, delivering independent advice to local business throughout England.

UK Online for Business was used to publicise the Bredon Hill project and to present information about broadband telecommunications in public meetings.

Both UK Online for Business and Business Link are actively promoting Satellite Broadband in the SEEDA rural satellite project.



## Funding models for community broadband projects

The case studies point to four principal ways that are being used for grant funding of community broadband projects:

- Funding a community organisation to become a broadband service provider.
- Using the community organisation as the channel for funding to a supplier.
- Directly funding a supplier to provide service to a community.
- Directly funding users to obtain service.

The method used will be dependent largely on the regional development agency or local authority that provides the funds.

### Community organisation as a funded service provider

Buckfastleigh and Edenfaster projects are examples of projects where a community organisation has been grant funded to become a broadband service provider. In Buckfastleigh, the South West Regional Development Agency set up and funded the community organisation, Buckfastleigh Broadband Ltd, as a telecommunications service provider to provide services to both the public and private sector in the town. Buckfastleigh Broadband contracts with users to provide services and with suppliers to provide equipment and basic telecommunications services. Backhaul is provided using a link to the local school through an agreement with the South West Grid for Learning. Buckfastleigh Broadband is responsible for customer support and billing as well as service provision.

Edenfaster, funded by the NWDA, operates in a similar fashion to Buckfastleigh. Edenfaster offers services to users in both the public sector and private sector. It procures equipment for its wireless network from Enterasy and Locust World and its backhaul service from CLEO.

This model also applies at a business park level and in multi-occupancy buildings. SEEDA has provided funding to its Enterprise Hubs to establish broadband services for businesses that come under their umbrella. An Enterprise Hub is a support organisation

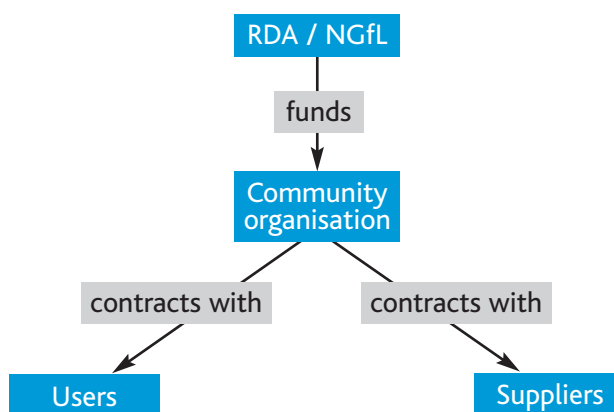


Figure 2: Community organisation as service provider

for new businesses. The Newbury Enterprise Hub at New Greenham Park has used this funding to provide 34Mbit/s backhaul with fibre between buildings on the Park. The Enterprise Hub then acts as the service provider to businesses on the Park.

### Community organisation as a channel for funds

In this case the community organisation acts as a conduit for funding but does not provide the service itself. Users contract directly with the supplier.

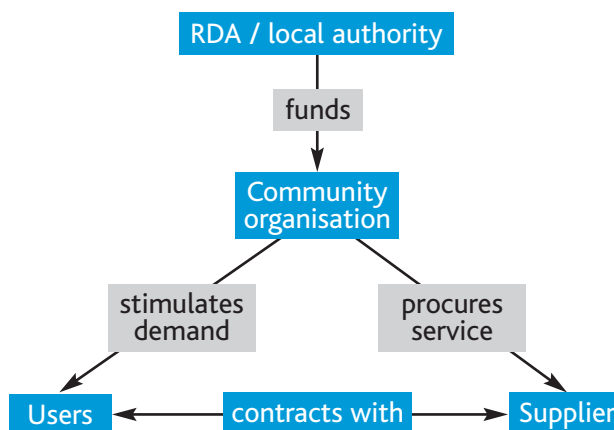


Figure 3: Funded or unfunded community organisation

Funding may come from a regional development agency or another source. The community organisation uses the funds to part pay for the service provided. CARNET is an example of this approach to funding. CARNET has used Countryside

Agency Vital Villages funding to reduce installation charges paid by subscribers from £199 to £49. The result has been a doubling in the number of subscribers.

CARNET is also funded by a ‘Community Levy’ (approximately 8% of the monthly subscription) collected for them by the service provider, Invisible Networks.

### Funded supplier

This model has been used by Advantage West Midlands for the Bredon Hill project. Bredon Hill does not have a formal community organisation. Instead, AWM is underwriting subscriptions for a broadband service.

Care has to be taken in using this model to avoid State aid issues. De minimis<sup>6</sup> State aid funding of projects is possible within strict rules.

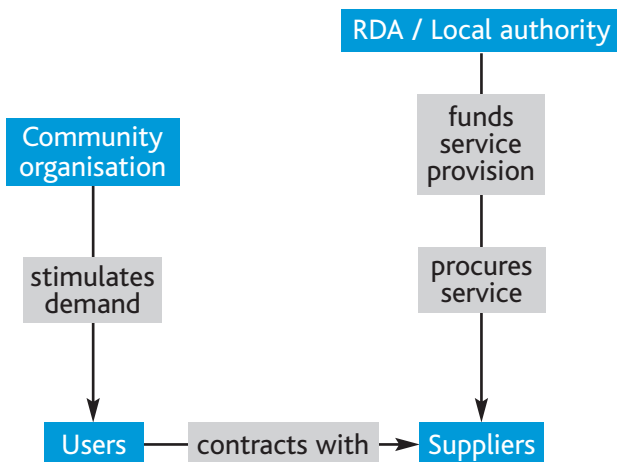


Figure 4: Funded supplier.

<sup>6</sup>State aid rules are complex. A DTI booklet about State aid is provided at the following link.

[www.dti.gov.uk/europe/stateaid/01.htm](http://www.dti.gov.uk/europe/stateaid/01.htm)

Article 87(1) of the Treaty of Rome defines four tests to establish if a measure constitutes State aid. A State aid will only be present if all four tests are met.

1. Is the measure granted by the State or through State resources?
2. Does the measure favour certain undertakings or the production of certain goods?
3. Does the measure distort or have the potential to distort competition?
4. Is the activity tradable between Member States?

In most cases, granting funds, cash injections, loans and guarantees, and even tax exemptions and free advertising on State television are considered to be State aid. Inside areas of deprivation, special rules apply and State aid may be allowed. Outside areas of deprivation, however, State aid is not generally allowed, except under one or other of a number of block exemptions including those listed opposite.

### Funded user

This approach has been used mainly for the SEEDA and Rabbit satellite schemes to fund the installation of a customer’s equipment which is expensive in comparison with other forms of broadband communications. While the approach does not have to be limited to satellite based services, it can be used selectively to target disadvantaged individuals within a community. SEEDA uses strict criteria to ensure that its satellite fund is used to support organisations that otherwise do not have broadband services.

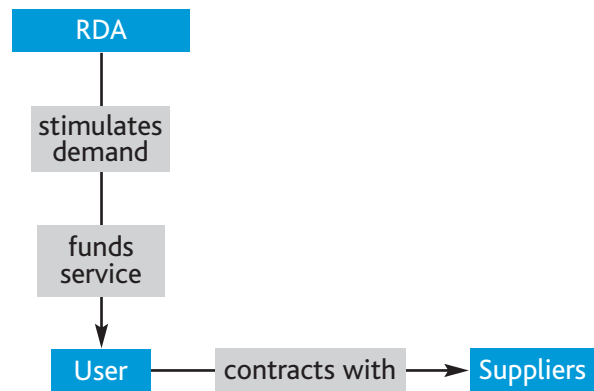


Figure 5: Funded user.

#### De minimis aid

Any funding provided under this rule must be identified as such to the recipient. The award must not breach a 100,000 Euro (£60,000) limit over a rolling three year period. The funded party must provide information about de minimis aid provided in the previous three years. It should be noted that for agriculture, fisheries and transport this type of aid is not allowed.

#### Aid to SMEs

Limited aid to SMEs is allowed for investment, consultancy and knowledge dissemination and participation in the first fair or exhibition. The limits vary by size of organisation and location within or outside a development area.

#### Training aid

Between 25% and 80% of the training costs depending on the size of the organisation, whether in or out of an assisted area and whether training is specific or general.

# Implementation

Figure 6 below gives a six step process for obtaining a broadband service from an initial appreciation of the demand for broadband through the development and implementation of a service to the ongoing operation of the service.

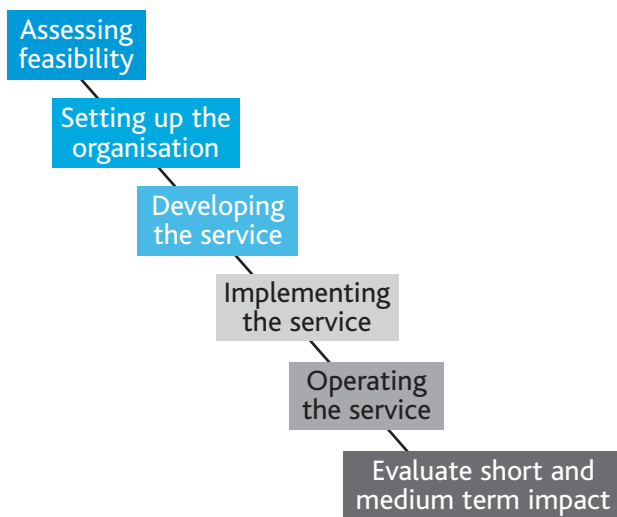


Figure 6: Obtaining a broadband service.

## Assessing feasibility – market analysis and business planning

This activity need not take long or be over complex. Most of the community projects reviewed here undertook either a ‘needs assessment’, if they were public sector focused, or some straightforward market analysis and research, if they were focused on the wider community.

In the Bredon Hill project an initial feasibility study was carried out by consultants. This included an estimation of the number of households, small and medium sized enterprises (SMEs) and public sector buildings in the locality based on information from available databases. This information was used to determine numbers of internet users and potential broadband users based on national averages for take up. More in-depth information about user needs was obtained through face-to-face meetings with prospective users of a service. These meetings were held in the community, in people’s houses, at their place of work or in the local pub. The

feasibility study also estimated the overall cost of providing a service to the community. The information was used to estimate costs and requirements for funding.

Once funding was assured, a second round of public meetings was held to determine a more accurate estimate of take up. The estimate was used in the preparation of an invitation to tender for service providers. The knowledge that funding was available and that the project was going ahead resulted in a significant increase in the level of interest being shown.

In general, any funder will require an estimate of the size of the market and a business plan that indicates the financial risk associated with the venture. This plan will be valuable in ensuring that the project has direction and can be monitored.

The business plan will need to cover:

- Objectives of the scheme and benefits to individuals and the community.
- Market:
  - geographic range;
  - numbers of business, residential customers and public sector customers.
- Service portfolio:
  - basic internet access, enhanced local network services, value added services, commissioning services, support services.
- Implementation plan.
- Pricing.
- Community organisation costs.
- Business model.
- Risk analysis.

The initial registration scheme will generally turn into a marketing campaign, as the service is readied. The Alston Cybermoor project has been promoted by press and local television. A booklet giving details of the proposed broadband service prepared by Gaia Technologies and Cisco was mailed to all who had expressed interest.

Alston Cybermoor is a broad based project that is building ICT capability in the area. A sustained local campaign to promote ICT and boost social cohesion in the community has been an essential part of the project. This campaign is ongoing with the aim of growing and sustaining interest in the project.

## Setting up the community organisation

### Incorporation

CARNET was a long time in its inception. A discussion paper was developed in November 1998, a group of interested individuals got together in December 1998, and it met again in December 1999. In May 2002, CARNET approached the Industrial Common Ownership Movement (ICOM)<sup>7</sup> with a view to becoming a Mutual Trading Company. ICOM sent a detailed questionnaire that helped focus the group on the best constitution for the organisation. CARNET was incorporated in August 2002, using Memoranda and Articles of Association prepared by ICOM, and the Cambridge Ring North East project went live at around the same time.

This process can usually be undertaken a lot quicker. A project champion needs to convene a meeting of interested individuals in the area. If possible, a proposed set of Memoranda and Articles of Association should be available for discussion either at the first meeting or shortly afterwards perhaps prepared by a subcommittee. Having agreed

these papers, there will be a need to set up the company and appoint directors.

Membership of such organisations usually consists of the subscribers and other interested parties. In Buckfastleigh the membership comprises:

- Buckfastleigh Town Council;
- Dartmoor National Park Authority;
- Department of Trade and Industry;
- Devon County Council;
- South West Grid for Learning;
- UK Online/Business Links;
- South West of England Regional Development Agency (SWRDA);
- Teignbridge District Council.

This reflects the nature of the Buckfastleigh project, its funding and its public sector focus.

### Funding

Case studies used a variety of funding sources (see Table 2 below). Only one, Kingsbridge, had no public funding, but amounts required varied considerably. Edenfaster, for example, is receiving £40,000 from NWDA, whereas Buckfastleigh is receiving £500,000 from SWRDA.

Project	Fund used	Use
Alston Cybermoor	Wired Up Communities Fund, DfES. NWDA, Social Inclusion Grant and Rural Development Programme, Cumbria County Council.	Meeting community organisation costs including networking costs. Capital and deployment.
Bredon Hill	Evesham Market Towns Partnership. UK Broadband Fund, AWM.	Feasibility study. Implementation.
Buckfastleigh	UK Broadband Fund.	Capital and deployment.
CARNET	Vital Villages.	Subsidising customer installation.
Derwentside	Regeneration funds; pooled funds from local authorities served by Derwentside. Vital Villages.	Capital and deployment. Community IT centres.
E <sup>2</sup> B <sup>N</sup>	DfES and LEA. Local authority. EEDA's Connecting Communities Fund.	Education network; connections to schools. Connections to libraries. Extension to rural communities.
Edenfaster	NWDA Broadband Fund.	Deployment and project management.
Newbury Enterprise Hub	SEEDA.	Network implementation.
SEEDA	UK Broadband Fund.	Grant to end users.

Table 2: Project funding and uses.

<sup>7</sup> [www.co-opunion.coop/ICOM.htm](http://www.co-opunion.coop/ICOM.htm)

Funding is complex and requires considerable attention. It can divert a project away from its original objectives, if the funder has conflicting requirements.

Particular funding issues to be considered include:

- The reasons for obtaining funds – to fill a short term gap during the start-up period, to provide a service at an affordable price level, to meet the needs of particular (disadvantaged) users.
- Identification and evaluation of funding sources (see Section C, Annex 1) against the use to which the funds will be put, the relationship the funder will require with the project and the obligations the funder will place on the project.
- The recipients of the funds, usually a legally constituted body, but this body may be constrained by State aid issues to the amount of funding it can receive.

The funding organisation will generally define the uses of the funds provided and will require a statement of the benefits to the community from the community organisation. For both Alston Cybermoor and Edenfaster, NWDA has incorporated these into service level agreements. Edenfaster's service agreement is complex.

The use of funds may be tightly defined. For example, NWDA has reserved the right to reject prospective subscribers to the Edenfaster network that are located outside the north west region. Edenfaster straddles the boundary between north west region and the Yorkshire and the Humber region, and some of its subscribers are located in Yorkshire.

## Developing the service

### Community networks

A broadband service for an individual community generally requires a new distribution network to be built. This may take the form of an ADSL overlay to the telephone network or an independent wireless network. Designing and building such a network requires skill and time. Quite apart from technical issues in the design, there will be a need to negotiate with property owners about siting of equipment or provision of wayleaves<sup>8</sup> on their

premises. Designing a network and associated service support systems (billing, customer support, etc) is a multi-disciplinary activity that no small group of people with limited funding should undertake lightly.

The role of the community organisation may be limited to the specification of the service or it may extend to network design, depending on the availability of relevant expertise and inclination to implement the necessary service infrastructure. In Bredon Hill, the role of the consultants that procured the service on behalf of AWM was limited to the specification of the required service. Even then, the consultants that prepared the procurement specification drew a distinction between mandatory services and additional services that the supplier might choose to offer. AWM's consultants subsequently procured the service for Bredon Hill using open tendering through the Official Journal of the European Communities (OJEC).

This approach gave tendering organisations a considerable amount of flexibility in responding. They were not constrained by technology and the services, beyond a basic minimum, were open to them to define. When used in a competitive tendering process, such a specification of service is likely to yield attractive bids with interesting choices of services.

CARNET followed a similar approach, leaving design of the services largely to Invisible Networks.

Most of the other community networks have been designed by the community organisations themselves. Buckfastleigh, Alston Cybermoor and Edenfaster are following this approach with technical skills embedded in the community organisations. The Kingsbridge network has been implemented by a technically proficient project champion acting alone.

The technologies used for these distribution networks include:

- ADSL in Bredon Hill;
- unlicensed band wireless networks or a combination of wireless and other technologies in Alston Cybermoor, Edenfaster, Buckfastleigh, Kingsbridge and CARNET.

<sup>8</sup>A wayleave is a permission to cross land for the purpose of telecommunications or electricity supply.

Kingsbridge and Edenfaster have both adopted low cost mesh network technology from Locust World. In Kingsbridge, this technology, combined with some very low cost antennae, has enabled a network to be built at a total cost of £1,000 for equipment. The mesh technology simplifies the design of radio networks, since it automatically establishes links between nodes in the network.

With an increasing number of companies developing a credible community broadband service offer, many community organisations will be able to procure a service from a service provider. This allows the project to act as sponsor and the supplier to assume the end user service responsibilities and contracts. However, there will continue to be cases where this option is still not available, because the projected revenue stream is insufficient to attract a credible supplier.

### Larger networks

Networks that cover larger areas require a backbone infrastructure in addition to a local distribution infrastructure. In a lot of cases infrastructure is available in the form of circuits and fibre that the project may lease. A managed network service may be procured that delivers bandwidth at particular Points of Presence in communities. Distribution from these Points of Presence may then be handled by the backbone service provider or by the project. Derwentside has followed this convention and has purchased its network from Telewest. This is an option with in-built sustainability, as long there are contracts still in place or the supplier still views the contract as profitable business.

CLEO, ERYC and E<sup>2</sup>B<sup>N</sup> designed and implemented backbone networks themselves. ERYC and E<sup>2</sup>B<sup>N</sup> purchased circuits from service providers but configured and managed the network themselves. CLEO had the more difficult task of building a microwave and leased circuit infrastructure across Cumbria and Lancashire. It did this in combination with Your Communications, ntl and Telewest.

There is a belief that the cost savings of self-build can be sufficient to make broadband projects feasible which may have been too expensive if provided over a fully managed infrastructure. Indeed, these self-

build networks are relatively low cost, although this may be as a result of the quality of service provided. CLEO is providing a high standard of internet access to the schools of Cumbria and Lancashire at a cost which is lower than schools networks in other parts of the country, despite the general lack of telecommunications infrastructure in the areas covered. However, CLEO does not offer a commercial quality of service guarantee.

The downside of the CLEO approach is the effort required to manage the service using a small base of people. In the long term, and certainly for small communities, this may make self-provision impractical.

### Implementing the service

There are two overall approaches to the implementation of broadband services:

- Project management by a service provider. The provision of satellite services under the SEEDA scheme, the provision of services for CARNET, for Bredon Hill and for New Greenham Park are examples of this approach.
- Project management by the community organisation. Derwentside, Alston Cybermoor, Edenfaster, Buckfastleigh and Kingsbridge are examples of this approach.

Generally, the organisation responsible for designing the network is also responsible for implementation.

Some activities are likely to be subcontracted out on cost grounds irrespective of who is managing implementation, to ensure that a suitably qualified team of people is in place or for other reasons. Derwentside has an ICT department with 28 staff, including 7 development staff. This team is focused on service development rather than deployment. Deployment of the wireless links and PC installation is handled by a number of local companies. This approach has led to the development of a base of ICT skills in the community. CLEO used Lancaster University ICT staff to design and implement its network. The project manager, Barrie Forde, and his team provide a lot of the core skills but subcontract specific tasks as required.

Other community schemes, such as Edenfaster

and Kingsbridge, where funding is small, provide the management and all technical skills from within the project team, limited more by time than expertise. Employment of subcontractors is a luxury not undertaken lightly by these projects.

### Customer support

Alston Cybermoor and CARNET are the only projects considered here that have been providing services for a sufficiently long time with the available resources to provide a sophisticated approach to support. One of the aims of the Alston Cybermoor project was to develop ICT skills in the community. Alston's formal response has been to provide a customer support helpline for first level customer support. Any problem that the support team cannot solve is escalated to the relevant supplier, but the Alston team continues to manage the problem. In addition, a large amount of informal support has been provided through neighbours, friends and family.

CARNET's customer support is provided by its service provider, Invisible Networks, through a helpline.

### Evaluating impact

Not all the projects covered in this report measure their impact on the local economy or other social aspects of their project. The reason is simple. It is very difficult to do so. However, some significant metrics can be obtained. Whether the information gathered could be used for fine-tuning of the project is doubtful, but lessons can be learnt for future projects. The indications from Alston Cybermoor, the most mature of the projects is promising.

No absolute guidelines are yet available for metrics that can be taken, but NWDA's Service Level Agreement (SLA) for the Alston Cybermoor community scheme specifies that the following are to be monitored:

- progress against project plan;
- service availability;
- penetration against availability.

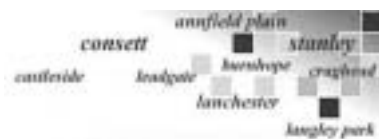
# Section B

## Case studies

### 1. Derwentside District Council



Derwentside has used its own ICT department and ICT as a tool to drive economic regeneration. The Council recognised at an early date that the internet would be a major technology for the delivery of its own information and services and those of other public sector organisations in the area. It also recognised the importance of telecommunications infrastructure in improving the attractiveness of the area to business. The Council procured a broadband infrastructure for the Council's services with additional capacity for use by the community. The resulting ICT infrastructure and the skills developed by the ICT department have been the foundation for the supply of a range of services to the District, to other local authorities in the area and to the wider community.



#### Project objectives

Derwentside District Council in the County of Durham covers some 10 towns and villages and has its offices in Consett. The closure of the steel works there in 1980 contributed to high levels of unemployment and deprivation in the area. As a consequence, the Council and other bodies have carried out a number of funded regeneration projects that have continued to the present day.

In the early 1990s the Council adopted an ICT strategy to provide access to Council systems from

several Council sites. This resulted in a major requirement for telecommunications capacity. In addition, the District Council pioneered the provision of access to the internet from Council offices through dial connections.

In the wider community, incoming companies and public sector organisations alike faced problems in obtaining high-speed telecommunications services for corporate networks or to access the internet.

As a result, the Council proposed a radical plan to develop a broadband infrastructure covering the District to provide voice, video and data services. On the back of this initiative were further plans for the delivery of internet services for all parts of the community.

In 1996 the Council procured a 155Mbit/s ATM based fibre network to satisfy the Council's requirements, those of other public sector



L to R Mike Clark, Executive Director, Steven Hodgson Operations and Infrastructure Manager and Nick Tazamarias Senior Policy Officer with Beacon Council Flag.





Derwentside Council Offices.

organisations and the wider community. Telewest was the primary supplier. The original investment of £4m was financed from Single Regeneration Budget funds. The contract with Telewest allows the Council to use the network for 22 years free from further charges other than for new connections to the network.

### Business model

The Council's achievement has not been as a result of a single project but has been a continuous process from 1995/96 driven to a large extent by the Chief Information Officer for Derwentside.

The business model was based on the need for economic regeneration in Derwentside and the failure of the telecommunications industry to provide competitive telecommunications infrastructure in the area.

The project has been financed using Single Regeneration Budget funds, other Derwentside District Council funds, pooled funds from neighbouring authorities and service charges paid by users of the network including authorities other than Derwentside, agencies and businesses.

Derwentside has used the opportunity arising from the aggregation of demand across the public sector to procure telecommunications infrastructure with low initial unit costs and minimal recurring costs. The availability of services at a low cost has

enabled a number of projects to be established to provide ICT services and internet access to the community. The broadband infrastructure supports:

- internal ICT within Derwentside District Council;
- internet access for Durham County Council libraries and schools;
- North Durham Healthcare Trust;
- hosting of a 'health promotions catalogue', a portal for healthcare professionals, in conjunction with the Trust. The catalogue is being offered as a service to other trusts;
- the supply of internet services to other local authorities, including Wear Valley and Teesdale District Councils and Gateshead libraries and schools;
- the supply of internet and other ICT services to SMEs through Northern Infomatics;
- a large number of community projects;
- 33 public access points provided as a result of community projects and a further 13 provided directly by Derwentside District Council in council offices.

In addition, the District Council has contributed to the pool of ICT skills in the region by offering apprenticeships in ICT and by outsourcing service deployment to local companies.

## Implementation

Telewest provides the core network. Local companies are used for deployment of wireless links for last mile connections and PC installation to allow the council employees to concentrate on service. The Council's ICT team is 28 strong with a development group of 7. The network is managed by the District Council.

## Customer acquisition and support

The lack of commercial telecommunications services in the area means that many broadband requirements are now satisfied by the District Council scheme. The local authority offers broadband connections to any organisation within its area.

Derwentside ICT department offers a service to commercial and community organisations within the district and also sometimes outside. Other district and county councils have employed Derwentside services for broadband provision and other ICT projects. The ICT manager is a well-known local proponent of internet technologies and actively promotes the Council's services in the region.

Many community related projects exploit the district-wide infrastructure. These projects are funded independently from Vital Villages and other sources. Examples include the Burnopfield IT Centre and the Stanhope Community Project.

At the Burnopfield community centre the Countryside Agency has offered initial funding to establish an IT suite, which is open for community use. The installation of the IT suite has enabled certified courses to be run from Burnopfield in partnership with Consett College and the Learning and Skills Council.

Demand for this scheme within Burnopfield has been demonstrated to be extremely high particularly amongst women in the village who are keen to upgrade their skills before returning to work. The project is managed and run by Burnopfield Community Association, a charitable trust.

The Stanhope project is proposed by a group of enthusiastic and committed volunteers operating as a charitable trust that is intending to upgrade a large, centrally situated, community hall. The hall is currently underused and in need of some upgrading.

By altering and improving the building, the group plans to offer a multi purpose hall that will offer a DVD cinema system, a gym, an ICT training suite, meeting rooms and upgraded kitchen and seating facilities. The Countryside Agency will contribute towards the cinema, ICT suite and gym. Stanhope is close to, but not in, the Derwentside District.

### Pointers to success

- Early recognition of the role of the internet and the value of its wide access in the community.
- Dynamic ICT management with a vision to use ICT and the internet to promote economic regeneration and community cohesion.
- An imaginative approach to securing a partnership with a telecommunications company funding the capital spend on infrastructure in return for low cost access in future.
- Pragmatic approach to the delivery of services, maximising the skills in the ICT department and fully utilising those skills across internal and external customers.
- Strong political support within the District Council.

### Key issues

- Driven and funded by economic regeneration needs.
- Dependent on individuals with the vision and mostly part of discretionary local government activities.
- The provision of telecommunications services by the local authority may lead to market distortion but is allowable in a situation of economic and supply deprivation.
- The open procurement process obstructs partnership building and innovation in the public sector.

## 2. Cumbria Lancashire Education Online (CLEO)



CLEO is a consortium of LEAs that took advantage of the telecommunications and business skills available at Lancaster University to develop a major broadband network. The demography of the sub-region would indicate that this was one of the most difficult areas in England to enable but with strong local partnerships the project has delivered both educational and community provision.



### Project objectives

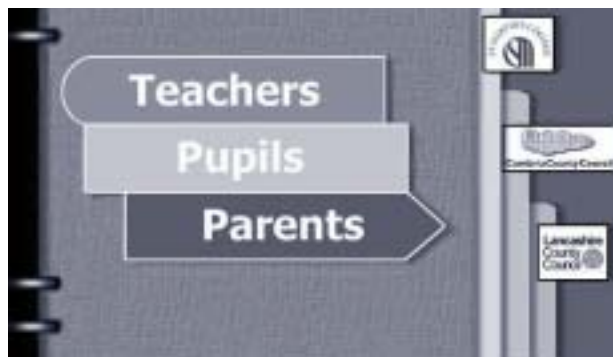
The CLEO broadband consortium is a sub-regional LEA partnership set up to provide a cost effective broadband infrastructure for all schools in Cumbria and Lancashire and a programme for the development and delivery of multimedia content.

In 2000, the lack of telecommunications infrastructure in the two counties meant that the DfES bandwidth targets for schools could not be met. Moreover, this lack of capacity also meant that demand from local authorities, libraries, health and the wider community was also unsatisfied.

The CLEO network was designed to meet education needs and to provide sufficient flexibility to meet immediate and future requests for service from the community. The CLEO network is now carrying most of the data traffic in the rural areas of the two counties. The level of supply deprivation is such that any project requiring connection makes itself known to CLEO.

### Business model

While funding has been provided by the DfES and NWDA, the project is still not established as a legal entity. This has meant that procurement and contracting has been complex and ad hoc. For example, the computer department at the University of Lancashire has acted as the procuring entity for the network infrastructure.



The CLEO Consortium is a sub-regional LEA partnership delivering broadband to schools and communities.

Indeed, the University plays a key role in CLEO. In addition to its procurement role, it provides technical and managerial skills to design, implement, manage and operate the network. Barry Forde, Head of Technical Support, at the University was retained by CLEO to develop and manage the network, responsibilities that he undertakes in addition to his normal role within the University.

A limited number of service providers is used to provide the broadband service. Your Communications, ntl and Telewest provide telecommunications services within the sub-region. UKERNA provides internet services for educational purposes and Telewest provides internet services for organisations outside the education sector.

A wider group of equipment suppliers is used to provide equipment for access from schools and other sites to the backbone network and to provide microwave links in the backbone. Over the period of the deployment the project has evaluated many technologies from equipment suppliers and these have resulted in a stable group of suppliers capable of delivering suitable equipment to the project.

### Implementation

The network was built in 2000/1 and now supplies 25% of all schools, including all secondary schools, as well as many other users.

The backbone network is a figure of 8 design using mainly microwave technology rated at 155Mbit/s. Broadband services of typically 5 to 10Mbit/s are provided to schools and other users

over this network. Access links use a variety of technologies.

No company was found capable of supplying the total solution and a high degree of flexibility has been required to ensure that the project objectives are met.

### Customer acquisition and support

Most schools have recognised that the pricing offered is attractive and many, but not all, are taking service from CLEO.

Other customers include individual SMEs and community networks. These customers recognise CLEO as the primary source of network and internet access in the areas where there are problems in obtaining broadband services. As a result, CLEO is supporting a number of community networks,

including Alston Cybermoor and Edenfaster which are reviewed elsewhere in this report. Indeed, these broadband schemes would not be feasible without the low cost backhaul that CLEO offers.

Support of both the network and its customers has been a major issue for the project. The project has found that a lot of support is required to allow effective exploitation of the service, particularly in schools. The identification of network faults as opposed to software or user problems sometimes requires active intervention. The third party providing support has not proved capable of providing the service levels required and the project is looking at a modified, more proactive approach to support.

Project Access for Cumbria, an NWDA sponsored broadband service, may address some of the network support issues faced by CLEO.

#### Pointers to success

- Lancaster University had available skills that allow the flexible development of concepts and technologies while gathering the requirements.
- Good level of partnership between the LEAs, college and university.
- Good commercial partnerships with local suppliers.
- The project has now obtained a Public Telecommunications Operator licence allowing more flexibility in deploying further parts of the network.

#### Key issues

- Some skills were only available on an ad hoc basis.
- An operating company was not set up at an early enough stage.
- An open public competitive procurement process using the Office Journal of the European Communities (OJEC) is not conducive to building partnerships and driving innovation from the public sector.

### 3. Alston Cybermoor



Alston Cybermoor is an example of a complete working ICT and broadband project in a small rural community with regeneration needs.

## Cybermoor ALSTON

#### Project objectives

The Alston Cybermoor project aims to bring ICT and broadband to a rural area of Cumbria, with a population of 2,200, covering the Cumbrian hill town of Alston and the adjacent villages of Nenthead and Garrigill. The intention is to provide broadband cover to all 1,200 households, businesses and the three schools in the area - one secondary with 160 pupils and two primary schools of 170 and 28 pupils.

The earlier phases of the project aimed to develop personal computer skills and more general ICT skills. This latest stage aims to deploy a

broadband network and related community services to meet the needs of all sectors of the community, including households, businesses, the local authorities and the local primary and secondary schools.

The benefits sought from this deployment are social inclusion, development of ICT skills, leverage of incoming businesses and development of employment opportunities.

A wireless network has been deployed in the communities. The local schools and County and Parish Council are the major subscribers to the broadband service with approximately 360 other connections, including 10 businesses. There is provision for satellite deployment for more remote households not covered by the wireless distribution network. A pilot of five outlying households is planned.

The project gives guidance based on the experience in Alston to similar, but less advanced, projects.



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The Information Centre at Alston Town Hall.

## Business model

Cybermoor is a company limited by guarantee founded specifically for the project and owned by its subscribers. Each new subscriber becomes a shareholder. Cybermoor provides a high-speed broadband service over a network procured from several suppliers. The overall infrastructure has been chosen and designed by the project's broadband working group.

The project was initiated through Voluntary Action Cumbria. All capital and deployment costs have been met through grant aid. Funding was primarily from the DfES through the Wired Up Communities Fund. This has been augmented by a Social Inclusion Grant from the NWDA and Rural Development Programme funds from Cumbria County Council.

Targets have been set by some of the funding organisations. For example, NWDA and Cybermoor have agreed targets for the number of new media business users and content publishers involved with the project.

The broadband service is charged on a means related basis but with the aim of being self-financing. There are two rates for households, depending on income, and a higher rate for businesses.

Procurement was through open competitive tendering using OJEC and was managed by the project with some external assistance. The process was difficult to manage and tedious but did not cause any specific serious problems.

## Partners, their roles and relationships

The project champion, Daniel Heery, has been involved from the beginning. He is a local person with experience of local government and ICT who had a vision of ICT being used to strengthen and benefit the local community. He planned the project and submitted the funding request to the DfES. When this was granted, he became the Project Officer.

Backhaul provider - CLEO (Cumbria and Lancashire Education Online) provides the backhaul and ISP connection for the project using a

microwave link rated at 5Mbit/s bursting up to 10Mbit/s. A leased line from BT is being installed to improve the resilience of the connection.

Distribution network provider - Gaia Technologies is supplying the community-wide wireless distribution network. Gaia has installed Wi-Fi transmission points in the town and installed customer premises equipment.

## Implementation

The wireless network was piloted during the summer of 2002 to test the feasibility of using this type of technology in the Pennines. The pilot demonstrated that wireless could be used for broadband services and led to a decision to deploy.

Despite this pilot, implementation has proved difficult for several reasons, but principally because there were insufficient resources available to manage suppliers. In response, NWDA funds were sought to procure a part-time project manager based locally to smooth the deployment process.

The network has 12 transmission points to cover Alston and its outlying villages. Cisco Aeronet IEEE 802.11 equipment has been used. This provides a shared transmission medium rated at 11Mbit/s. The Pennines and lack of suitable sites for antennae have caused some problems, the most serious being the positioning of an antenna for the microwave link to a CLEO Point of Presence. The chosen solution from CLEO involved an antenna on a very exposed mast that has unfortunately proved fragile and unreliable in bad weather. The formal service was scheduled to start in December 2002, but the connection failed and weather prevented repair for two months. For cost reasons, there was no resilience built into the system and the launch was delayed. The antenna was fixed but is still giving intermittent problems. A leased line is currently being installed to provide backup to the microwave link.

The service has now been up and running since early 2003 and is giving good service to its subscribers. The high performance in comparison with slow and unreliable modem connections has been a revelation to users.

## Customer acquisition and support

A continuing local campaign to promote ICT and boost social cohesion in the community has been an essential part of the project. Its continuity has been particularly important given the technical problems that have been experienced.

The project has been promoted by press and local television. In addition, Gaia wrote a booklet describing the proposed broadband service that was mailed to all who had expressed interest.

Initial market research covering requirements for internet services was carried out during the earlier stages of the project. No statements of intent were requested from the potential subscribers.

The communities have developed a valuable informal support network through friends, neighbours and families. More formally, Cybermoor itself provides first level support.

Users of the service have expressed considerable pride and appreciation of the project and some consider themselves fortunate to have had the opportunity to be involved. For many users the improved performance associated with web browsing, e-mail and file downloading allow a much fuller exploitation of ICT in the home and business.



Daniel Heery, the Project Officer, demonstrates the benefits of wireless working in Alston's sunshine.

### Pointers to success

- A local champion, with ICT skills and knowledge of the local authority, was able to also act as the project manager.
- Genuinely community based with strong county and parish support.
- The project ensured an active PC user base through the PC/ICT skills transfer part of the project.
- A goal of bettering ADSL service performance and quality.
- Specific targets for company and community new media development.

### Key issues

- Early underestimation of the support and project management requirements.
- Lack of resilience/redundancy on backhaul.
- Difficulty in formalising working SLAs with suppliers.



## 4. Edenfaster

Started in early 2002, Edenfaster is a community-based project aimed at bringing broadband and all its advantages to a rural area of Cumbria. The aim of the project is to provide an innovative broadband service and associated applications. There is an evangelical approach to promoting the benefits of broadband in the community. The project is partially funded by the NWDA as a pioneering venture.



### Project objectives

This project has adopted a radical approach to delivering broadband. It is effectively a laboratory for new technologies and applications and it has set itself many challenging objectives. The project objectives are expressed in detail in the agreement between Edenfaster and the NWDA and include:

- Offering a secure 11Mbit/s LAN and establishing demand for the service in a population of a least 10,000 and over 500 businesses.
- The trial of new and innovative mesh wireless technology and rural/semi-urban broadband solution.
- Achievement of high profile publicity for broadband projects in Cumbria through media and conferences.
- Promote broadband benefits according to the government and region's guidelines.
- Proving sustainability and resilience for broadband infrastructures.
- Solving security issues, which are of paramount concern to anyone using the internet or a wireless connection; these include threats from hackers and crackers, viruses, information confidentiality and safe use by children.
- Using the project to address social exclusion issues in the rural communities.

- Building a replicable successful project model.
- Creating at least one local job with transferable IT and admin skills and above average wages for the area.
- Document the project in the form of a white paper and an economic impact study.
- Attract new business, market the region and attach to the world market.
- Develop support networks using local businesses and organisations to offer help, advice, support and local products and services online.
- Develop and deliver broadband content and value added services for the locality, including video on demand, VoIP, security on demand for houses, farms and other premises, agricultural applications to overcome movement restrictions, services for tourist attractions and accommodation providers, help with major health and safety problems which rural areas experience.

This ambitious list reflects the comprehensive approach of the project champion and other members of the team to learn from established projects, such as Alston Cybermoor, and take the vision forward.

### Partners, their roles and relationships

Project champion, Lindsey Annison, together with other local ICT professionals, are concerned to deliver broadband as a community based service to address social as well as economic issues. Ms Annison has generated a lot of local and national interest in this project through the press and magazines.

**Funding** - NWDA provided a £40,000 grant through its Broadband Fund in March 2003 enabling deployment to start.

**Backhaul and internet access** - CLEO will provide the primary backhaul and internet access. Other backhaul suppliers may be employed to provide resilience.

**Distribution network equipment** - Enterasys is supplying conventional Wi-Fi equipment. Locust World is supplying mesh radio software and equipment. Croft plc is providing radio antennae installation services.



**Training** - the local heritage centre is offering basic ICT training up to NVQ level. More advanced training is available through Cumbria Credits.

### Business model

Edenfaster is a company limited by guarantee formed by a group of local ICT professionals to deliver broadband services for education, business and home users in Appleby, Kirby Stephen and surrounding areas. The initial phases of the deployment project have been grant funded.

The intention is to develop a wide and ambitious range of services exploiting the bandwidth that can be made available locally, using wireless LANs and the fastest internet service that funds and the supplier will allow.

The target price for the service is £25 per month for domestic users and £50 for business users for a 1Mbit/s unmetered service. There is provision for internet access to be provided to unwaged and unemployed users at a special rate.

There is an extensive Service Level Agreement (SLA) between NWDA and Edenfaster defining the aims of the project in return for NWDA funding. Although the funding is very welcome to the project team, regulatory issues associated with funding impose limitations on the project. The SLA has ensured that a full business plan has been developed and validated by an outside agency.

Edenfaster management team aims to use the project to grow its expertise in new technologies and services and the deployment of community networks, so that it can support community network deployment in other locations. To this end it is adopting a 'hands on' approach to the project. Hence, the design of the network and services is being undertaken by the project in partnership with its chosen suppliers. Components are being purchased and managed directly by the project. Some basic services, such as backhaul and internet access, billing system and installation services will be purchased as services.

### Implementation

Deployment of the wireless distribution networks in communities started immediately after funding was granted by NWDA. Two types of radio technology are being used, both in the unlicensed band and using IEEE 802.11 wireless LAN technology.

In Kirby Stephen, Locust World is providing equipment that establishes a mesh radio network in conjunction with IEEE 802.11 wireless LAN technology. Locust World mesh radio equipment is also being used for the community network in Kingsbridge, Devon. This technology enables the LAN to configure itself dynamically, an advantage in areas where design of the LAN may be a complex issue because of line of site constraints or other problems. This solution also enables provision of internet access through a TV and a specially designed TV set-top box, thereby reducing the cost of equipment for individual subscribers that do not already own a PC. In the remaining communities, Enterasys is providing standard wireless LAN equipment. Both types of LAN were piloted before deployment.

CLEO, the major supplier to community schemes in the region, will supply backhaul and internet access.

A Broadband Information Centre is being created in Appleby to act as the base for the service and for support. A community portal will be located there. Individuals within the community will be actively encouraged to develop local content for the portal.

### Customer acquisition and support

The project's approach is to generate interest by obtaining publicity through all available media along with developing local contacts with interested parties. A Guardian article in October 2002 generated 900 emails; BBC news online has generated 1,500 emails and a Silicon.com report 200.

The generation of so much interest has its costs and the project has been contacted by many other community projects in the UK and beyond. Lindsey Annison along with other like-minded professionals has set up the Access to Broadband Campaign (ABC) with the aim of boosting and supporting the roll out

of broadband in rural areas with a focus on wireless technologies. This has generated interest from development agencies and industry.

Local interest was stimulated by addressing the Appleby Town Forum and two seminars are being organised in conjunction with Business Link. The technology has been taken out to local events demonstrating the possibilities of broadband in the community. There has been close cooperation with the local schools and colleges to allow them to take early advantage of the service.

100 prospective subscribers have been identified in Appleby of which 70 are businesses or teleworkers. A take-up of 10% would be a success but the project aims to achieve higher penetration by the use of set-top boxes.

Early adopters will be an important component of the project in that they are expected to be evangelists in the community promoting and supporting the further rollout across the target area.

### Pointers to success

- Although initially grant reliant, the aim is to become autonomous as soon as possible.
- The wide range of skills required to drive such a project were available locally.
- Rural communities have well developed means of disseminating information that have been exploited by Edenfaster.

### Key issues

- The shortage of financial skills in the project team. This has now been addressed.
- Lack of skills in obtaining funding and negotiating the state aid mine field.
- The funding contains an element for project management but this is very limited.
- The project, by choice, is effectively a research and development vehicle for the NWDA and subsequent projects. Edenfaster believes that insufficient recognition is made of this in the funding available to date.
- There are several broadband connections into the area that cannot be shared and will stay out of the scope of the project for the foreseeable future. These include services for the police and connections to local schools.
- Obtaining access to suitable sites for antennae has proved difficult.

## 5. SEEDA Satellite Programme



The South East England Development Agency (SEEDA) has been piloting a programme of low-cost satellite broadband access, primarily in areas where ADSL is not available to facilitate access to broadband services.



### Project objectives

The project sponsor is SEEDA, which is using the regional broadband fund to encourage understanding and deployment of satellite technology in particular, and broadband services in general, to small companies currently without access to broadband. Hence, the service is mainly targeting rural areas.

The project objectives are:

- To reduce broadband satellite installation and first-year running costs for a single PC installation towards the level of BT's Business 500 ADSL tariff.
- To obtain user feedback on the relevance, applicability and benefits of a fast, affordable, always-on, broadband service.
- To use the results of the programme to help stimulate broadband demand across the South East region.

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 broaden knowledge of broadband enabled applications. SEEDA, Business Link and UK Online are actively promoting the programme at events across the region and can provide ongoing ICT support to subscribers.

The grant is conditional on cooperation with SEEDA in providing feedback in the first year, aimed at highlighting the subscriber's experience in installing and using broadband and to provide data to demonstrate its financial impact on the business.

### Business model

Each applicant is expected to produce a business case identifying the benefits of broadband and to report against expectations. Case studies have been prepared from the pilot material.

In order to qualify, the applicant must be an SME or other organisation of less than 250 employees. It must have no access to broadband anywhere. A maximum grant of £1,060 is available. This is intended to cover installation costs and some running costs over the first 12 months. It is paid in four quarterly payments.

Individual subscribers are responsible for the procurement of a satellite service from an approved list of suppliers. Approval of suppliers is only a measure of a supplier having a sound business basis and is not an approval of the technology used.

The programme has gone through several phases of deployment building up to a region-wide scheme. The initial pilot in Hastings and Rother indicated strong initial demand with 55 approvals being granted from 151 application requests. However, only 22 installations were completed. The regional pilot results indicate a similar proportion of requests to approvals to installations but the deployment phase is not yet complete. SEEDA expects to award 325 grants in this phase.

### Partners, their roles and relationships

**Funding** - SEEDA is the sponsor and provides funding from its Broadband Fund.

**Administration** - Wired Sussex was contracted to promote and administer the application process for the Hastings and Rother phase and is administering the later phases.

**Promotion** - Business Link is promoting the service in the region-wide phase.

**Service provision** - four main satellite service providers have been identified by Wired Sussex: Aramiska, BT, Isometric and SatDrive.



## Implementation

The installation of the system is the responsibility of the supplier contracting to the end user. Any problems are handled as part of that relationship. In some circumstances a small group of applicants may share a single satellite connection by LAN infrastructure but again installation and management of the required LAN infrastructure is the responsibility of the applicant and supplier.

## Customer acquisition and support

The nature of the programme is that it is intended to promote the benefits of broadband to small businesses rather than provide a comprehensive service. Many events have been held over the project period promoting benefits, but word of mouth testimonials from existing users have also been important in encouraging service take up.

Each application takes about ten weeks to process and the process is supervised and supported by Business Link. Reactions to the project and its administration from applicants are generally positive but there is a high drop-out rate between application and grant. Some of these have resulted from difficulty in obtaining planning permission for a satellite antenna, while others have succumbed to the spreading availability of ADSL.

Satellite users indicate that the service provided can be very effective for general internet use including web browsing, e-mail and downloading. Satellite services have undoubted advantages of rapid installation, universal availability and considerably lower cost than equivalent leased line options.

However, supplier imposed limitations and service characteristics can lead to problems with more complex and real time applications. Restrictions on firewall configuration, IP addresses and domain names can restrict the use of the service for hosting and VPN installation even when the available data rates can support the application. Incompatibility between the satellite service and software for downloading files can also cause problems such as unreliability during software updates.

Those planning to use a satellite service should therefore have a good idea of precisely what they are going to use it for and clarify with the proposed supplier that these requirements can be implemented.

### Pointers to success

- The pilot ensured that there was demand in the region.
- Targeting to ensure the funding reaches the right beneficiaries.
- Wired Sussex and Business Link are proving to provide an effective combination of skills.
- Business Link is able to extend its relationship with applicants to offer more general ICT advice.

### Key issues

- Local targeting by a regional organisation creates further demand from outside the targeted area.
- Planning issues lead to some failure to take up grants. In many rural locations satellite dishes require planning permission. This applies to listed buildings, conservation areas, National Parks and Areas of Outstanding Natural Beauty. A tenant or leaseholder usually requires the permission of the freeholder.

## 6. Buckfastleigh Broadband Ltd.



The backdrop to the Buckfastleigh Broadband Ltd (BB Ltd) project is the desire to address the demise of this former mill town and to contribute to economic revival and a greater sense of community spirit in Buckfastleigh and the surrounding rural areas, including Dartmoor.

The project is the result of a local project champion, who was highly motivated to assist the community, and her partner, who has a strong telecommunications background. They are executing a two-year pilot with £500k from the DTI UK Broadband Fund and have established a hotspot community network in Buckfastleigh. This includes a community facility and extends some 5km into a Dartmoor village.

The network uses a leased line into the local school for backhaul and a local technology partner that provides a non line-of-sight fixed wireless connection.



### Project objectives

The project will implement broadband infrastructure and services to the small, rural town of Buckfastleigh to underpin the provision of improved social and economic services to the community.

The project will monitor its impact on the community and report outcomes to the South West of England Regional Development Agency (SWRDA)



WAVE in the main street is a community meeting place and the source of Buckfastleigh's broadband services.

within the outline proposed timescales set out in this document.

### Partners, their roles and responsibilities

BB Ltd, a company limited by guarantee, was formed to establish and manage the Buckfastleigh Broadband Community Network. Members of this company comprise various stakeholder groups:

- Buckfastleigh Town Council;
- Dartmoor National Park Authority;
- Department of Trade and Industry;
- Devon County Council;
- South West Grid for Learning;
- UK Online for Business/Business Links;
- SWRDA;
- Teignbridge District Council.

### Business model

A goal of the project is to create a plan for sustainability after the pilot period, with the resulting benefits of an increase in ICT skills amongst the community, a contribution to the regeneration of the town's central public area and long-term employment in the town. This project will evaluate the technical feasibility, the advisability and the potential community and regional benefits within a rural environment of sharing of publicly funded broadband infrastructure and services with the commercial sector.

BB Ltd is based on a pilot approach of two years duration involving the development of a Community Area Network and the establishment of an Internet Café style facility called WAVE. The network is hotspot oriented with the intention of bringing together people in the community. WAVE has involved significant effort in identifying, planning, developing and fitting out the 'high street' building. In association with WAVE, significant effort has gone into marketing and awareness programs to raise interest in broadband in the community.

There is little revenue and this comes in the form of small contributions by WAVE visitors. There is an issue with charging potential commercial users, as the backhaul is based on a private circuit into the local school leased via an agreement with SWGfL which bars commercial contracts. An alternative is being sought to enable broadband services to be sold to industry, now that the working of the Community Network has been shown to operate satisfactorily.

There is a SDSL link from the school to WAVE.

The project is at a key point in terms of developing a business with ongoing revenues that may be sustainable.

£500k of DTI funding has been provided, delivered in tranches, administered and facilitated by the SWRDA.

The project was initiated by a technical evaluation exercise. The project management team has a strong technical background through experience in the telecommunications industry. The technology is based on Point-to-Point Fixed Wireless non-line of sight networking from Orthogon Systems, based in the nearby town of Ashburton. Orthogon Systems is bringing its product to market in mid 2003 and BB Ltd network is using pre-production units to provide a service. The company is focusing its leading edge technology on the American market because of Radiocommunications

Agency (RA) issues with power output. The company's products can use up to 4W transmission power, which is legal in the USA, whereas the RA is considering allowing up to 2W.

### Demand estimation

The focus has been on building demand through marketing and awareness programmes through two Programme Managers employed by BB Ltd. The areas of activity are indicated below.

**Business** – focus on main business centres and multi-tenanted small industrial units, drawing on the lessons from the ActNow project in Cornwall. Four specific locations targeted.

**Education** - primary: meetings and presentations, secondary; working sessions, adult; partnership with local provider and utilisation of WAVE; further: discussions and the investigation of an 'extended campus' based on access to school networks.

**Community** - working with community groups and the press to raise awareness and utilise the WAVE facilities.

**Health** - focus on local community based initiatives, such as the Community Health Visitor and a related ante and post-natal exercise.

**Outreach** - planned preparation to Dartmoor National Park Authority to implement a Community Broadband Network in Dartmoor towns and villages.

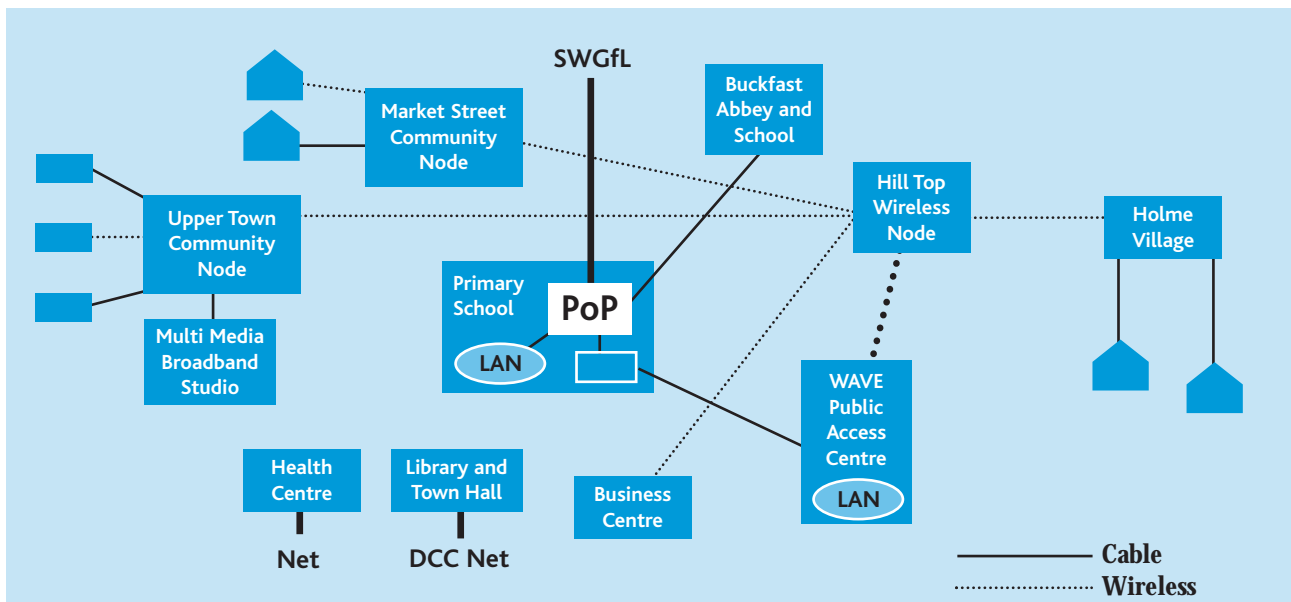


Figure 7: Buckfastleigh Broadband – The Network

**Research** - based on a study being undertaken by the University of Plymouth.

## Implementation

**Phase 1:** The definition of an implementation strategy for broadband services encompassing the town of Buckfastleigh and its surrounding environs.

Timescale: February 2002 - August 2002

**Phase 2:** Implementation of initial broadband services to Buckfastleigh. In particular:

a broadband network linking key public facilities – School; Town Hall; Library – using the latest broadband technologies. A Marketing and Public Broadband Internet Access Centre (WAVE) in the high street that will promote and demonstrate broadband services. Extension of the broadband network to a number of strategic locations around the town.

Timescale: August 2002 – December 2002

**Phase 3:** A rollout programme to ensure maximum uptake of broadband services by commercial and non-commercial users. This will encompass four 'Action

Programmes' covering the areas of Business; Education; Health Information; and Community. Lessons from the pilot will be published and made available to other rural communities.

Timescale: December 2002 - December 2003

**Phase 4:** Project evaluation and the publication of the final report.

Timescale: January 2004 - February 2004

## Customer acquisition and support:

The two-year pilot project is now facing its completion date in Q1 2004 and BB Ltd's attention is now on developing paying users with a view to a transition from the pilot to a sustainable business. The focus is on business customers and SMEs in particular. A key issue that is being addressed is the contractual ability to levy a charge for the service. This concerns the use of the school's SWGfL leased line and those responsible for this and the contract with BT are debating this matter. Meanwhile, BB Ltd is making progress regarding its own backhaul through its own leased line.

21 August 2002 – First broadband connection into Buckfastleigh Library.

3 October 2002 – 3.5 GHz radio wireless head-end installed on ntl mast.

7 and 8 October 2002 – 3.5 GHz radio wireless broadband network installed and operational at WAVE, Upper Town community node, Searles Business Centre and Market Street community node.

29 October 2002 - The SWGfL 2Mbit/s broadband connection to the primary school was installed.

6 December 2002 – SDSL connection completed linking the primary school to WAVE.

### Pointers to success

- Strong community focus not only bringing broadband to sections of the community but also bringing the community together.
- An impressive range of supporting partners, the SWRDA in particular and other public and private sector organisations.
- Exploitation of the abundance of local wireless communications and related technical talent in the team and the surrounding area.

### Key issues

- Developing a sustainable business, that is making the difficult transition from the funded pilot project to legitimate and appropriate revenue generation, including commercial utilisation of public communications bandwidth.
- Reliance on a highly capable fixed wireless solution that is in the process of its first product launch and the quest of becoming an established supplier.

## 7. Kingsbridge Community Network



Kingsbridge Community Network has come about through the efforts of a project champion, Bill Noyce, who was brought up in the area and feels deeply that something should be done to bring a decent level of electronic communications to the community. Bill has a technical background through systems administration role in BT and now works for local web design company Saltstone Media that provides the leased line for backhaul.

### Kingsbridge Link

Bill has established, through his voluntary part-time efforts and £1,000 that he provided himself, an 8-node Wi-Fi network that uses a meshing protocol that serves as a model for community networks. The nodes use low spec PCs, running Open Source software together with Wi-Fi (IEEE 802.11b) hardware to support the meshing process.

This project provides a vivid illustration of the remarkable results that can be achieved through a part-time resource and a small outlay. Other communities could readily benefit from this approach given backhaul through, for example, use of the library or school leased line and using the Wi-Fi meshing approach. In this way a project could easily get to this proof of concept stage, where a working system of a reasonable size is established.

This model lends itself a small service provider business that is typically found in the community. Such a business would probably value the addition of a community network business and would have the type and range of skills needed to develop, operate and support this business. It should be noted that the £1,000 used to set up this network should be taken in context. It does represent what can be done for a proof of concept on a voluntary basis but this cost is just a part of the overall cost of the service provider business needed to provide a commercial service.

### Project objectives

- To assist the community, given a level of perceived interest in decent internet facilities

and that BT is not forthcoming with ADSL provision.

- To demonstrate that a community network can be provided at low cost through the endeavours of a committed project champion.
- To establish sufficient infrastructure to prove the concept and to provide a platform for further development.

### Partners, their roles and relationships

The project has been enabled by the shared use of the leased line of Saltstone Media, a local web and service provider company that the project champion works for. The Kingsbridge Link has been established in the 'spare time' of the project champion.

The community network is based on the Linux operating system and associated open source technology that supports the AODV (Ad Hoc On-Demand Distance Vector Routing) meshing of IEEE 802.11b. The open source software was created by the US Department of Commerce National Institute of Standards and Technology ([www.nist.gov](http://www.nist.gov)) Wireless Subgroup. There are a number of projects using this new technology throughout the world. Locust World has provided this technology through value added services of integrating the Linux AODV system and associated IEEE 802.11b card in low cost PC units of some £100 to £250. This technology is also being used in Edenfaster.

Other well known technologies developed within the open source movement include the Linux operating system itself and the Apache web server.

The hardware used in Kingsbridge is based on low specification 'Pentium 133' PCs that have little or no value together with a solid-state alternative to the disk (flash memory) and an IEEE 802.11b card. With the AODV protocol, a scaleable mesh network with redundancy is provided. This improves with the addition of nodes and is suitable for community networks. The size of network supported needs to be determined through practical experience of this and other projects.



While the backhaul is through shared use of the Saltstone Media leased line, there is potential to improve the network through utilisation of bandwidth to public places such as the libraries that have a 2Mbit/s leased line.

### Business model

Kingsbridge Link is not based on an organisation and is constituted by an individual, that is a project champion who has undertaken the establishment of the community network in a single-handed voluntary manner and with his own money.

The community network has been provided on a proof of concept basis and would need to be developed by a suitable organisation, such as a local service provider, into a commercial business with an associated service to users. In this, the commercial restrictions associated with IEEE 802.11b are noted.

The AODV based Mesh system supports the ability to identify different classes of user including guests and control their usage of the network including the ability to bill for services according to an appropriate charging policy.

The project has not been publicly funded. Indeed, there is some concern from the project champion about the levels of funding attracted by other broadband projects and an interest in attracting sufficient funding to move the project on into a sustainable proposition.

### Demand estimation

Demand estimation was based on informal investigations and discussions conducted by the project champion. A sufficient degree of local interest was determined and this led to the provision of the 8-node network. The network is used by a handful of users. Publicity in the local paper and by other means such as the website has resulted in many enquiries for the service and 30 specific names.

### Procurement

This project has not been the subject of funding sources and has been established with £1,000.

### Implementation

The 8-node network has been established and there is interest in establishing further nodes locally that will improve the operation of the network. The thought is to base this on the locations of those requesting the service. There is interest in developing links to more distant communities.

This depends on the ability to support such developments with finance and resources.

### Customer acquisition and support

Despite the reliance on the efforts of a part-time voluntary project champion, there has been publicity and this has attracted a healthy level of interest.

The challenge now for KCN is the organisational and business related demands that developing the business will involve.

#### Pointers to success

- An exceptional illustration of what a part-time voluntary resource can achieve with no external funding and driven by a very strong interest in the community and the well being of the area.
- The early use of a strategically important wireless technology (open source and Linux based) that can serve as a model for low cost, pragmatic and effective community networks.

#### Key issues

- Rising to the challenge of developing the network and providing a supported service to customers that involves major issues of organisation formation and funding.
- Concern that such a project, given that it has got off the ground without funding, might now be by-passed from a funding perspective, particularly as it is at a critical stage in this respect.
- Absence of support, practical and otherwise, from the public sector bodies, such as the SWRDA.



## 8. Bredon Hill Villages, Advantage West Midlands

The Bredon Hill Villages are in a rural area of Worcestershire with low density of population. There is however a significant demand for broadband services in the area from ICT, media and farming enterprises, schools and home workers. These interested parties have been actively promoting the benefits of broadband and have been identified by Advantage West Midlands as a suitable candidate for deployment of broadband.



### Project objectives

The immediate aim of the project is to bring broadband services into an area in South Worcestershire between Tewkesbury and Evesham. This area is adjacent to the Gloucestershire border and roughly to the south of Bredon Hill. It includes a number of villages with a total population of 5,000, and a pool of 1,000 jobs. There are four BT exchanges in the area, none of which has broadband services.

The project is being funded by AWM under its broadband intervention policy. AWM's objective is to maximise the economic benefit to the region by

improving the availability of broadband telecommunications. It is one of four projects being funded by AWM: Leominster; Park House Industrial Estate (Stoke on Trent); Upton Magna and Bredon Hill. These projects are intended to highlight the range of technical and commercial options available for broadband delivery.

Wychavon District Council's interest in stimulating broadband services was to provide a more diverse economy, and more specifically to increase the area's attractiveness to service and high technology businesses. At the same time, the Council was becoming aware that businesses were being lost to business parks and towns outside the area because of the lack of cheap broadband telecommunications services.

The broadband requirement in villages around Bredon Hill was originally identified by Penelope Bossom who could be characterised as the project champion. Her objectives were specifically to create 'working villages' and maintain a sustainable local economy in villages that could support a wide range of business types.

### Customers and users

The primary focus is to provide broadband services to SMEs in the area. These are diverse and include a number of ventures that work with graphics and images, including architects, a pottery and artists. It also includes some high technology ventures – software development and chip design, for example. These enterprises require broadband telecommunications at a reasonable price to function.

There is also an opportunity at the same time to provide services to consumers, and the intention is to support them as well.

### Demand estimation

The original feasibility study carried out by Wychavon District Council (WDC) was funded by the Evesham Market Towns Partnership, which harnessed grant funding from the Market Towns



Photograph courtesy of Artwork Creative Ltd

Eckington Bridge, Bredon Hill.

Programme Structural Funding together with funding from the District Council and Evesham Technology, the computer manufacturer.

Once a decision had been made to go ahead in principle, a registration scheme was set up. This identified 111 prospective customers, 60 SMEs, 43 consumers, 3 public sector and 5 others - corporate, public sector and unknown.

Initial publicity was carried out by phone and e-mail, parish magazine, public meetings and a mail drop in the targeted communities.

### Partners, their roles and relationships

The project champion, Penelope Bossom, has been responsible for mobilising demand within the area and for representing that interest first to Wychavon District Council and subsequently to AWM. A close working relationship between the project champion and WDC and then AWM contributed significantly to the success of the project.

**Wychavon District Council** was responsible for an initial feasibility study that it undertook with consultancy Intercai Mondiale. Their involvement in the development project contributed to its acceptability to some businesses, for example, by indicating impartiality. Phil Merrick, Economic Development Manager at Wychavon District Council, was able to extend the range of prospective users beyond those immediately known to the champion, to introduce the project to AWM and organise and fund specialist skills.

**Evesham Market Towns Partnership** had early ownership of the project. It also provided funding and structure for workshops and training, activities that otherwise might not have been covered.

**AWM** was the principal funding organisation and is implementing the project within its overall broadband initiative. The funding that AWM is contributing is mainly covering project management and infrastructure.

AWM has brought in a consultant, Analysys, to operate its broadband initiative, to procure broadband services within the initiative and to project manage service introduction on behalf of AWM.

**Business Link** was brought in to describe the

benefits of broadband to prospective users. Business Link had to tailor its advice to be relevant to the changing needs of prospective users and the local community organisation. Initially, it had to be focused on broadband technology and benefits. Subsequently, it needed to focus more on process of obtaining supply in the area.

### Business model

The intention is to provide a basic multi-user business broadband service – asymmetric contended broadband services of at least 512kbit/s downstream and 128kbit/s upstream. An upper limit has been placed by AWM on the price of the service of £80 per month excluding VAT. Installation and other fees have been limited to £260 excluding VAT. This price is in line with BT's tariff for business broadband.

In addition to the multi-user broadband service, the supplier has also been asked to provide an asymmetric contended broadband service for single users at a lower cost within a wider portfolio of services provided at the supplier's discretion.

The opinion of the stakeholders in the project was that it would be difficult to get an individual community to become a contracting party because of the risk involved and the time required to manage procurement. As a consequence, the supplier will sell its services directly to the end customers.

AWM's funding for the service is intended to reduce the risk to the supplier by underwriting demand for the service. Demand has been underwritten for up to 25 customers for the multi-user broadband service, and up to 100 customers for the single-user broadband service over the first twelve months of service availability. In addition, a grant has been made available if necessary to the supplier within the de minimis funding constraint. The supplier would contract with AWM for the duration of the project for the supply of a service to the area. Grants were to be provided under this contract as necessary.

A local service provider, Independent Networks of Coventry, was selected in late May 2003. Independent Networks service is based on DSL to be provided from locations close to each of the exchanges in the area.

## Benefits to the locality

### Community Benefits:

- A community of businesses has been developed already around Bredon Hill. They are beginning to get to know each other and are the stronger for it.
- The project will lead to local information services.
- The anticipation of broadband is already helping to keep jobs in the community.

### Potential benefits:

- improved security.



Conderton Pottery, Conderton

Conderton pottery's marketing is improved by the high quality photographs on their website.

Table 3: Local businesses many uses of the broadband network

<b>Spread Garden Supplies, Beckford</b>	<ul style="list-style-type: none"> <li>• Reduced telecommunications costs.</li> <li>• Potentially, reduced IT costs through consolidation of two ERP systems into one.</li> </ul>
<b>Conderton Pottery, Conderton</b>	<ul style="list-style-type: none"> <li>• Broadband will provide a telecommunications infrastructure that will allow the Pottery to maintain a web-site with high graphical content.</li> </ul>
<b>Samantha Dadd Art Studio, Conderton</b>	<ul style="list-style-type: none"> <li>• Broadband will overcome problems in maintaining a graphical web site and in using email to deliver high-resolution images to customers. It will also support research in images carried out in part on the internet. Finally, it will support the development of an Arts and Crafts Trail around Bredon Hill.</li> </ul>
<b>David Pearson, Architect, Kemerton</b>	<ul style="list-style-type: none"> <li>• David Pearson has an immediate requirement to exchange images and CAD drawings with clients. His current use of ISDN is very expensive.</li> <li>• As his practice grows ISDN will become technically inadequate.</li> <li>• Ultimately and in the not too distant future, architects will be designing collaboratively, and at that point, each architect and other design team members will have to have an 'always on' broadband connection to enable the free exchange of information with others.</li> </ul>

### Pointers to success

- Strong local support given by an exceptional project champion.
- Local demand was well researched.
- Funding approach that reduces risk for the supplier to an acceptable level, while minimising the funds required.
- Project manager to organise procurement.
- Central organisation to contract with supplier.
- Close working relationships between the partners within the Regional Broadband Stakeholders Group.
- Realistic targets.

### Key issues

- Length of time involved in obtaining a service.
- Availability of skills for project management, partnership building, business planning and technology.
- Time required for the project champion role.
- Development of a connected community – pointers required.
- There is a need to train up project champions.
- Business Link's advice needs to be relevant to the changing needs of prospective users and the local community organisation.

## 9. East Riding of Yorkshire Council Broadband Network



The ERYC Broadband Network has been under development since 1996. This early, pioneering vision has led to one of the UK's most extensive and comprehensive integrated Broadband Networks. A joined up strategy, which has not only produced best value out of the network, but successfully integrated funding from many sources.



### Project objectives

East Riding of Yorkshire Council (ERYC) is a rural unitary authority with the largest geographic area of any such local authority in England. The extensive area covered means that access to Council services and to other public sector services has often required considerable amount of travel, with a round trip of two to three hours possible. The ERYC broadband network addresses this problem by providing an integrated method of delivering public sector services through Customer Service Centres located across the Council's area. In addition, it has provided an infrastructure to deliver education services and to provide telecommunications services for the Council itself and for NHS and Police services.

### Business model

The network covers the whole of East Riding of Yorkshire, reaching 170 parishes and villages. The project base is extensive and comprises:

- Education - 165 Schools, 51,000 pupils and staff. All 18 secondary schools are connected at a minimum of 8Mbit/s each way. Over 60 primary schools are currently connected, against a target of reaching all primary schools by the end of summer 2003. Primary schools are provided with a 2Mbit/s symmetrical service.
- Local authority Customer Service Centres in

rural locations throughout the County. These are one-stop-shops covering services provided by centrally located council departments, Small Business Centres, Citizens Advice Bureaux and some health services. The Customer Service Centres allow users to have face-to-face appointments, to video conference centrally located staff, or to access electronically presented services over a broadband link. Over 90% of queries are being dealt with at the first time of calling from these centres.

- Small Business Centres.
- The East Riding Legal Services Partnership, which comprises Citizens Advice Bureaux, Legal Services Commission and local solicitors.
- The Police - direct links through CSC/Citizenlink network.
- East Yorkshire Primary Care Trust that operates its VPN over the network.
- 300 local authority 'homeworkers' targetted.

ERYC is currently in negotiation with the Inland Revenue, Department for Work and Pensions, Connexions and local FE colleges to extend the service further.

The organisations supported by the network have formed an informal local partnership to monitor the delivery of the service and plan extensions. Contracts exist between ERYC and the Regional Broadband Consortium to provide services to schools, and



The Citizenlink at Wilberfoss.

between the ERYC and the underlying service providers BT and Kingston Communications.

Major funding sources comprise:

- £2.5 million capital funding each year from NGfL;
- a total of £1.4 million capital funding from the local authority spread over four years;
- £300,000 each year from the local authority to cover operating costs.

Other funding sources included Yorkshire Forward, the Lord Chancellor's Department, and East Yorkshire Primary Care Trust to cover the cost of specific extensions to the network.

The ERYC Broadband Network is beginning to enable community broadband services. A number of community groups are developing through support by the Phoenix Fund. One such project is developing a broadband network of five 'Communities of Enterprise' in the Withernsea and South Holderness Rural Achievement Zone. The intention is to support such initiatives on the ERYC network.

### Demand estimation

Demand estimation was based on the NGfL guidelines for schools and estimates provided by public sector partners themselves. Demand has turned out to be double the estimates.

No market research was carried out beforehand, although market research is now carried out every six months to identify areas where the service can be improved and grown. This market research is undertaken by ERYC using one-on-one meetings, training events and community events.

The community benefits of the project were publicised by a comprehensive marketing programme that included: a website, press releases, parish magazines, public meetings in the areas covered, mail shots and leaflet drops. The promotional material was designed in house. The most effective promotions have been word of mouth testimonials.



The Citizenlink videolink access points at Willerby.

### Benefits to the rural community

The ERYC Broadband Network benefits the rural community by providing public sector services via the Customer Service Centres. For example clients 'see' Citizens Advice Bureaux staff or solicitors without the need for a 2-3 hour return bus trip.

#### Pointers to success

- Demonstrates potential for integrated service delivery across the public sector.
- Best value was achieved by a combination of procured services and in-house design and build.
- The corporate and professional project management approach to the broadband network has been the 'glue' to help promote the ERYC network.
- The ERYC Broadband Network positions ERYC competitively and supports the County's fast population growth. There has been significant growth in inward investment and ERYC is becoming a Beacon Council.

#### Key issues

- The Network initiative has not yet been extended into communities or SMEs because of restrictions placed on local authorities.

## 10. Milton Keynes Broadband Network



The Borough of Milton Keynes has evolved from small towns, villages and hamlets set in the undulating countryside of North Buckinghamshire into an extensive urban environment. However, about 22,000 (11%) of the Borough's population live in 28 villages including Lavendon, Olney, Stoney Stratford and Woburn Sands.

This project is providing a wireless broadband network together with associated broadband demand aggregation in the Milton Keynes area. The Council will engage with suitable qualified and experienced partners.

The total investment needed for a wide-scale roll out will be substantial. However, it will facilitate rural access, e-government and social inclusion objectives that will place Milton Keynes amongst the foremost e-enabled rural communities within the UK.



### Project objectives

Milton Keynes Council believes that broadband internet services are a requirement within the Milton Keynes area. Many small rural businesses and citizens complain about lack of access. The Council has a direct leadership role in solving this problem for its rural community and in fostering the economic well being of the area. Analysis suggests that Wireless Broadband represents a cost effective way to deal with the accessibility problem.

Milton Keynes Council are proposing:

- initial wireless broadband pilot (or pilots) for around 200 to 300 mainly rural 'customers' to receive wireless broadband internet services and;
- adapted use of broadband demand aggregation consultancy services to aid in the assessment of the pilot and to collate information on demand and opportunities for service delivery within the Milton Keynes area.

The initial proving wireless broadband pilot(s) will run for around four months. During the pilot,

the broadband aggregation consultancy will run an evaluation of the pilot assessing the 'commercial' potential and the application of the technology (and other technologies) for use throughout the especially rural parts of Milton Keynes Borough.

### Demand estimation

Part of the purpose of this pilot is to evaluate the likely demand and factor this into the business model development. A very significant part of the population in rural Milton Keynes cannot gain access to broadband services. Inaction may present a danger for rural economic growth, with rural citizens and SMEs being restricted from access to affordable broadband services.

### Partners, their roles and relationships

This project assumes the creation of a new service delivery capability (a new network infrastructure), heralding an enabling ability for the Council (as a user in its own right) to link to other public sector agencies: the police, NHS Trusts, fire services, voluntary sector agencies and schools in the Milton Keynes area. Links between this network and the Council's existing wireless broadband network are planned. Council officers have held joint discussions with a networking specialist consultant working on behalf of Bedfordshire County Council to examine the potential and benefits of linking two National Grid for Learning (NGfL) networks and see particular benefit potential in a number of areas. Costs savings including more efficient use of backhaul across the two networks are apparent.

### Business model

The pilot project to prove the implementation of a wireless broadband internet service will cover 200 to 300 subscribers across the rural Milton Keynes area. The pilot will run for at least four months. Milton Keynes Council aims to provide quality broadband internet access services with varying bandwidths from 512Kbit/s up to 6Mbit/s. During the pilot period, the operational and commercial effectiveness of the service and the demand for broadband will be assessed.

If the pilots are successful (and the analysis proves the case outlined in this project proposal for a wide scale roll out of wireless broadband services), then a public/private sector company will be formed to deliver services across the whole Milton Keynes area.

Two grants are immediately available from SEEDA to assist with the projects proposed:

- a wireless broadband grant of £25,000;
- a broadband aggregation consultancy grant of £30,000



Olney, one of Milton Keynes' many small towns.

## Procurement

A collaborative working (partnership) approach is planned for the wireless broadband project. The broadband aggregation consultants and partners will be asked to work with the Council and will contribute expertise to undertake a range of tasks. Both the partners, the Service Providers and the consultants will be sought by open (OJEC) tendering.

## Customer acquisition and support

Milton Keynes Council estimate that commercially competitive services can be offered, priced at around £25 per month for access by individual households with speeds of 512kbit/s at a contention ratio of 20:1, and priced around £50 per month for a SME with a speed of 1Mbit/s.

Low rental charges may be made for rural citizens and SMEs participating in the pilot with no charges anticipated for the first month or so of the pilot. Customer premises equipment with an estimated value of £58,000 including fitting charges will need to be installed. The final transmission points selected will require access to 'backhaul fibre' providing suitable capacity for access out into the internet.

## Pointers to success

Success criteria will be established for each service and project:

- Ease of customer equipment installation – typically should be achieved within 2.5 hours for an average installation. The target will be to achieve 50 CPE installs within a week and to complete the full CPE installs within five weeks.
- The service transmitted (network transmission only) must be available for at least 99.9% of the total time in the pilot period.
- Extent of and duration of support calls; no call should last longer than 15 minutes and each customer should generate less than 3 calls over the pilot period (maximum of 600 calls in total for the whole pilot period).
- Customer satisfaction with the service will be surveyed. Satisfaction levels must be scored out of six (one - poor up to six - very good). 80% or more of customers must rate the service as either a five or six.
- Customers will be surveyed on how much they value the service and their reactions to commercial propositions and service pricing will be tested. A successful outcome will be where customers state they are willing to pay at least £25 per month for the service.



## 11. Cambridge Ring North East Broadband Network



CARNET is a 'not for profit' community network, using mainly wireless technology. It came about as a result of the vision of four key people. Two of those people formed a wireless community broadband company – Invisible Networks Ltd. The other two set up a not for profit organisation to provide the community network - CARNET. Invisible Networks pay a 'community levy' (about 8%) to CARNET, on each monthly fee. This unique combination of demand and supply working together to deliver a solution has worked very well. Since CARNET, Invisible Networks has proved their business model and is currently developing several other wireless community Broadband networks in the region.

### Project objectives

CARNET's overall objective is to deliver broadband connectivity into the local community, a rural area to the North East of Cambridge. The broadband network is intended to provide access to the internet and to community based applications and information. This objective has to be achieved at a reasonable cost.

When the network was being planned, expected benefits included: community development, employment retention, reduced commuting and congestion, crime prevention and reduction in isolation for the infirm and other housebound individuals.

A Wi-Fi broadband community network now covers 14 villages in total - the 6 'original' villages: Bottisham, Lode, Longmeadow, Stow cum Quy, Swaffham Bubeck, Little Wilbraham, plus 8 'new' villages totalling some 3,445 households. Currently it supports 109 subscribers, increasing by about one per day. 298 people have registered an interest. The initial application is broadband internet access, but six community applications including community CCTV are being explored.

### Partners, their roles and responsibilities

CARNET is a company Limited by Guarantee, owned by its members. All subscribers to the broadband network are CARNET members.

CARNET was a long time in its inception. A paper was developed in November 1998, the group got together in December 1998 and it met again in December 1999. In May 2002, CARNET approached the Industrial Common Ownership Movement (ICOM) with a view to becoming a Mutual Trading Company. ICOM sent a detailed questionnaire that helped focus the group on the best constitution for the organisation. CARNET was incorporated in August 2002 and the Cambridge Ring North East went live at around the same time.

CARNET canvassed BT, ntl, and Redstone (formerly Manet Communications) as possible suppliers without success, before meeting Invisible Networks in September 2001.

CARNET and Invisible Networks have an informal rather than contractual agreement on working together and agreement on responsibilities.

Invisible Networks was founded in November 2001, with the intention of developing Community Broadband Networks across the East of England region and beyond. CARNET was the first such network.

Invisible Networks estimated demand during a series of public meetings starting in January 2002 (70 people at the first meeting). No statements of intent were obtained. However, for networks in new communities, Invisible Networks now requires pre-orders.

The CARNET network has stimulated the broadband market in its area, although it was not built specifically to do so. Invisible Networks anticipates that 25% of all households will take-up access to the network within two years at a charge of £30 per month.



Bottisham - receives broadband via a wireless network.

## Business model

Invisible Networks contracts with individual customers in the CARNET area to supply broadband services with the expectation of making a reasonable return on its original investment.

Invisible Networks works closely with CARNET in providing services and funds CARNET through a 'community levy' of about 8% of the monthly fees (about £2 per subscriber per month). CARNET was responsible for the initial tranche of customers for Invisible Networks, and continues to market the service on behalf of Invisible Networks. In addition, CARNET is responsible for developing community applications to be delivered on Invisible Network's broadband network. Invisible Networks sees these applications and CARNET's support as likely to improve customer retention, particularly if BT or another broadband supplier starts to provide services in the area.

To a great extent, CARNET has proven the business case for community wireless Broadband Networks.

The project received a Vital Villages grant from the Countryside Agency in December 2002. This has had the effect of stimulating the take up of services by reducing set up fees from £199 to £49. Before the grant was given, take up had stalled at around 3% of households. Since the grant was provided, take-up has more than doubled.

Countryside Agency funding criteria were very relevant to the aims and objectives of the project.

The network is available to any organisation or

individual within the network's catchment area.

However, public sector organisations have not joined the scheme because of a combination of cultural and contractual constraints. As a consequence, there has been a loss of revenue to the scheme, which affects its overall viability, and in addition, the public sector organisations have to pay more for their telecommunications services in the area.

## Customer acquisition and support

The project was publicised by a comprehensive marketing programme including: a website, press releases, articles in the parish magazines covering villages in the area, public meetings in the area and elsewhere, mail shots, and several leaflet drops by members of the user groups and the project champions. The promotional material was designed initially by CARNET and then by Invisible Networks when it became involved.

The most effective methods of promoting the service have been testimonials on the website and word of mouth publicity by CARNET members.

The relationship between the number of expressions of interest and numbers taking the service has been approximately 2.7:1 conversion ratio. The proportion of users terminating their service has been 1 out of 63 since August 2002.

Invisible Networks used a two-person team for customer acquisition, but relied heavily on project champions in the villages and CARNET for pre-sales work. Invisible Networks employ three customer support staff but these cover all Invisible Networks' communities. Customer support includes: telephone and e-mail support, and a trouble ticketing system. It will shortly move to an online website.

## Implementation

Invisible Networks were responsible for the design of the network. The parameters used were derived from commercial and technical expertise and research. Invisible Networks built prototype networks to test network design concepts, estimate implementation costs and to provide customer demonstrations.

CARNET was not a pilot, but the network was subjected to a period of two months Beta testing

before Invisible Networks started charging subscribers.

The local distribution network uses IEEE 802.11b Wi-Fi, technology and some analogue circuits from BT where it is not possible to get a line of sight between network nodes. Backhaul from the villages to Invisible Networks' central site is via a 2Mbit/s leased circuit.

Wi-Fi was used because it is cheap and flexible for distribution. There are no wireless licences to be purchased, and broadband speeds can be obtained without the line rental charges or the trench digging needed to build a fibre or wire based distribution network.

The location of access to the internet was not a contributory factor for success.

### Skills and training

CARNET was instrumental in the success of the broadband implementation. The community around Cambridge has a considerable number of professional people who could provide the necessary business and other skills to set up and run a community organisation and to develop marketing tools and community applications.

Specific resources that CARNET has brought to the project include: community participation; commitment; motivation and interest; excellent team working; incisive, visionary and penetrating; management skills and ICT engineering skills.

CARNET initially lacked skills necessary to prepare bids for funding. It has since developed considerable experience of making grant applications.

### Local impact

The CARNET Broadband Network has enabled improvements in social cohesion. New links are already being made across the thirteen villages and to a certain extent within them. The Community Networks can be used to provide local information services.

At a personal level, the most positive changes have arisen from the use of IT for education in the home. For example, children can use the internet to research topics and access education material. With broadband, several children in the home can access the internet simultaneously, whereas with dialled connections, they have to queue for access during the relatively limited time available for homework in the evening. Other household applications include: reducing commuting, more efficient shopping and potentially, cameras in the house for remote security.

At a community level, CARNET is investigating opportunities for funding the development of a web-based community skills database, enabling community members to share or exchange skills and knowledge.

The proportion of SMEs and consumers taking up the service has been 8% by household and still growing fast (the statistics do not separately distinguish SMEs).

Invisible Networks has grown from 2 employees to 15 employees in 12 months funded by network revenue and consultancy revenue.

Income is being directed into business growth rather than profit. The Invisible Networks plan is to expand at a rate of 10-20 villages per month.

Community activism is seen as an essential part of their marketing providing a unique proposition that puts its competitors at a disadvantage while enabling the company to access demand at a low cost.

### Pointers to success

- A good relationship between sponsor and supplier, based upon a shared vision and supported by a community levy. CARNET argued for the levy to be 8%, but had to settle for 6%. The levy on the supplier to support the sponsor concept has worked well.
- A good relationship between the demand side (CARNET) and the supply side (Invisible Networks). The relationship is built upon trust although there is an intention to formalise it legally.
- Strong community development ethos both by CARNET and Invisible Networks. The supplier needs to be committed to (and have appropriate skills for) ongoing network development and growth.
- Public sector support to help take the project from initial early adopter phase into mainstream. Eventual funding from the Countryside Agency to support growth of take-up by installation subsidy. No significant support from BT, ntl, Manet Telecoms. No significant support from the RDA.
- Users reaction to the service is very positive. The service has been compared favourably to some corporate services. Some applications that were not possible previously are now being used including remote monitoring and e-procurement. Collaboration facilitated by the service has improved quality, production and adherence to deadlines. The ability to update websites more often with richer content and the development of video links has also been remarked on.

### Key issues

- CARNET had a lack of: accountancy skills, initially funding bid writing skills, public sector and political experience, these initial skills gaps may have slowed the process of getting public sector funding.
- The budget for accountancy was too limited; there should have been a separate budget item at least in their internal planning for the Countryside Agency grant.

## 12. New Greenham Park



The airbase on Greenham Common is being turned into a major rural business park by Greenham Common Trust, now the owners of the site. New Greenham Park will provide a large number of business units of different types. The Trust is keen to encourage high technology businesses and sees the provision of broadband services on the site with a broadband connection to the internet as a means of attracting such tenants. The involvement of AL Digital in the development of a data centre out of a command and control bunker has raised the requirement for broadband services. The Trust has now involved IT and telecommunications companies on the park to provide customer support and technical services to other tenants. The Trust is now

considering ways of exploiting the backhaul capacity it is acquiring and the support capability to deliver services to nearby communities.

### Project objectives

The Trust's vision for New Greenham Park is the creation of a high quality, vibrant, mixed business campus with a wide range of high quality commercial properties that will provide for the diverse needs of local, regional and national businesses. This plan includes the provision of necessary infrastructure before development commences on a plot.

Substantial redevelopment of New Greenham Park is planned. There is outline planning permission for 1.6 million sq ft including space for warehousing and distribution as well as offices and workshops. Planning permission has been granted for some developments including the building of a major regional distribution centre and is in progress for others. This redevelopment will involve the demolition of many of the current buildings and

New  
**Greenham**  
Park



Figure 8: Development master plan for the park



The Bunker at Venture West – the location of SEEDA's Newbury Enterprise Hub.

much of the paved area of the park. Most minor roads and some major roads will be removed also.

As part of the redevelopment, New Greenham Park has put in place a broadband infrastructure for the Enterprise Hub. The objective for the provision of broadband infrastructure was to increase the attractiveness of the park to prospective tenants and particularly to high technology tenants.

New Greenham Park has a mixture of large and small offices, high-tech units and properties suitable for research and development, warehousing and distribution property, light industrial units, small nursery/starter units and larger accommodation suitable for heavy manufacturing. Overall, there are over 160 tenants.

SEEDA (the South East England Development Agency) has located its Newbury Enterprise Hub at New Greenham Park. The Enterprise Hub is primarily located in two buildings Venture West, and the Enterprise Centre, but support is given to other businesses in the park. The Enterprise Hub provides 45,000 sq ft of incubator and other space in two buildings on the site and provides a variety of

administration, support and infrastructure services to New Greenham Park including outsourced HR, a nursery and a shuttle bus. The Enterprise Hub itself has around 45 tenants.

SEEDA has partially funded the development of the telecommunications infrastructure in the park through the Enterprise Hub.

A number of commercial organisations have become involved in the provision of services.

- AL Digital. Once contracts have been completed AL Digital will manage the telecommunications link to Telehouse.
- Ion Systems. Provision of IT support on site in conjunction with the Enterprise Hub.
- Wireless CNP. Prospective provider of telecommunications equipment and services to neighbouring residential areas.

### Partners, their roles and relationships

The airbase on Greenham Common became redundant in 1992 giving rise to a regeneration opportunity covering some 1,000 acres of land. A series of public consultations led to a project to

develop housing and commercial space, and to undertake nature conservation and restoration work led by Greenham Common Trust.

Greenham Common Trust is a community partnership, a charity designed to benefit the local community granting aid to a wide range of local projects. In 1997, it purchased 150 acres of buildings left over from military use in order to develop New Greenham Park, a mixed-use business park. The transaction also secured the remaining 750 acres to the Local Authority to be restored for use by local people, using funds from the Trust.

### Business model

The original broadband infrastructure comprised cabling within the two Enterprise Hub buildings. The Enterprise Hub provided a 512kbit/s internet access service from BT into one of the buildings with a wireless link across the park to the other Hub building. This service attracted eight users within the Enterprise Hub, with the Hub acted as the service provider.

This limited amount of capacity was insufficient for the needs of the Enterprise Hub, and in addition, did not make best use of the aggregation opportunity for internet access from businesses across the park. A further development of the broadband infrastructure on the park was therefore planned. Buildings were to be linked on a fibre optic spine running between the two Enterprise Hub buildings. The estimated number of additional users that could be accessed in this way was considered to provide sufficient demand for a 2Mbit/s connection to the park. A key requirement was the need for a service management infrastructure to give a range of service options such as alternative data rates and contention ratios.

Funding for this plan was sought from SEEDA and alternative service providers were considered for the internet access. There are now some 15 tenants taking this broadband service.

At the same time as this plan for communications infrastructure was being developed, the Trust entered into negotiation with AL Digital to take over a command and control bunker on the site as a secure

data centre for tenants on the park and other customers. One of the elements of the negotiation with AL Digital was the provision of telecommunications to the park from Telehouse in London. The data centre requirement was for some 34Mbit/s for internet access and private network provision. Overall, the aggregation of data centre demand and demand elsewhere on the park gave rise to expectations of substantial economies of scale, leading to a significant reduction in the expected unit cost of service provision. This lowering of cost has made the service more affordable to tenants on the park. Further increases in demand have led to plans to increase the bandwidth to 100Mbit/s. This will give sufficient capacity to extend broadband services to residential areas and another business park in the vicinity.

### Pointers to success

- Broadband has tipped the balance in negotiating leases with some companies.
- Flexible approach from SEEDA through a not for profit organisation.
- Starting small but having big aspirations.
- Involvement of local ICT firms.

### Key issues

- Inflexible contractual terms from telecommunications suppliers.



One of the many wireless enabled offices at New Greenham Park.

## 13. East of England Broadband Network (E<sup>2</sup>B<sup>N</sup>)



The East of England Broadband Network (E<sup>2</sup>B<sup>N</sup>) is a DfES project to develop regional broadband networks, in order to improve connectivity in schools, building on the NGfL (National Grid for Learning) initiative.

The East of England has one of the fastest growing populations in the UK. It has a higher proportion of rural market towns and villages than other regions and more than a third of its population live in towns and villages of less than 10,000. By using the broadband network to share educational resources and promote good practice between teachers, the consortium can help raise baseline standards in teaching and learning.



### Project objectives

The specific objective of the project was to improve teaching and learning standards, by providing broadband telecommunications to each school in the East of England. The service gives internet access and inter-school communications - access from any school to any other school without going via the internet. E<sup>2</sup>B<sup>N</sup> has ensured that such improved

telecommunications has not been limited just to schools but has focused on education generally by including libraries and community colleges on the network. As well as basic communications services, E<sup>2</sup>B<sup>N</sup> provides virus checking, e-mail, filtering, educational content (commercial and developed) through an educational portal, video conferencing, voice services and support.

It was a condition of funding that the project should be linked to existing public sector telecommunications projects or economic development projects and, in addition, that it should implement electronic government policy.

E<sup>2</sup>B<sup>N</sup> covers Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Luton, Milton Keynes, Norfolk, Peterborough, Southend on Sea, Suffolk and Thurrock. All 11 of the LEAs in the region are linked together into one regional broadband network.

The project initially covered 2,824 schools, many of which are rural, with approximately 1 million pupils and 50,000 teachers. Overall, 340 secondary schools are to be connected at a minimum of 8Mbit/s each way and over 60 primary schools are currently connected at a minimum of 2Mbit/s each way, with a target of 100% of primary schools by the end of summer 2003.



Cromer on the North Norfolk coast.



## Business model

E<sup>2</sup>B<sup>N</sup> was initially set up in 1999 with DfES funding by the East of England Telematics Development Trust (EETDT) in response to a UK Government initiative. EETDT itself is an ICT focused Regional Economic Interest Grouping (a non-profit distributing company). The E<sup>2</sup>B<sup>N</sup> Programme Director, Chris Kastel, is also a Director of EETDT. E<sup>2</sup>B<sup>N</sup> was originally an unincorporated consortium, but is now incorporated as a non-profit distributing company with charitable status, owned by the 11 Local Education Authority founder members.

Overall management of the project rests with the Programme Director, who reports to a steering group, made up of representatives from each of the 11 LEAs.

Network infrastructure is managed in a hierarchy: by the supplier at the core, by E<sup>2</sup>B<sup>N</sup> sub-groups and individual LEA teams at the edge and by the school staff at the school. Supplier management is under a framework contract with at least 11 separate SLAs between the LEAs and the service provider.

The end users have at this stage been the schools, teachers and pupils in their homes and at school. Roll-out to the rural communities is likely to result from the significant number of projects currently bidding for EEDA's Connecting Communities competition funding.

Following seed corn funding, the funding in total has been £6.9m (2000-01), £5.3m (2001-02), £9m (2002-03), £9m (2003-04) matched 50/50 from DfES and the LEAs in the consortium. These funds cover salaries, meetings, operating and capital costs. Additional local authority funding was provided to include libraries and other corporate sites. Financial projections are complicated because there are at least 11 different models used to calculate costs for the schools involved. E<sup>2</sup>B<sup>N</sup> does not know whether the costs are lower than they would be with direct procurement of internet access by schools. E<sup>2</sup>B<sup>N</sup> members feel that the funding provider should delegate control to the project while providing support and guidance on outcomes required.

In addition, the impact of accounting separation between public and private network usage is considered to be restrictive.

## Partners, their roles and relationships

The project champions, the LEA ICT advisers, have been an integral part of the project. They have been key communicators of the vision of the network to schools and communities making up for the relative paucity of marketing carried out by the project. They identified local requirements for services supplementing those defined by the DfES and undertook an analysis of costs to determine affordability of the project.

Service providers, Cable and Wireless, BT, ntl and Unisys, have contributed a varying amount to the project. Some clearly add value, working with E<sup>2</sup>B<sup>N</sup> beyond the letter of their contractual obligations. They have entered into the spirit of partnership, working with E<sup>2</sup>B<sup>N</sup> with expectations of a long term mutually rewarding relationship. Others have taken some time to adopt this working relationship and one service provider continues to take a short-term attitude.

There has been little need for partners other than service providers. Most of the skills needed - project management, partnership building, business planning, accountancy, funding, and technical are present within the E<sup>2</sup>B<sup>N</sup> team.

## Implementation

The E<sup>2</sup>B<sup>N</sup> network may be viewed as two layers:

- The LEA layer - this attaches LEA sites, schools, some libraries and some corporate sites to the LEA hub, normally at the LEA's HQ.
- The E<sup>2</sup>B<sup>N</sup> core - this attaches each LEA to each other, to the UKERNA hub for national interconnect and to the internet.

Several proven technologies have been used for local distribution to schools and other sites. They include analogue leased circuits - BT's EPS8/9 in conjunction with DSL modems to provide broadband communications, BT Learning Stream leased circuits, unlicensed (IEEE 802.11) and licensed wireless, dark fibre and optical laser. Technology choice was made to meet the requirements of individual links using a combination of commercial and technical criteria.

The distribution networks are linked to Cable and Wireless servers in London.

The LEA networks were designed by the suppliers in conjunction with LEA technical staff. Some LEAs acted as the ‘Technical Design Authority’, others passed this role to the supplier.

Technical verification was overseen by Cable and Wireless in all cases, working with the E<sup>2</sup>B<sup>N</sup> technical team. Each LEA network had a unique technical verification process. Cable and Wireless technical managers and E<sup>2</sup>B<sup>N</sup> technical group have verified the E<sup>2</sup>B<sup>N</sup> core.

### Customer acquisition and support

Customers are primarily schools, most of which are queuing up to be connected as soon as the funding is available. These customers are supported by the LEA ICT advisers.

### Benefits to users

Advantages to schools from using the broadband service identified by E<sup>2</sup>B<sup>N</sup> include:

- broadband access to NGfL resources;
- savings on content development and easier sharing of developed content;
- broadband access to education content from a student’s home;
- improved commercial content as a result of better understanding of learning needs;
- improved use of ICT within schools;
- savings in operating and capital costs;
- support of lifelong learning.

Advantages for the community include:

- new community services, such as video-conferencing and limited but expanding local information services;
- improved personal networking between individuals in the LEAs involved through the steering group that continues to meet to plan new services.

### Pointers to success

- A focused, co-operative and dedicated team that recognised the benefits that the network would bring to the region;
- A strong centrally held vision constantly developed by consultation and collaboration;
- A high level of collaboration on core services by all partners;
- A strong, fully inclusive, partnership from the start without significant risk of losing any of the partners at any time.

### Key issues

- Pre-existing contracts for telecommunications services were not always sufficiently flexible and there was lack of political will to renegotiate them;
- Marketing and awareness raising within LEAs was poor;
- Network management manpower has always been under resourced.

# Section C

## Annex 1: Funding sources

This annex provides information about sources of grant funding that may be used to develop community broadband networks for private sector use. While many funds exist, availability is limited by location and by the amount budgeted. The usual starting point to obtain funding is either a Regional Development Agency or a local authority. These bodies will of course need to consider funding applications rigorously and then monitor the use of the funds subsequently to ensure that they are used appropriately. A business case will be required from the applicant in many cases, and the applicant will then need to report on use during the life of the project.

### 1. The European Social Fund

The European Social Fund (ESF) is an important source of funding for activities to develop employability and human resources. It is used to add value to policies introduced to make a reality of the Government's objective of promoting employment opportunities for all in an inclusive society. The ESF will support five key activities between 2000 and 2006:

- active labour market policies;
- equal opportunities for all and promoting social inclusion;
- improving training and education and promoting lifelong learning;
- adaptability and entrepreneurship;
- improving the participation of women in the labour market.

The ESF supports the UK's National Action Plan for Employment which is produced every year. This plan sets out the main UK policies and initiatives in line with the European Employment Strategy.

The ESF normally provides up to 45% of the costs of a project. The rest, which is called 'match funding' has to come from other sources.

The ESF covers every part of Great Britain under one or more of three objectives:

**Objective 1:** covers areas that are economically disadvantaged: Merseyside, South Yorkshire, Cornwall and Isles of Scilly and, West Wales and the Valleys;

**Objective 2:** covers areas that are adjusting to changes in their industrial and service sectors, rural areas in decline, urban areas in difficulty, and economically depressed areas that depend heavily on fisheries;

**Objective 3:** operates everywhere except Objective 1 areas.

## Objective 1

The aim of Objective 1 is to meet the economic development needs, including structural adjustments, of the most disadvantaged regions or areas. Human resource development through Structural Fund support in these regions and areas should seek to make the most of economic growth by developing the whole workforce and creating jobs. This will increase opportunities for everyone, including disadvantaged groups.

Three regions in England benefit from Objective 1 funds. Interested organisations should contact the appropriate government office:

- Cornwall and Isles of Scilly- South West Office.
- South Yorkshire - Yorkshire and The Humber Office.
- Merseyside - Merseyside Office.

Areas covered by Objective 1 are not eligible for assistance under Objectives 2 or 3.

Objective 1 funding will be able to provide the full range of support available in Objective 3 areas, in addition to the specific needs of the Objective 1 area.

Each Objective 1 region has developed a Single Programming Document (SPD). This is a plan that sets out the specific priorities and key target groups for ESF support in that region.

## Objective 2

Objective 2 aims to renew industrial, urban, rural and fisheries areas that are in decline. Areas eligible for Objective 2 are broken down to ward level. Objective 2 is not available to those areas that qualify for support through Objective 1.

ESF is available in Objective 2 areas either:

- from the Objective 2 budget - activities must be linked to European Regional Development Fund activities;
- through Objective 3 in the same way as any other project.

Each Objective 2 region has developed a Single Programming Document (SPD). In England, the North West and South East regions have chosen not to have a ESF in their Objective 2 programmes.

## Objective 3

The England and Gibraltar Operational Programme supports employability and human resource development activities. In England, most of the Objective 3 programme is delivered at a regional level by government offices. Each region has a Regional Development Plan (RDP) that sets out regional labour market priorities, actions and target groups.

Objective 3 covers all of Great Britain except Objective 1 areas.

About £2.5 billion is available for Objective 3 in England and Gibraltar between 2000-2006. This is divided between the five policy fields as follows:

- Active labour market policies (25%)

- Equal opportunities for all and promoting social inclusion (26%)
- Lifelong learning (26%)
- Adaptability and entrepreneurship (14%)
- Improving the participation of women in the labour market (7%)
- In addition 2% has been allocated to technical assistance.

Co-financing has been introduced in England on a gradual basis from Autumn 2001 to allow ESF and the required match funding to be channelled to providers in a single funding stream through Co-financing Organisations (CFOs). The intention is that the great majority of ESF funds in Objective 3 areas will be channelled through CFOs. In most regions, some ESF funding is still available by making a bid direct to a government office. In these cases, projects are scored, appraised and selected through competitive bidding at regional level.

## 2. Rural Enterprise Scheme (Defra)

The Rural Enterprise Scheme (RES) provides targeted assistance to projects that support the development of more sustainable, diversified and enterprising rural economies and communities and help protect the rural environment. Its main role is to support farmers in adjusting or re-orienting their businesses in order to take advantage of changing market demands and business opportunities. The RES also has a broader role in supporting the rural heritage and environment, and in helping rural communities to thrive by providing assistance for small-scale community - based projects which are not covered by other mainstream government support.

Applicants can include individuals, partnerships, companies and other organisations. The beneficiaries must be non-public sector. Some measures have specific eligibility criteria. The implementation of RES is guided by the objectives and priorities of the European Rural Development Programme for each individual region.

RES is implemented in areas that are not Objective 1 areas or in some cases Objective 2 areas.

RES 'permitted measures' include:

- Basic services for the rural economy and population; basic services include ICT links and other infrastructure provision benefiting rural communities and businesses.
- Diversification into non-agricultural activities, including the conversion of agricultural or associated rural buildings, land or other facilities to non-agricultural uses.
- Development and improvement of infrastructure connected with the development of agriculture; while in general there is not considered to be a general need here, there may be opportunities on a case by case basis to improve infrastructure.

- The level of grant aid (up to 100%) is dependent on the expected return to the applicant.
- Applicable uses includes project development costs in some cases.
- Applications are managed regionally and is competitive. There is £24 million available in 2003/4 rising to £36 million in each of the following three financial years.

### 3. Leader+ (Defra)

For more information go to:

[www.defra.gov.uk/corporate/regulat/forms/Leader/](http://www.defra.gov.uk/corporate/regulat/forms/Leader/)

Leader+ provides a framework within which local action groups in rural areas can identify their needs and then test new approaches to local rural development. The pilot and experimental nature of the approaches tested entails a higher degree of risk than may be acceptable under mainstream measures.

Under this programme, 26 local action groups based on very specific localities across the country have been set up to pilot approaches to community regeneration. ICT and broadband provision is an option for each of these groups.

### 4. Sixth Framework Programme

#### The strategic objectives

Based on the Treaty establishing the European Union, the Framework Programme (FP6) has to serve two main strategic objectives: strengthening the scientific and technological bases of industry and encourage its international competitiveness while promoting research activities in support of other EU policies. These two objectives are setting the general scene for choosing priorities and instruments.

Participants could include:

- a research group at university or at a research institute (main target group);
- a company intending to innovate;
- a SME (15% of the budget is reserved);
- a SMEs Association or grouping;
- public administrations;
- undergraduate students;
- early stage researchers (post-graduate);
- experienced researchers;
- acknowledge world-class;
- institutions running research facility of transnational interest;
- organisations and persons from third country.

## The European and international dimension

Following the principle of subsidiarity, projects have to be transnational: only consortia of partners from different member and associated countries can apply. For mobility and training actions the fellows have to go to a country different from their country of origin or residence. Activities that can better be carried out at national or regional level, ie. without co-operation across borders will in general not be eligible under the Framework Programme.

## Focus and concentration

FP6 does not cover all areas of science and technology (with the exception of some special actions). A limited number of thematic priorities have been identified. Detailed descriptions of these areas and specific topics will be given in the calls for proposals. Potential participants have to check carefully if their ideas for projects fit within the scope of these priorities and topics. Multidisciplinary proposals addressing several topics may be submitted.

Information Society Technologies are included. There is a £60 million Euro budget for a continuous programme for this theme, that will close in December 2004.

For more information go to:

[www.cordis.lu/fp6/fp6\\_glance.htm](http://www.cordis.lu/fp6/fp6_glance.htm)

## 5. Treasury Challenge Funds: Capital Modernisation Fund and Invest to Save Budget

These two funds have provided finance for several DTI-led projects.

### Capital Modernisation Fund (CMF)

This is aimed at providing innovative capital projects with some or all of the resources they require to proceed. As such it only funds capital expenditure, with all current costs having to be met by bidders. The fourth CMF round, for which the results were not available at the time this report went to print, was launched in 2001.

- £30 million of CMF money was provided to set up the UK Broadband Fund, which aims to promote the take-up of broadband technology. No money has been set aside for this Fund in 2003/4.

CMF examples for the 2001-02 funding period (round three) comprise:

- £20 million for a Citizens Advice IT Gateway: to extend public access to electronically delivered support and advice services at Citizens Advice Bureaux in England and Wales;
- £4.1 million for Novel Reclamation Techniques: to enable productive line sorting of municipal solid waste materials in the UK;

- £2.2 million for a UK Oil Portal: to enable all business processes in this field relating to the granting of consents, approvals and regulatory reporting across all government departments;
- £50 million towards a £75 million Business Incubation Fund for the Small Business Service;
- £60 million towards a £100 million Renewable Energies Fund (completed by £20 million from the Performance and Innovation Fund and £20 million from DTI budgets).

### Invest to Save Budget (ISB)

The ISB is smaller than the CMF and finances projects conducted in partnership between two or more public bodies, and which demonstrate innovation or improvements in public service delivery. Projects should have approximately an 80/20 split between current and capital expenditure and bidders are expected to fund at least 25% of project costs from their own resources.

A national Phoenix Fund was announced by the Secretary of State for

## 6. The Phoenix Fund (Small Business Service)

Trade and Industry in November 1999.

The Phoenix Fund is designed to encourage entrepreneurship in disadvantaged areas. A shortage of jobs, local services and enterprise are common features amongst the socially excluded. Encouraging entrepreneurship will help create jobs and stimulate activities in communities where crime and unemployment are high. This helps meet the basic needs of local people by providing services like shops. It also helps to develop self-confidence and determination in local people and communities which are the real drivers of regeneration in the long run.

The Phoenix Fund currently includes:

- A Development Fund to promote innovative ways of supporting enterprise in deprived areas. (England only).
- A pilot network of volunteer mentors to pre and early start-up businesses, through the Business Volunteer Mentoring Association (England only).
- A Challenge Fund to help resource Community Development Finance Institutions ('CDFIs') (England only).
- A Community Development Venture Fund (CDVF) to create a venture capital fund for SMEs in disadvantaged communities (parts of England only).
- Loan guarantees to encourage commercial and charitable lending to CDFIs (UK wide).

For more information go to:

[www.sbs.gov.uk](http://www.sbs.gov.uk)



## 7. New Opportunities Fund

The New Opportunities Fund (NOF) distributes Lottery grants for education, health and environment initiatives that help create lasting improvements to people's quality of life, particularly in disadvantaged communities.

By working in partnership with other organisations the Fund support sustainable projects that improve people's quality of life and address the needs of those who are most disadvantaged in society.

The Fund delivers programmes that are designed to improve the quality of life for people and communities, address disadvantage, encourage community participation and complement government strategies. Programmes are specified in some detail in (statutory) policy directions issued to us by the government and can only be funded within the framework of those directions.

The Fund can support legally constituted public, private or voluntary organisations. For some programmes funding is focused on particular organisations.

The maximum grant varies from programme to programme from a few hundred pounds to over one million.

For more information go to:  
[www.nof.org.uk](http://www.nof.org.uk)

## 8. Regional Development Agencies

In the financial year 2002/3, Regional Development Agencies (RDAs) administered the UK Broadband Fund that was financed from the Capital Modernisation Fund. This fund will not be operating in 2003/4. Nevertheless, each RDA will be funding specific projects within its area to trial technologies and community approaches for broadband. The method of distributing funds and the rules for doing so are defined by each RDA and can be found on their website.

The Broadband Task Force is working closely with RDAs. The Task Force objectives are:

- to provide a cost-effective way of meeting the broadband needs of individual government organisations whilst meeting their procurement targets;
- to enable the extension of broadband networks to increase the availability to the wider community, thus contributing to regional economic development objectives and national targets;
- to ensure value for money for the public sector as a whole.

## 9. State aid rules

The DTI booklet about State aid is provided at the following web link:

[www.dti.gov.uk/europe/stateaid/01.htm](http://www.dti.gov.uk/europe/stateaid/01.htm)

However, there are a number of block exemptions to state aid rules that are listed below.

### De minimis aid

Any funding provided under this rule must be identified as such to the recipient. The award must not breach a 100,000 Euro (£60,000) limit over a rolling three year period. The funded party must provide information about de minimis aid provided in the previous three years.

It should be noted that for agriculture, fisheries and transport this type of aid is not allowed.

	Small enterprise	Medium enterprise
Employees	50	250
Turnover (million Euros)	7	40
Assets (million Euros)	5	27
Investment aid		
- outside development areas	15%	7.5%
- inside development areas	ceiling of 30% or 50% dependent on area	
Consultancy and knowledge dissemination	50%	
Participation in the first fair or exhibition	50% of additional costs of renting, setting up and running a stand	

Table 4: Aid to SMEs.

### Training aid

Between 25% and 80% of the training costs depending on the size of the organisation, whether in or out of an assisted area and whether training is specific or general.

## Annex 2: Technology choice for community networks

### 1. Digital Subscriber Line

#### DSL technology description

Digital Subscriber Line (DSL) technology allows the ordinary telephone connection between the local exchange and a home or small business (commonly called the Local Loop) to be upgraded to carry broadband data. Effectively it increases the capacity of the Local Loop to allow it to carry between 8 and 30 times the traffic carried over an analogue telephone connection using a modem.

DSL is very sophisticated. It must be remembered that the Local Loop is based on a design going back to the beginnings of the telephone over 100 years ago, a design intended to convey analogue voice at the minimum intelligible quality, plus power and ring current for an electro-mechanical bell. In electrical terms the circuit is extremely noisy, with widely varying line characteristics and quality. The electrical characteristics of the subscriber line must be carefully measured before it is known whether DSL can be supported and at what speed.

DSL is available in several different versions, the most common being ADSL (Asymmetric Digital Subscriber Line). ADSL is particularly suited to Internet connections, where the amount of data transferred from the network to the user is normally far greater than that transmitted in the opposite direction. The main members of the DSL family are summarised in the table below.

Technology	Maximum downstream bandwidth	Maximum upstream bandwidth	Number of copper pairs used	Separate voice channel?	Maximum range from exchange
VDSL	25 Mbit/s	1.6 Mbit/s	1	Yes	0.9 km
(Very high rate DSL)	8 Mbit/s	8 Mbit/s	1	Yes	0.9 km
ADSL	8 Mbit/s	1 Mbit/s	1	Yes	5.5 km
(Asymmetric DSL)					
HDSL	1.5 – 2 Mbit/s	1.5 – 2 Mbit/s	2	No	4.6 km
(High bit rate DSL)					
HDSL2	1.5 – 2 Mbit/s	1.5 – 2 Mbit/s	1	No	
(High bit rate DSL 2)					
SDSL	2.36 Mbit/s	2.36 Mbit/s	1	No	1.7 km
(Symmetric DSL)	0.384 Mbit/s	0.384 Mbit/s	1	No	4.1 km
IDSL	0.144 Mbit/s	0.144 Mbit/s	1	No	5.5 km
(ISDN DSL)					
SHDSL	2.36 Mbit/s	2.36 Mbit/s	1	No	2.0 km
(Symmetric high bit rate DSL)					

Table 5: The xDSL family.

ADSL is the most popular and widely-deployed technology within the DSL family. Although the maximum downstream bandwidth is 8Mbit/s, this is really only practical within 1 km of the exchange. Therefore, BT has compromised on a maximum downstream rate of 2Mbit/s (upstream 256kbit/s) which is practical for up to 3.5 km from the exchange.

A variant to the main ADSL standard is RADSL (Rate Adaptive DSL), which allows a range of 5.5 km, with the proviso that the upstream bandwidth may be reduced as low as 64kbit/s to allow more frequency spectrum for the downstream channel, if required (see below).

BT has been supplying RADSL as standard for ADSL services since August 2001.

G.DMT is a ratified standard defining a common interface for ADSL modems. G.DMT 'wires only' ADSL was launched as a product by BT Wholesale in January 2002, allowing users and ISPs to self-install third-party modems that meet the G.DMT standard.

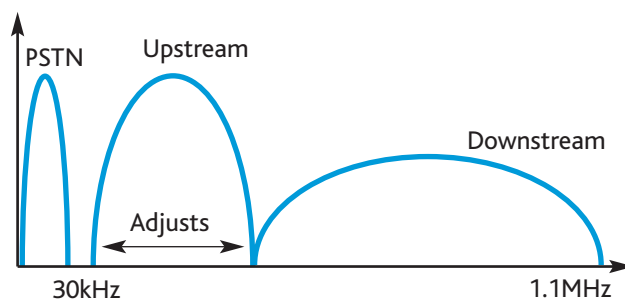


Figure 9: RADSL frequency spectrum.

### Mass market DSL provision

When used to provide a mass market internet service, DSL lines are terminated at the local exchange in a DSL Access Multiplexer (DSLAM). Voice traffic and internet traffic are separated, the voice traffic being sent to the normal voice switch and the data traffic being sent to an Internet Service Provider over an IP backbone.

Such mass market services are contended. This means that the backhaul capacity is less than the aggregate of the subscriber line bandwidth, and users 'contend' for this capacity. The ratio between the aggregate of subscriber line bandwidth and the bandwidth of the backhaul line(s) at the DSLAM is known as the Contention Ratio. For domestic customers BT has set the contention ratio at 50:1. For business customers the ratio is 20:1. Other suppliers are free to set other ratios down to 1:1, where the backhaul bandwidth is equal to the bandwidth available over the subscriber line.

Internet access is contended in this way to minimise the cost of provision to individual subscribers. Typically the cost of a contended ADSL business service is one sixth of the equivalent uncontended service.

In theory, the contention ratio could reduce a domestic 512kbit/s connection speed to 10.24kbit/s and a 2Mbit/s business service to 100kbit/s. In reality, this does not happen because the stochastic nature of internet use makes it extremely unlikely that 50 adjacent users will be using all the available capacity simultaneously. Typically, the user experiences a link with about 80% of rated capacity. Thus a 512kbit/s link will deliver 400 kbit/s to the end user. However, as the number of DSL subscribers increases and more bandwidth-hungry broadband services come on-line, the contention ratio may grow in significance.

## Wholesale

BT Wholesale sells broadband services on a national basis to suppliers. These suppliers then package and market their individual Broadband services to domestic and business customers. Thus the service contract is with the supplier and not with BT. At the time of writing there are over 50 ADSL suppliers in the UK. Most offer a national service, limited only by the rate at which BT is DSL-enabling local exchanges.

On a national scale, BT has implemented ADSL at approximately 1,150 exchanges and claims about 3% penetration of households.

There are three major conditions that limit the use of ADSL broadband connections:

- The local exchange must be 'DSL enabled' by installation of DSL Access Multiplexer (DSLAM) equipment.
- Distance - The maximum data rate is determined by the length of the copper cable from the exchange to the telephone and if this is greater than 3 km the full speed of 2Mb/s will not be available. From 3 km to 6 km the maximum speed available is 512Kb/s. There is a test performed on all lines and the line must satisfy a signal to noise ratio requirement. In June 2003 this was set at 60dB.
- Line quality - In some cases the line quality may not be sufficient for DSL to operate.
- Materials used - Some existing telephone lines were installed using aluminium rather than copper cables. There are also some connections that are delivered partially over fibre or microwave. These are unsuitable for carrying ADSL.

If an existing line is not of sufficient quality it is possible that BT can be persuaded to either improve the quality of the line or install another line of sufficient quality (at a cost). This will only be possible if BT has sufficient spare capacity to allow extra lines or routes to be used.

On average, in an enabled exchange area about 97% of all properties can be served with DSL.

BT Wholesale has implemented a demand led approach to enabling ADSL services at exchanges. BT has set targets ('trigger levels') for a number of exchanges based mainly on a detailed cost analysis. The cost analysis includes the cost of upgrading backhaul capacity where necessary since this is a major determinant of the outcome of the cost

analysis. Exchanges that do not have an SDH link are disadvantaged. This cost analysis is complex and far from transparent.

There is a wide range of trigger levels from 200 to 700 but recent revisions of trigger levels have resulted in some trigger levels being drastically reduced. BT is making significant progress in extending the list of exchanges with a registration scheme. On 3rd April 2003, BT announced that a further 600 exchanges would go into the scheme, with potential penetration at 90% of UK households. The list of additional exchanges was announced in July 2003.

Wholesale pricing for BT's ADSL products is given in the table below.

Product	Service	Wholesale monthly fee
IPStream Home 500	512Kbit/s upstream; 50:1 contention	£13
IPStream Office 500	512Kbit/s upstream; 20:1 contention	£18
IPStream Office 1000	1Mbit/s upstream; 20:1 contention	£28
IPStream Office 2000	2Mbit/s upstream; 50:1 contention	£38

Table 6: BT's Wholesale ADSL services

### Exchange Activate scheme

BT Wholesale has developed a scheme, 'Exchange Activate', derived from a 'Mini-DSLAM' pilot. The scheme is intended to provide ADSL access at exchanges that perhaps otherwise would not see the standard ADSL deployment. It requires an ISP or other organisation to purchase a block of 30 connections for a 3 year period thereby underwriting the cost of DSL deployment at the exchange. This scheme is at the consultation stage.

The pricing indicated at this time is around £55,000 for 30 connections lasting 3 years, or around £51 per user per month. An exchange can have multiple blocks of 30 users. If an exchange reaches its actual trigger level for a standard ADSL build, then a 'buy out' scheme exists that will reimburse some of the charges to the service provider, based on how long the service has been running.

### Retail services

There are many companies acting as ISPs including BT Openworld and BT Connect. and they are responsible for end user sales of BT's wholesale services. BT Wholesale provides the relevant equipment at the exchanges and the cable connections to the ISP's internet access point.

### Local Loop Unbundling

ADSL is also available through Local Loop Unbundling (LLU), where BT give a supplier complete access to the connection between the local exchange and the subscriber. This requires installation of the supplier's equipment at the exchange or close to the exchange. It has been the subject of considerable debate between Oftel, BT and the suppliers. The

European Community Regulation on LLU came into effect on 1st January 2001. Oftel required BT to action LLU from 8th August 2000.

In general, companies taking advantage of LLU are concentrating on the higher-speed and symmetric variants of DSL for business customers within urban areas, since these offer the highest short-term return and satisfactorily differentiates their product from BT's.

The supplier installs its own DSLAM and configures lines with the type of DSL and contention ratio required for its services.

There are considerable costs to LLU which means that it is satisfactory only if a relatively large number of subscribers in an exchange area use the service from a single ISP.

Independent Networks are using LLU to implement broadband services at Bredon Hill.

### **DSL and analogue private circuit (EPS8/9)**

DSL can also be used on a spot basis with basic analogue private circuits. By placing a DSL modem at each end of the private circuit, it can be made to deliver a symmetric 2Mbit/s or 4Mbit/s service at a fraction of the price of the same service from BT. Alternatively, a DSLAM may be located at the head end and a point to multipoint broadband service offered.

The private circuit has to be within one exchange area, and the normal end to end distance limitations apply. However, this approach is used in business parks, villages with a local serving exchange, or even small towns to provide local point to point services, private networks and internet access for business via an ISP. Typically, it is the ISP that will install the service.

## **2. Licensed Fixed Wireless Broadband Access (FWBA)**

### **Unlicensed band versus licensed band**

FWBA is a radio technology that generally operates within the microwave region (1-40GHz). The signals are not reflected by the atmosphere, and repeaters are required for long distances. Fixed wireless works by transmitting data between an antenna located at the users premises and the service provider's base station. Systems operate in either the licensed or unlicensed parts of the microwave spectrum. Unlicensed operation is in part of the band shared with other unlicensed radio users, microwave ovens and other devices. The Radiocommunications Agency believes that this telecommunications services in this band are prone to interference. Early experience has indicated that use of the unlicensed band for telecommunications is practical and few problems with interference have been encountered.

### Basics of radio transmission propagation

There is an inverse relationship between distance and throughput for terrestrial systems (less range = greater throughput). Propagation can be affected by terrain, antenna design, obstructions and heavy rain. There are techniques to compensate for environmental deterioration of the signal, including simply increasing power. At lower frequencies the problem of multipath propagation of the same signal becomes an issue, there is the possibility of reflections and echo.

There is always path loss with radio transmission. Radio waves can be absorbed by or be reflected by interactions with the environment. The propagation characteristics vary with frequency. Generally at higher frequencies operation has to be line of sight, at lower frequencies the signal bounces around more. Antenna design and placement can be critical to good operation as are the inherent radio conditions of a geographical area.

An advantage of wireless in some areas is that it causes a minimum of disruption to the local environment. Base stations are generally installed on tall buildings in the region of 20 metres high. In rural areas this is obviously not appropriate and mast location can be an environmental and planning issue.

### Spectrum

The Radiocommunications Agency is responsible for allocating radio spectrum licences in bands suitable for FWBA operation. There are several possible bands of spectrum for FWBA although slow progress has been made in making licences available. The table opposite indicates the current state as at May 2003.

Overall, Community Networks may be built using:

- unlicensed spectrum in the 2.4GHz and 5GHz (A or B) bands; the 5GHz C band may be opened up shortly;
- licensed spectrum in the 3.4GHz, 3.6GHz and 28GHz bands.

Licensed spectrum is being made available on a regional or national basis. The implication of this is that it will be available to infrastructure providers with national ambitions rather than to more localised community organisations. This spectrum may be used to build community networks by one of these large infrastructure providers. However, past experience suggests that these organisations will focus on urban areas rather than rural areas.

In contrast to licensed spectrum, unlicensed spectrum can be used by anyone and is therefore available to community organisations. Moreover, the volume of equipment sold in the unlicensed spectrum has resulted in very low prices that are in line with typical affordability criteria for a community network.



## FWBA suppliers

The history of commercially available wireless broadband services in the UK is somewhat chequered. The only national service was launched as Tele2 but in January 2003, Firstnet acquired the licence and now provides a Fixed Wireless Access service in the frequency range of 3.6 - 4.2 GHz.

Firstnet's Wireless network is currently provided from 38 points of presence, with a further 6 to be opened in the near future. Firstnet has plans to extend network coverage and is working with various

Band	Current situation
2.4GHz	Radiocommunications Agency now allows this band to be used to offer public telecommunications services. There is a considerable base of equipment that operates in this band using one or other of the protocols defined in the IEEE 802.11 family of wireless LAN standards (see below)
3.4GHz	This band has been reserved for Fixed Wireless Access at up to 2Mbit/s. An auction of this band was successfully conducted in spring 2003 and revenues were awarded in fifteen regions, seven of which cover 'provincial' areas (ie not metropolitan areas) in England, Wales and Scotland.
3.6-4.2GHz	Firstnet holds one national licence. The Radiocommunications Agency is intending to launch a consultation exercise about making spectrum available in this band during 2003.
5GHz	The 5GHz band is divided into three – A, B and C. 'A' and 'B' are reserved for nomadic and mobile users and are not suitable for fixed broadband access. 'C' is most appropriate for fixed broadband access. The Radiocommunications Agency is intending to release all bands, has announced the standards for 'A' and 'B' and is providing test and development licences in the 'C' band. Rapid progress is reported towards making this band publicly available for use without a Wireless Telegraphy Act licence.
	Once released, the 'C' band will be the most appropriate band for external wireless LANs operating in accordance with the IEEE 802.11 standards. It provides sufficient power, 54Mbit/s bandwidth and a relatively large number of channels in comparison with the 2.4Ghz band. The 'C' band will be licensed on a non-exclusive basis to ensure that the interests of the present users of the band can be guaranteed. For the same reason, some areas of the country will be prohibited from using the 'C' band. Until the 'C' band becomes available, the 'B' band may be found to be appropriate for community networks.
10GHz	Preparations for licensing are stalled.
28GHz	This band will be auctioned for a third time in 2003. It will be available for any legal use but will probably be of most benefit as a backhaul technology as radio equipment in this band is currently too expensive for all but a few end users.
40GHz	This band can be used for broadband services, broadcast TV, video on demand and video distribution.
	The Radiocommunications Agency has consulted on the use of the 40GHz band (40.5-43.5GHz) for Broadband use. There is support for opening up this band, but demand for services has yet to mature. The RA is intending to auction this bandwidth, but not for at least two to three years.

Table 7: The available spectrum that can potentially be used to provide a wireless network

government and private schemes to achieve this.

The use of licensed radio spectrum means that wireless transmission can be secured, discrete and provided on a range of bandwidths to suit a DSL comparable service - but symmetric, rather than asymmetric - or as a point to point connection.

In this manner a service can be provided in flexible bandwidth increments from 2Mbps to 155Mbps.

Firstnet's strategy is to establish a 'Broadband Britain' in line with government directives. This goal will be achieved by rapidly deploying broadband into rural areas and other sites where ADSL and cable is not and may never be available.

To this end, Firstnet is consulting with the local education authorities (LEAs) to deliver broadband services into schools throughout the UK. Firstnet is looking at using educational establishments as a stepping stone to deliver broadband network the surrounding community through the school platform. By placing a transmitter onto the roof of the school the surrounding town or countryside can then gain access to the wireless broadband service.

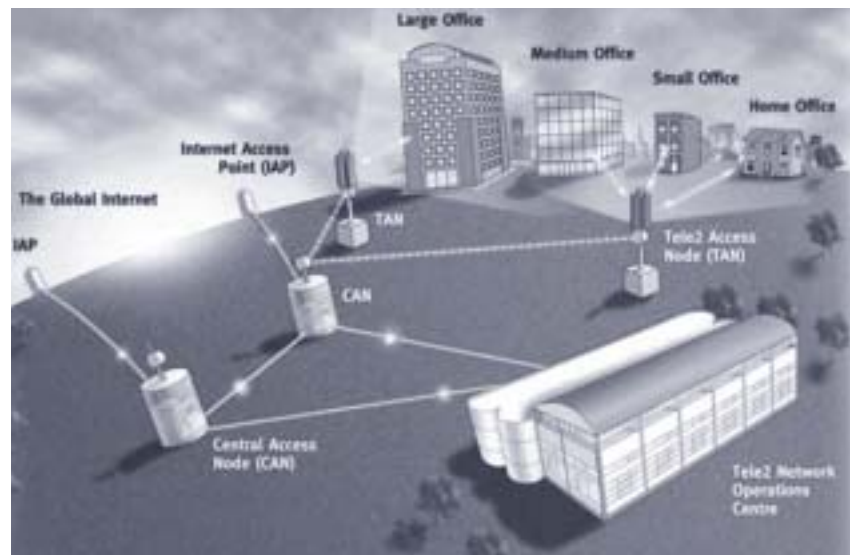


Figure 10: An example of a FWBA network architecture © Tele2.

In the 3.4GHz band, licences have been awarded as follows:

- Poundradio Ltd: Metropolitan regions - Greater London, South Coast, Severnside, Midlands Tyne Tees, Central Scotland;  
Provincial regions - South West and South Wales, South East, Midlands and Mid Wales, Scotland, North of England, North West, Yorkshire and North Wales, Northern Ireland.
- Red Spectrum Ltd: Northern Metropolitan.

Full details of the auction are available from the Radiocommunications Agency.

### 3. Unlicensed Band Fixed Wireless Access

Wireless Local Area Networks (WLANs) are a fast emerging technology, allowing users to connect to a LAN using radio transmission. Wireless LANs have applications both within the home and office environment and importantly in providing network access in public areas such as hotels, airports and even retail outlets. WLAN technology is also being used for point to point and point to multipoint transmission outside buildings over short to medium distances.

Wireless LANs in the UK operate in the 2.4 GHz and 5GHz bands. Use of these bands does not require a licence. The dominant technology is based on the IEEE 802.11 standards. These are proving very successful with large sales volumes of equipment forecast and achieved. As a result there is a very active base of developers and suppliers with product innovation giving rise to rapid performance improvement, and economies of scale leading to very low prices in comparison with other wireless technologies.

#### General wireless LAN systems

The primary application of wireless LANs is to provide in-building communications giving rise to reduced costs for installation, moves and changes. Wireless LANs are beginning to be used to provide Internet access in public spaces for individuals who are travelling. LANs for mobile internet access are typically located at 'hot spots' including hotels, stations, airports, or cafes.

Generally all a user needs in order to connect is a 'wireless enabled' device. This may be a laptop computer with a suitable card and appropriate software. The wireless connection is established through a base-station. The base station is used to link individual PCs and to services such as the Internet. To make the connection to the Internet the base station plugs into an existing wired network infrastructure. Alternatively (in an office environment for instance) a PC that is connected to the internet can be used as a gateway for wireless devices.

The use of Wireless LANs outside buildings is possible. At 2.4GHz, the power allowance is limited, with consequential range limitations. Configured for point to point usage with a suitable antenna, it is possible to reach up to about 10 km. Configured for point to multipoint usage, range is constrained since the antenna has to provide wider coverage rather than spot coverage. With an omnidirectional antenna, distances of 1 km can be achieved although in practice distances are going to be more limited. WLAN coverage is more or less based on line of sight. As the radio signals at 2.4GHz and 5GHz are readily absorbed by water, the principle by which a microwave oven works, any vegetation that blocks line of sight will successfully hide a transmission. Buildings and other objects with a low water content have

less of an impact, but will lead to degradation of the signal and markedly reduced range.

Currently the costs of WLAN equipment conforming to IEEE 802.11 a or b are as follows:

- PC cards - £45
- Antennas - £50 - £200
- Routers - £100.

Specialised equipment designed for external provision is more expensive. Typical external node costs are as follows:

- Router including antenna and cabling - £950
- Mast - depends on height and available supports
- Installation - £100 to £1000.

## Licensing

Any organisation that intends to offer a public commercial service requires a licence to do so which is independent of any licence for use of the radio spectrum. An operator of a Wireless LAN that is used to offer services to the public may require a Telecommunications Act Licence. If voice services are provided, then an operator would definitely require a Telecommunications Act Licence. The Radiocommunications Agency and Ofcom will allow IEEE 802.11 LANs operating in the 2.4GHz and the 5GHz (a and b) band to provide services that require a Telecommunications Act Licence. Test and Development licences are available in the 5GHz C band already which can be used for pilot implementations.

Guidance on licensing of telecommunications services is available at the following DTI site.

[www.dti.gov.uk/industries/telecoms/general-guidance-notes.html#cla](http://www.dti.gov.uk/industries/telecoms/general-guidance-notes.html#cla)

## Standards

### IEEE 802.11

IEEE 802.11 is a group of specifications developed by a working group of the Institute of Electrical and Electronics Engineers (IEEE) intended for wireless LANs. Generally they specify single Medium-Access Control (MAC) layer and multiple physical layers (PHY). There are presently four specifications: 802.11, 802.11a, 802.11b, and 802.11g. All use the Ethernet protocol and Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) for path sharing. IEEE 802.11 provides support both for access points (effectively a bridge from wire to wireless) and for peer-to-peer wireless communications. It provides security in the form of shared private key security.

The IEEE 802.11b standard is often referred to as Wi-Fi and offers nominal speeds up to 11Mbit/s. However, available bandwidth is less, and this will degrade further with distance or interference.

The modulation used in 802.11 has historically been Phase-Shift Keying (PSK). The modulation method selected for 802.11b is known as Complementary Code Keying (CCK), which allows higher data speeds and is less susceptible to multipath-propagation interference.

802.11b is well-established in Europe and the USA and is the world-wide market leader regarding wireless LANs.

### HiperLAN

HiperLAN is a competitor to the 802.11b standard in Europe. A new improved version, namely HiperLAN/2 is expected to be introduced by ETSI soon. HiperLAN/2 offers data speeds of around 25Mbit/s and operates in the 5GHz band, the same spectrum band as 802.11a. It is uncertain which technology will dominate as major companies side with each technology. For example, Ericsson has a large stake in the HiperLAN market and strongly opposes 802.11a, objecting to it through the main European standards body, ETSI. However, Wi-Fi and other IEEE802.11 products are making the early running in this competition. HiperLAN/2 products are not available as of May 2003.

### IrDA

The IrDA (Infrared Data Association) is an industry led organisation that creates international standards for the hardware and software used in infrared communication links. Infrared data communication is a major technology in wireless data communication utilised in laptop computers, personal digital assistants (PDAs), mobile telephones, and other devices.

Applications for IrDA include; transferring documents from notebook computer to a printer, co-ordinating schedules and contact lists between your desktop and handheld computers, and sending faxes from notebook computer to a distant fax machine through a public telephone. IrDA is a low cost, low power technology with high noise immunity.

Infrared communication requires a transceiver microchip (a combination transmitter and receiver) in both devices that communicate. Appropriate software may also be required in one or both communicating devices for synchronisation. The IrDA-1.1 standard allows data rates of up to 4Mbit/s. It is possible to use infrared for longer interconnections and could be used for interconnections within LANs. IrDA has a maximum possible range of less than 1.5 miles and the maximum potential data rate is 16Mbit/s. Since IR is line-of-sight optical transmission, fog and other atmospheric conditions may affect the signal. A 16Mbit/s standard is under development.

Costs of IrDA equipment is higher than IEEE 802.11 equipment, and has similar issues concerning line of sight.

## Bluetooth

Bluetooth is a specification for a technology that enables short-range wireless connections between computers, personal digital assistants (PDAs), mobile phones and even home appliances. The technology operates in the frequency band of 2.4GHz globally. Data rates of 1Mbit/s are achievable (up to 2Mbit/s in the 2nd generation).

Users will be able to buy a three-in-one phone that can be used as a portable phone, to synchronise with information in a computer, initiate actions such as a print-out, and, generally to manage all fixed and mobile computing devices.

Bluetooth devices have only recently found their way onto the market, and the technology has not yet had the impact expected of it. In the United States, IEEE 802.11b has taken a share of the Bluetooth market, especially within airports and hotels.

Bluetooth requires that a relatively low-cost transceiver chip be included in each device. The transceiver operates in the frequency band of 2.4GHz world-wide. Up to three voice channels are available as well as data. The maximum range is about 10 metres. Connections can be point-to-point or multipoint. The maximum range is 10 metres. Data speeds of 1Mbit/s (up to 2Mbit/s in the 2nd generation) are achievable. Devices may communicate in areas with a great deal of electromagnetic interference thanks to a frequency hopping scheme. Security is provided in the form of built-in encryption and verification.

## Service providers

### Hot spots

The following organisations are developing chains of Wi-Fi hot spots in the UK:

- BT Openzone;
- Starbucks;
- Megabeam;
- UK Explorer;
- Internet Exchange.

### Invisible Networks

Invisible Networks is focused on the development of Community Networks and is already offering services in the Cambridge area. Invisible Networks is starting to offer services in other parts of the country. In addition to services, Invisible Networks also provides products for wireless networks.

### LocustWorld

LocustWorld offers equipment for wireless Community Networks based on open source software. Its products are used in Kingsbridge and EdenFaster.

### ISPs and systems integrators

Some ISPs and systems integrators associated with telcos are using IEEE 802.11 for point to point connections to specific end users sites and in some cases for point to multipoint connections. In general, these organisations have a price model that is not consistent with Community Networks, where pricing has to be competitive with ADSL.

## 4. Powerline

Powerline distributes broadband services over the low voltage section of an electricity network. It uses existing infrastructure which has almost 100% potential coverage. It requires no additional wiring, modems can be plugged into any electricity socket within a building. It exploits the widely distributed nature of the electricity supply network and therefore can provide a means of delivering broadband services to isolated communities and socially disadvantaged areas.

Powerline provides an alternative revenue stream for electricity companies. In turn, the electricity companies have the financial strength that enables them to invest and trusted recognised brands.

The first successful demonstrations took place in Germany in 1999 and services have been launched in Germany, Switzerland, Austria and Scandinavia in 2001.

There was concern that Powerline would result in high radio emissions that would interfere with other radio services. However, the Radiocommunications Agency has permitted the technology to be used in the UK. Scottish and Southern Electricity (SSE) is running three networks, in Crieff, Campbeltown and Maidenhead (within SSE's offices). It is also being used for point to point links between council offices in Inverness and for schools in Bournemouth. SSE is still running pilot services.

A Powerline 'injector' is fitted to the electricity supply infrastructure downstream of the distribution transformer, which converts medium voltage supply to low voltage (240V) supply. A modem is then provided at each location where it is required. Telecommunications services can then be enabled between the modems and the injector. Access to the internet or other telecommunications services can then be provided by a leased line or a satellite link attached at the injector.

In Campbeltown 80 customers have been connected using a satellite link for internet access. Service is delivered from the satellite terminal to an injector in the electricity substation.

Typical requirements are distances no greater than 500 metres between each customer unit on the low voltage supply. Transmission speeds of between 2 and 20Mbit/s are possible at these distances, dependent on physical nature of the plant.

Currently Powerline is only available at all from Scottish and Southern Electricity in the UK and resellers, and then only on a pilot basis. It is anticipated that service will be provided at about the same price as ADSL. The main cost of service provision will be the backhaul link.

Powerline should be available commercially in some parts of the country in early 2004.

## 5. Broadband satellite

Broadband satellite is not currently positioned, either in terms of pricing structure or consumer awareness, to replace other broadband technologies such as DSL. Rather it is intended as a complementary solution providing coverage in rural or remote areas where terrestrial alternatives are not available.

Broadband satellite systems come in two flavours: one-way and two-way.

The one-way solution provides a service similar in operation to that of conventional satellite television. Requests and uploads are made over the PSTN via a conventional dial-up modem whilst data is delivered to the user via the satellite.

This service is not suitable for community broadband schemes.

The two-way systems offer contended bi-directional internet access via the satellite. This approach is suitable for community broadband schemes with relatively small numbers of subscribers. However, the contended nature of the service makes it unsuitable for larger numbers. If dedicated access is needed, then this can be provided by a VSAT link that would be dedicated to the service. Such a link would probably not be cost effective in comparison with leased circuits or microwave links.

Because of its contended nature, some of the two way satellite service providers are careful to limit the number of users on their services. They will not want to support community broadband networks on their broadband internet services.

While satellite broadband is available universally in the UK, it does have disadvantages over other forms of access.

- During unfavourable weather conditions, such as heavy rain or thunderstorms it is possible that the signal from the satellite may be lost, an event termed an 'outage'. Just as the loss of signal will cause poor quality television pictures, so will it lead to dropped connections and lost data. To compensate for these effects all satellite communication systems are designed with a so-called 'rain-margin'; signals are transmitted at increased power levels to compensate for the effects of poor atmospheric conditions.
- The two-way antenna technology requires much more careful alignment than one used to receive television pictures. Further, as



the dish is a radiating element, to conform to strict regulation it must be installed (or relocated), at a cost, by a qualified professional. Installing an antenna may become a legal as well as logistical exercise; planning permission may be required where multiple antennae are mounted or if installation is in contravention of heritage orders.

- The transmission path to a geo-stationary satellite introduces a delay of about 0.25 sec. As a consequence some applications do not perform efficiently in a satellite-delivered environment. Aramiska has attempted to overcome this problem by cacheing popular web sites locally. This has two benefits: it improves performance by serving web content locally rather than over the satellite link whenever possible, and it reduces bandwidth requirements on the satellite segment, thereby reducing cost or improving performance on the link.

Typical costs of a 2Mbit/s service are as follows (Source: Aramiska):

<b>Charge</b>	<b>Package 1</b>	<b>Package 2</b>
Installation	£500	£3,200
Recurring	£5,388	£4,150

<b>Wired Sussex list of satellite companies</b>
Aramiska
Beyondsl
Bridge
BT
Cedar/StreamBeam
Internet Interchange
Isonetric
Networks Unlimited
PeopleCoMM International Ltd

## Annex 3: Backhaul Network Providers

### **Commercial providers**

Cable and Wireless  
BT  
COLT  
easynet  
Energis  
Faultbasic  
Fibernet  
FirstNet  
Global Crossing  
Kingston Communications  
Level 3  
MLL Telecom  
Neosnetworks  
ntl  
Redstone  
Synetrix  
Telewest  
Telia International Carrier (TIC)  
Thus  
Viatel  
Vitesse Networks  
Worldcom  
Your Communications  
Zipcom

### **Public sector providers (as at April 2003)**

CLEO  
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## Project participants

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Edenfaster	Lindsey Annison, Edenfaster
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Heloise Tierney, Defra	Nigel Heriz-Smith, UK Online
David Hingley, DTI	Paul Keegan, UK Online
Rebecca Marmot, DTI	

# Glossary of terms

ABC	Access to Broadband Campaign
ADSL	Asymmetric Digital Subscriber Line
AODV	Ad Hoc On-Demand Distance Vector Routing
ATM	Asynchronous Transfer Mode
AWM	Advantage West Midlands
Backhaul	A means of bringing the internet to a Point of Presence (PoP) in the community
BB Ltd	Buckfastleigh Broadband Ltd
BFWA	Broadband Fixed Wireless Access
Broadband	A range of technologies supporting higher quality, faster access to multimedia
BSG	Broadband Stakeholders Group
Caching	A technology which sources content at lower bandwidths, stores relatively large quantities of content, which is then made available locally at higher bandwidths
CARNET	Cambridge Ring North East
CATV	Cable Television
CCK	Complementary Code Keying
CDFIs	Community Development Finance Institutions
CDVF	Community Development Venture Fund
CFOs	Co-financing Organisations
CLEO	Cumbria and Lancashire Education Online
CMF	Capital Modernisation Fund
CPE	Customer Premises Equipment
CSMA/CA	Carrier Sense Multiple Access with Collision Avoidance
DfES	Department for Education and Skills
Distribution network	A means of distributing the service from the PoP to every subscriber in the community
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
DTI	Department of Trade and Industry
DVD	Digital Video Disk
E <sup>2</sup> B <sup>N</sup>	East of England Broadband Network
EETDT	East of England Telematics Development Trust
ERP	Enterprise Resource Planning
ERYC	East Riding of Yorkshire Council
ESF	European Social Fund
ETSI	European Telecommunications Standards Institute
FE	Further Education
FP6	Sixth Framework Programme
FWBA	Broadband Fixed Wireless Access
FWBA	Fixed Wireless Broadband Access
GSM	Group Special Mobile
HE	Higher Education
ICOM	Industrial Common Ownership Movement

ICT	Information and Communications Technology
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
IrDA	Infrared Data Association
ISB	Invest to Save Budget
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
kbit/s	kilobit per second = Thousand bits of information per second
KCN	Kingsbridge Community Network
LAN	Local Area Network
LEA	Local Education Authority
LGA	Local Government Association
LLU	Local Loop Unbundling
MAC	Medium Access Control
Mbit/s	Megabit per second = Million bits of information per second
NGfL	National Grid for Learning
NOF	New Opportunities Fund
NWDA	North West of England Development Agency
Oftel	Office of Telecommunications
OGC	Office of Government Commerce
OJEC	Official Journal of the European Communities
PC	Personal Computer
PDA	Personal Digital Assistants
PHY	Physical Layer
PoP	Point of Presence - a physical location in a telecommunications network from where services to end users or to a subsidiary network can be provided
PSK	Phase Shift Keying
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RA	Radiocommunications Agency
RABBIT	Remote Area Broadband Inclusion Trial
RADSL	Rate Adaptive Digital Subscriber Line
RDA	Regional Development Agency
RDP	Regional Development Plan
RES	Rural Enterprise Scheme
SDH	Synchronous Digital Hierarchy
SDSL	Symmetrical Digital Subscriber Line
SEEDA	South East England Development Agency
SLA	Service Level Agreement
SME	Small and medium sized enterprise
SoCITM	Society of Information Technology Management
SPD	Single Programming Document
SWGfL	South West Grid for Learning
SWRDA	South West of England Regional Development Agency

UKERNA	United Kingdom Education and Research Networking Association
UMTS	Universal Mobile Telecommunications System
VoIP	Voice-over Internet Protocol
VPN	Virtual Private Network
VSAT	Very Small Aperture Terminal
Wi-Fi	Wireless Fidelity, networks conforming to the IEEE 802.11 standard
WLANs	Wireless Local Area Networks





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