A Marchmont/Ufi Product

ICT Connectivity Toolkit

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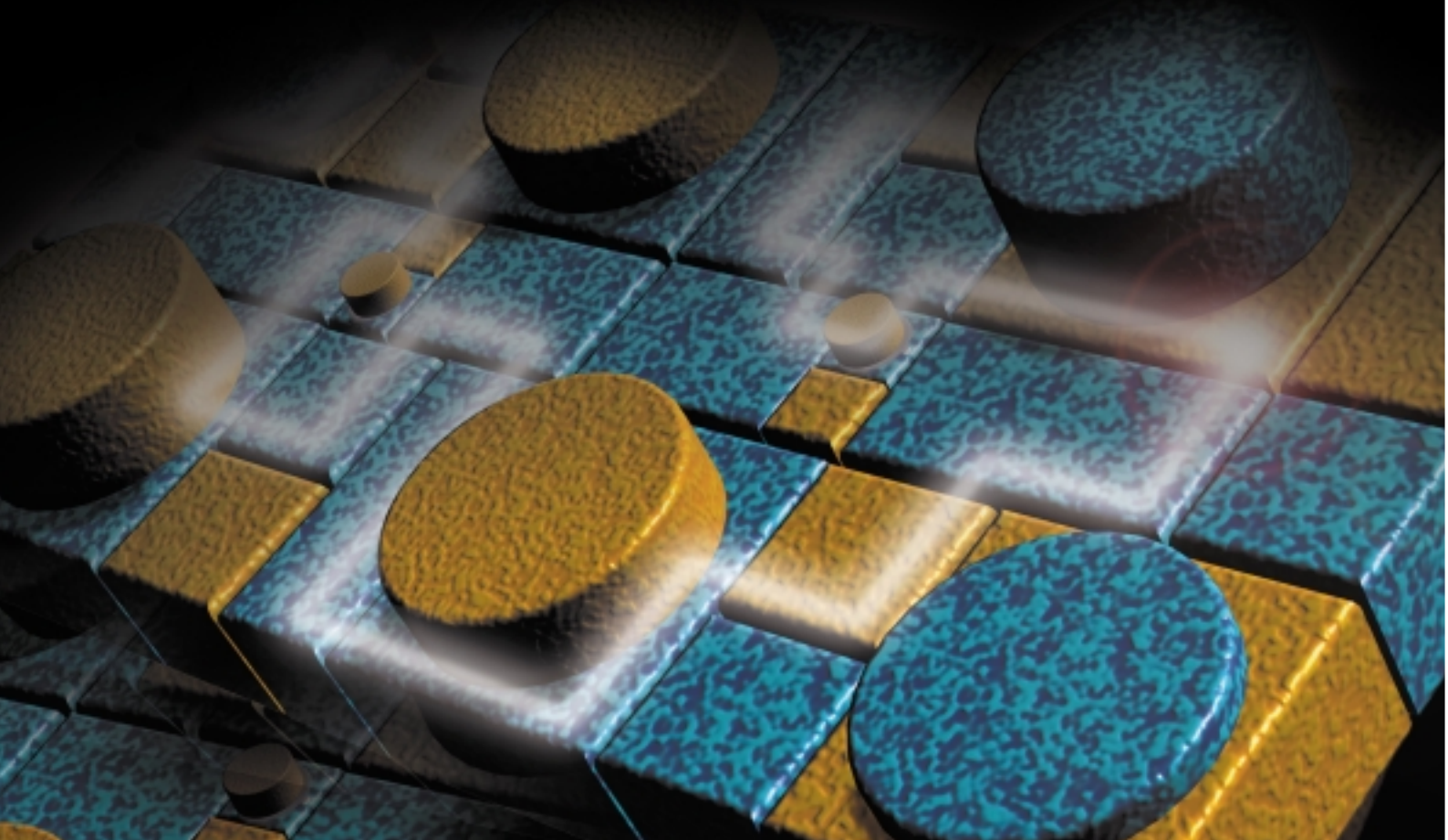

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ICT Connectivity Toolkit

Contents

1 Introduction

1a The Purpose of this Document

This document contains essential information designed to assist the University for Industry (Ufi) hubs and learning centres and for other organisations that may be in the process of creating online learning centres, to consider their ICT and connectivity readiness for online learning and for them to examine the expectations of their target customers. It has been designed primarily for the following groups:

- The managers of organisations delivering (or considering delivering) training through Ufi (learndirect) or similar suppliers of online training
- Individuals with ICT responsibility for hubs an learning centres to assist them in planning with their partners for ICT readiness for learndirect delivery, particularly for delivery to small and medium sized enterprises (SMEs)*
- Managers of learning centres that want to move towards online delivery
- Managers in organisations that want to create their own online learning centre.

The document covers key topics for the target groups including connectivity issues, capacity planning, business planning, bandwidth* sizing and network asset audits. At the core of the document lies a toolkit, containing a checklist of key questions that will need to be addressed if the organisation is to deliver **learndirect** services or any online learning materials. The statements below each question are designed to provoke the thought 'what this means for the hub/learning centre/SME'. Some of the information is specific to organisations delivering **learndirect** services and this can be ignored if it doesn't apply to your centre.

For ease, we have also included a glossary in Section 8 of this document, which covers the technical terms referred to here. We have also include any other definitions that will be useful to refer to when using technical documents of this nature.

1b What is Ufi and **learndirect**?

Ufi is a new public-private partnership, which will boost the competitiveness of business and the employability of individuals. Working with businesses and education and training providers, it will use modern technologies to make learning available at a time and place to suit the learner - at home, in the workplace and through a national network of learning centres. Ufi will put learners first.

The brand that the learning will be delivered through is **learndirect**. learndirect is described as 'a brand new way of **learning** that allows you learn what you want, where you want, and at a pace that suits you'. **learndirect** is for everyone.

Ufi's mission is:

To boost individuals' employability, and organisations' competitiveness and effectiveness by;

- Inspiring existing learners to develop their skills further
- Winning over new and excluded learners
- Transforming the accessibility of learning in everyday life and work.

1c Structure of Ufi

Ufi will manage and deliver the majority of its objectives through a regional structure. There will be a number of Ufi hubs across England, Wales and Northern Ireland. Scotland will have its own separate organisation, Scottish University for Industry (SUfi), that will provide **learndirect** services in Scotland. Hubs can have geographic or sectoral coverage and are likely to involve a range of providers from the educational, training, voluntary and business sectors.

Hubs will:

- Lead the establishment of learning centres across their region or area
- Provide support and networking services for learning centres in their region
- Provide a concentration of key Ufi related skills and services in their region or area

learning centres will:

- Offer a public access point to **learndirect** services
- Provide local learning facilities to learners who lack such facilities at home or work
- Be a focus for delivering **learndirect** learner support services

Access Points will:

- Not necessarily be staffed
- Be typically smaller than learning centres
- Be a focus for delivering **learndirect** learner support services
- Occasionally have restricted access times

These definitions and roles may change as Ufi develops. All of these will access Learning Opportunities (LOs), which will be stored at the Ufi central systems unit in Brentford. This is known within Ufi as the 'server farm*'. The learner will work on the LO online, whether accessing **learndirect** through a branded centre or from elsewhere, like their home or office.

Responsibilities of each of these:

The flow of LOs from Ufi to the learner raises many questions including:

- How do you ensure that the learner has a high quality learning experience?
- If the learner accesses LOs through the Internet, what happens to the time it takes for the screen to refresh* during periods of peak Internet usage?
- If the learner accesses LOs directly from the Ufi server farm, through a learning centre connected to Ufinet via SuperJANET*, what happens to screen refresh times during periods of peak network usage?
- What is the impact of decisions regarding ICT connectivity in LCs on the other partners within the hub network?

This guide explores these questions and some potential answers. Many answers will be provided at hub level, however, LC Managers need to understand how connectivity and ICT decisions they make impact on their partners, learners, and ultimately the success of their business. Hub managers need to understand how connectivity and ICT decisions they make, impact all those involved with the hub, including learning centres.

2 The Toolkit

2a The Purpose of this toolkit

This toolkit examines the issues around ICT connectivity for the hubs and learning centres participating in Ufi, for the delivery of online learning and provides some pointers towards resources that may aid hubs and learning centres with their ICT infrastructure. It will be used principally for assisting hubs and learning centres to consider their ICT readiness for online learning and for them to examine the expectations of their target customers. One of the prime target groups for **learndirect** services is SMEs. This is viewed as a way for them to upskill their people cost-effectively, and therefore improve their competitiveness. Resource constraints in SMEs mean that being able to access effective learning quickly and easily, will be a key driver in the successful penetration of this market sector. Delivering against an expectation of quick response times will help ensure a positive experience for the learner.

2b Who is this toolkit aimed at?

This toolkit is aimed at hub managers, learning centre managers and those with ICT responsibility for hubs and learning centres, to assist them in planning with their partners for ICT readiness for **learndirect** and other online learning, particularly for delivery to SMEs.

2c How to use this toolkit

This toolkit is not designed to be a workbook, more a checklist of key questions that will need to be addressed for the hub, learning centres and access points.

We have detailed why we think the question is relevant and highlighted examples of how other organisations have addressed the question.

Those examples are shown in grey boxes.
The statements below each question are designed to provoke the thought 'what this means for the hub or learning centre or learners in SMEs. Most of the toolkit applies whether you are a hub manager or a learning centre manager. Where there are differences in considerations we have explained these.

We have provided a tick box to the right of each question to enable you to keep track of which areas have been addressed for the hub, learning centre or learners in SMEs.

Some may find all of the questions relevant; others will find that only a few apply to their particular circumstances. Those answering the questions will wish to give their attention to those questions that are answered 'no' and the implications upon the hub or learning centre.

2d What decisions do you need to make?

When addressing connectivity issues there are a number of areas, which impact the service delivery to the learner:

Peak loading

There will be different numbers of learners using the network at different times and they will be at various stages in their learning.

They will be accessing courses with a mix of media that could include text, graphics, sound, and video. These media will affect the amount of loading that is placed on the network. Simple text is quick and easy to download whereas video takes far longer and uses up more bandwidth.

A loading demand is placed on the network every time the learner presses the enter button either to give or receive information. Not all learners will press the enter button at the same time: some will be reading, some will be thinking and some will be distracted in other ways. Peak loading occurs when all learners, using the most media rich learning materials, press the enter key at the same time.

Ufi have made some assumptions about the number of learners that are active at any one time. These are that for every three concurrent learners working on **learndirect** learning opportunities at the same time, only one will be active (i.e. pressing the enter button). This is called the contention ratio*. It may be subject to variations and the contention ratio in your own centre or hub may be different. Ufi's assumptions followed a period of consultation with various hubs and centres.

Cacheing

Cache is temporary local memory used to store Web pages so when the same page is subsequently accessed, it can be reloaded more quickly than over the Internet and places less demand on the network loading. This is only the case when the same page is accessed from the same machine.

Ufi materials, as well as those from some major developers, do not allow for cacheing so each page from each learning opportunity has to be downloaded from scratch each time the learner accesses the page. Ufi's reasons for this are that flexible access (at home, work, learning centre or mobile via a range of access devices) means that it is unlikely that the learner will be in the same location and on the same machine every time, therefore cacheing is of little benefit.

Loading all from points of access.

All learning centre managers and hub managers need to consider where their network loading is likely to come from. This is also critical for learning centre managers that have other learning centres or access points, accessing Ufi or the hub through their network. Where learning centres and access points all access learndirect materials through a single point, the total loading on that connection to Ufi will be the sum of all active learners in all learning centres and access points. Different learning materials generate different download burdens depending on the mix of media they contain i.e. text, graphics, video etc. There is more on materials download burdens in the next section 'What are the Ufi materials?'.

When sizing bandwidth requirements for the connection to Ufi, it is necessary to calculate the total number of active learners in each location and the amount of bandwidth each of them needs depending on the type of media they are accessing. Multiplying one by the other will give the total bandwidth required for Ufi traffic at peak loads.

To try to help hubs and learning centres size their bandwidth requirements Ufi have issued guidelines regarding their materials in terms of their expected download burdens, both in the early days and for later, probably Autumn 2001, when materials will become more media-rich, for example containing more video content. These are also detailed in the next section. Download burdens from other materials developers will be similar and they should be able to provide you with those figures to be able to size all your bandwidth requirements.

What are the Ufi materials?

learndirect learning materials developers have had limitations placed on them for the amount of loading they can design their materials on. Their maximum, at the moment, although this will change as we get access to more bandwidth for less money, is 25Mb per learner per hour. Which is about the amount of material, which can be downloaded using a standard 56K modem. This will not always be the case. Different learning materials generate varying download burdens. Some materials utilise BLOBS* (Binary Large Objects), which require a reliable connection to remain in place until that BLOB has finished downloading. If the connection breaks before the download is complete, the download has to start again from scratch, once the connection is re-established.

At the start, the average download burden of materials from Ufi, will be 5-15 Mbs per learner per hour. Current (February 2001) download burden from web sites on the Internet are between 10-13Mbs per hour. In the future **learndirect** materials will start to become available, which are increasingly media-rich, for example containing more video. This could result in an increased download burden of up to 38Mbs per learner per hour. This is more than the 25mbs per learner per hour, currently viewed as about the maximum a learner at home dialling into the **learndirect** ISP* will be able to download and maintain a 'quality of service' response time of 2 seconds (i.e. from the point at which the learner presses the enter button the length of time it takes for the screen to be refreshed with the new information).
So issues are immediately raised regarding the quality of service, and type of materials that learners operating from home can expect.

In order of download burden the mix of technologies used to put learndirect materials together are as follows:

- HTML and graphics
- Flash, Shockwave, Real – streaming technologies
- Binary Large Objects – streamed with a plug in
- Java Applications - for complex applications

Telecommunication companies (telcos) are rapidly going to be able to offer significantly more bandwidth into the home. ADSL* which will provide 2Mb downstream is being rolled out by BT under the brand names BT LearningStream (for educational organisations) and BT Openworld (for domestic use). Others will follow. ADSL will allow things like video-on-demand to become an affordable reality. At the start of 2001 broadcast restrictions, which have prevented BT transmitting entertainment over their home connections, no longer apply. This means that learning materials developers will have far more bandwidth to play with when developing new learning materials and a delivery route to the consumer through BT.

However, in the early days, with the materials that will be available, the loading is more likely to be between 5 and 15Mb per learner per hour. If we take the contention ratio of 3:1 which was mentioned previously, then, based on these assumptions, a 2Mb connection would support about 200 (70 active) concurrent learners.

Once the materials achieve a download burden of 25Mb per hour per learner, the number of concurrent learners that can be supported over the same 2Mb link drops to just over 100 (35 active).

Performance

Obviously the best performance will be gained through fast access to **learndirect** materials directly from Ufi's server farm. As soon as any of the following occur performance will start to degrade:

- Access which routes through the internet (e.g. learner dialling in from home through a third party internet service provider)
- More active learners than the connection has been sized for.
- The connection out of the hub starts being used for other traffic, which has not been sized for and takes up all the available bandwidth.

This will impair the learning experience for the learner and may even drive them away, never to return. It has been shown that if a screen takes 7 seconds to refresh 35% of people leave the website and don't come back, 11 seconds and the figures are worse with 70% of people going elsewhere.

Research into training repeatedly shows how difficult it is to encourage SMEs to engage in any form of employee development. As online learning is fairly new and the take up in the marketplace, even in large corporations, is still relatively low, it's critical to get the quality right. Apart from a quality learning experience, which provides "better than Internet" materials, why else are good connections needed for online learning?

The provision of effective and timely support is more likely to encourage a learner to complete whatever learning opportunity they have embarked upon. If an SME invests in online learning for its employees and sees no return on that investment due to unfinished LOs, they will not re-invest in the future.

Customer expectation

An SME employee who enjoys fast screen refresh times and high quality of service through their learning centre at work, may choose to compromise that quality of service for the convenience of completing his learning opportunity at home. As long as customer expectation is set so that those compromises are fully understood and accepted, then customer satisfaction will remain high and the learner is more likely to return time and time again.

Non-Ufi traffic

It is unlikely that a learning centre connection to the outside world will be supporting Ufi learners exclusively; Ufi's assumption is that for every 10 seats in a learning centre, only 4 of those will contain a **learndirect** learner. Part of that assumption arises out of the fact that many hubs and learning centres already provide some learning of their own online. This learning provision may be part of the comprehensive database of learning opportunities, which the **learndirect** helpline will be searching when counselling a prospective learner, Ufi branded learning opportunities are only a small proportion of that database.

All the Ufi assumptions about the number of Ufi and non-Ufi learners in a learning centre, the mix of materials and the active versus concurrent contention ratios are utilized in the capacity planning spreadsheet, which is included as part of the toolkit. It assists the hubs to size the bandwidth they will require to deliver learndirect services, both at the start and from Autumn 2001. Further guidance on using the spreadsheet is included in Section 6 Capacity Planning.

Verification

Any planning or purchasing decisions made using the capacity planning spreadsheet, provided as part of this toolkit, should be verified by yourselves using your own learner and contention ratios and mix of materials and media before making any commitments based upon them. These are intended as guidelines only to show you the sorts of issues that need to be considered when planning your networks.

3 Business Planning

The following questions have been designed to assist Ufi hubs and learning centres in addressing their ICT infrastructure issues. These issues are not just technically focused but include people, process and strategy groupings.

Under each question, in italics, there is an explanation of the thinking behind the question and the reason for its inclusion.

Throughout the toolkit there are pointers and examples of best practice. These are in shaded boxes.

Leadership

01. Do you have a system/people responsible for identifying your organisation's IT requirements for Ufi participation?

Yes ◯ No ◯

Given that the hub is made up of a number of different organisations each with their own connectivity strategies and issues, it is crucial to the success of the project that there is a central point of contact for the hub for ICT requirements for Ufi participation.

Learning centre managers need to know who that is and liaise closely with them to ensure that decisions made take account of needs both locally and at hub level.

A centrally co-ordinated growth strategy is key to the success of hub development.

Your comments

People Management

02. Have you assessed the skills and abilities that staff members will need to perform any new ICT roles?

Yes ◯ No ◯

Staff competence and confidence will have a significant impact on the quality of learning experience for the learner. They want to feel they are in safe hands, being looked after by people who know what they are doing, especially if they are returning to learning having had a negative experience previously.

Technical support staff need the knowledge to be able to assess whether a problem is user error or with the hardware or software systems themselves.

New loading on your networks may mean that you choose to start monitoring traffic on those networks. This will enable you to test the assumptions that have been made and in turn ensure that adequate bandwidth is available to deliver quality of service to the learner, if you are a learning centre manager, or learning centres and access points, if you are a hub manager.

Network management software may be something you've never used before that you need training to gain maximum benefit from.

Your comments

03. Do you have a strategy for identifying and developing these new staff ICT skills?

Yes ◯ No ◯

If not, this may be a good time to define ICT competencies for your organisation and the levels of expertise that different staff should have. Tying this into your overall organisational staff development plans and review processes will ensure consistency with corporate personnel policies.

Your comments

Example of People Management

Staff Development in learning centres

Learning World in Tyneside is a training resource for the whole community, offering a wide range of courses and corporate training, suited to businesses and individuals alike. When Learning World first got involved with UfI they set up an internal operations group to help them prepare to deliver learndirect services.

This operations group represented the separate areas of their business that were going to be impacted by the new service; sales, reception and guidance staff, technical support and finance.

The group quickly began to identify a number of issues surrounding the delivery of learndirect services alongside the rest of their learning activities. Many of these centred on staff development and were different for each member of the learning centre staff.

Staff wanted more confidence in their knowledge and understanding of learndirect products and services. Learning Support staff wanted to know more about course content and the way specific courses mapped to available qualifications, Guidance and Reception staff wanted to know more about how to find information that is relevant to learners with different needs, which requires a detailed understanding of how to use the **learndirect** *website effectively and technical support staff wanted to know more about software and hardware requirements in order to provide quality access to the learning environment and materials.*

It also became clear that the **learndirect** *service needed to be fully integrated with the rest of the business so that the learning experience is consistent for all learners.*

These issues are being addressed in a number of ways and include the following:

- *Members of staff undergo general awareness training about* **learndirect** *and the products and services available.*
- *Each member of staff is enrolled as a* **learndirect** *learner to enable them to speak from their own experiences.*
- *Specific focus groups are being created to look at finding solutions, which address issues highlighted in the context of each business area.*
- *All staff are aiming to achieve IBT3 (Integrated Business Technology) by June 2001.*

Staff have individual targets to achieve for using **learndirect** *systems. These may include accessing the website, enrolling learners or searching for courses for example. An e-learning facilitator has been appointed to help staff with their targets. They contact staff weekly to find out how often they've used the system and in what way, what problems they've encountered and any feedback or experiences they'd like to share with others, either in their own organisation or with UfI.*

All these are aimed at improving staff confidence with the system, providing constructive feedback to UfI and improving the integration of **learndirect** *services with the rest of Learning World's business to help ensure a high quality learning experience for the learner.*

Policy and Strategy

04. Have you decided who will use the centre, what they will use it for, what their alternatives are?

Yes ○ No ○

Clear objectives and an understanding of the potential market for the centre are vital. Decisions regarding connectivity will be affected by the comparisons that customers are likely to make with other provision in the area (or indeed anywhere in the world since we're talking about online learning).

Your comments

05. Are you aware of the various ways in which you can connect to learndirect eg JANET*, ISP, Internet*

Yes ○ No ○

Please refer to the glossary of section 8 for explanations of the terms. You can also refer to the Ufi website www.ufi.com in the Regional Activities area, Ufi ICT section, which explains the different ways of accessing Ufi and the pros and cons of each method.

Your comments

People Management continued

06. Have you decided how your organisation will connect to **learndirect**?

Yes ◯ No ◯

Perhaps you could form a steering group to consider the best options for your organisation. This will ideally represent all those impacted by your decisions. Quality managers, learning coaches, hub manager if you are a learning centre manager and learning centre managers if you are the hub manager, financial managers and personnel managers are just some examples.

Your comments

07. Have you developed a connectivity strategy?

Yes ◯ No ◯

If not, Ufi are developing an ICT strategy blueprint to assist with completing it. Included in it will be an intra-hub network diagram, capacity planning spreadsheets and development plans covering the broader business issues and it's integration with the Ufi hub business plans and objectives.

Contact your Ufi regional manager for further information regarding this. A list of regional managers and contact details is given at the end of this toolkit.

Your comments

People Management continued

08. Are you aware of the pros and cons of the various connectivity strategies available?

Yes ◯ No ◯

Again refer to the Ufi website www.ufiltd.co.uk in the Regional Activities area, Ufi ICT section, which explains these pros and cons.

Your comments

Examples of Policy and Strategy

The strategy for a learning centre servicing local SMEs:

The Business learning centre in Skelmersdale was set up in partnership with business and with business customers in mind. The centre is in former industrial premises in the middle of industrial estate and it caters primarily for smaller industrial firms.

They have 60 businesses as regular customers as well as increasing numbers of individuals.

The centre was established jointly by LAWTEC (Lancashire Area West TEC) and Leyland Trucks with the support of Edge Hill College of Higher Education, and is on course to become self-financing from its earnings from customers.

It was originally set up as a cyber-centre in 1997 with funds from Brussels and has always had a focus on providing a service to smaller firms.

Hence since October 1999 the centre has opened late two evenings a week to accommodate users who are working towards IT qualifications.

The strategy for a learning centre servicing rural SMEs:

Essex TECS Learning Bus reaches it's customers by driving to them. The bus serves the business market throughout rural Essex, particularly catering for the needs of front-line staff, new supervisors and managers in smaller firms. It offers a complete training venue for up to four learners at a time, equipped with four multimedia workstations and a full suite of learning materials. The bus can be hired by the half day and typical hires are for three or four days. The most popular uses are for learning basic computer skills.

The strategy for a remote college to target potential customers in the city centre:

Out of town West Cheshire College uses the fact that Chester Library's learning centre is so well-placed in the city centre, to advertise it as a place where potential students can sign up for courses.

The College benefits from new students. The learning centre gets to keep the registration fee paid to the college through it's national funding arrangements - and also gets many more people coming through it's doors who can see what the centre has to offer. Twice the year the college does a major recruitment drive, for example leafleting bookshops, and the learning centre benefits directly by association with this marketing.

The linkages go further. The College runs evening classes in the library's learning centre two evenings a week. The key focus is IT training and currently the European Computer Driving Licence is extremely popular.

The strategy for a group of libraries and information services:

- *Staff training and development will have to operate at several different levels within the service - within the framework provided by the proposals and guidance in the 'building the new library network' report.*
- *This will include:*
  - *Awareness of the range of resources available*
  - *Basic computer skills for all staff, using the European Computer Driving Licence curriculum as a basis*
  - *Functional skills in installed library and information applications - again for all staff*
  - *Expert skills in one or more of the installed applications*
  - *Sufficiently detailed knowledge to enable initial problem diagnosis/solving and support at local level, as well as to undertake aspects of the development of the use of the systems and facilities*

The strategy for a University maintaining it's competitive edge:

- *All staff will need to acquire a range of skills so that flexible responses can be provided at all times*
- *The organisation of the IT staff and use of students, where appropriate, will be reviewed to provide for project management while ensuring that adequate internal procedures are in place to underpin it.*
- *Opportunities will be taken as they arise through new technologies or relocation of facilities to redeploy or redefine staffing levels.*

Birmingham Community College Quality Policy

As individual colleges we are committed to achieving the highest standards in the services we provide. Together we can innovate, share and develop good practice to raise the standard of our students' achievements and obtain the best value from our resources.

Collectively, we can ensure that students have access to the widest choice of courses, new learning technologies and are equipped to progress to higher levels of study or to employment. We can provide all sections of the community with access to the education and training they need to play a full part in the life of the city and we can ensure our local economy has a workforce with the skills it needs.

Resources

09. Have you involved partners who could provide support and advice on an ICT solution for your organisation, region or partnership?

Yes ○ No ○

ICT suppliers often have budget for development activities that may include finding ways to market to the ME sector, sponsoring community activities or piloting new product offerings. Asking key ICT suppliers onto your steering group can give you access to these as well as a potential source of free consultancy. In return they may expect to be included in any list of potential suppliers, when you are sending out invitation to tenders for example, for products or services that they provide.

Your comments

Processes

10. If you are already using IT to deliver open and distance learning (ODL) or to support students engaged in ODL, have you scoped the suitability of this system for expanded delivery under Ufi?

Yes ◯ No ◯

It is usually more cost effective and less problematic to upgrade or expand on existing provision than to start something new. It would be worth checking with your partners to see what they are doing. As ICT is developing so rapidly, it is possible that what they were doing when you started out to become part of Ufi, is different to what they are doing now.

Your comments

11. Have you looked at quality criteria for ICT?

Yes ◯ No ◯

Ufi will be defining service levels for learndirect delivery. It would be useful to look at what you would be able to support locally and at hub level before they are distributed, to ensure that any contracts or agreements that you sign are achievable, or that you have a business case on which to challenge anything which you think is unreasonable.

Your comments

Processes continued

12. Do you know how many concurrent users you will have at any one time?

Yes ◯ No ◯

The number of learners working on learning opportunities at the same time in the same location. Ufi's assumption is that in a centre with 10 concurrent users, 4 of them will be accessing **learndirect** *learning opportunities at one time. Others will be doing other learning or accessing the internet for other reasons.*

Your comments

13. Do you know how many of those will be active at any time?

Yes ◯ No ◯

Ufi have made some assumptions, based on their experience, about contention ratios, that is the number of concurrent learners that will press the enter button at the same time (active learners), which is currently 3:1. For every three concurrent learners working on a learndirect learning opportunity, only one will be active at any one time. The contention ratios given here are for online learning and not general Internet usage and are guidelines only based on discussions with a number of hubs and learning centres.

Your comments

Processes continued

14. Have you thought about how you are going to monitor your network traffic?

Yes ◯ No ◯

Software is available which will allow you to monitor your network traffic and analyse where your peak loading is coming from. It will give you the opportunity to forecast growth and plan and budget for necessary upgrades to your infrastructure.

Your comments

15. Have you thought about preserving quality of service delivery for learners when they are sharing connections with general web surfers?

Yes ◯ No ◯

It may be that at some point you choose to section off a proportion of your bandwidth to provide learners with guaranteed bandwidth availability which is separate from those using that are surfing the web for example. Your IT suppliers should be able to suggest some applications for consideration. If you'd like to look at an example the following URL www.packeteer.com should help. They have an application called Packetshaper that allows for network traffic sharing across WANs. It discovers and classifies application traffic on the network, analyses its performance, enforces bandwidth allocation and quality of service, and generates reports on service levels.

Your comments

Processes continued

16. Do you know what connectivity options there may be in your area?

Yes ◯ No ◯

Telecommunications companies will be able to tell you what connectivity options there are in your area. BT, Cable and Wireless and Ntl all have regional managers that will be able to provide you with quotes for connections. There may be other smaller local providers that will be able to give a local service if all you need is to be able to connect to your closest SuperJANET PoP (Point of Presence) for example.*

One of the most useful ways of finding connectivity solutions is to get all the partners together and create a map of the existing connections and locations that each knows about (a Network Asset Audit - covered in more depth later). Often partners have external links that would be useful to other partners, and assume that everyone involved is already aware of them. This is often not the case. Changes in personnel, organisational restructuring, the creation of new community or regional networks and policy changes can mean that connections, which would not have been possible a few months ago, are now welcome, affordable and technically quite straightforward. Partners will have their own connectivity solutions that might provide the answer for yours and other organisations connection problems and be happy to share their knowledge.

When investigating possible connectivity solutions, it is easy to become engrossed in thinking about physical cables. It is worth opening out your options to include satellite and radio connections as good alternatives to these.

If you are not part of a UfI hub or learning partnership, it is worth contacting your local college or university to see whether there is any common ground for you to work together. Many colleges and universities have links to regional learning initiatives and it would be worth meeting them to see if there are mutual benefits to be gained. If you are an SME, they may have targets to achieve which include a certain amount of development work within the SME community, you can help with this, perhaps in exchange for access to some of their learning materials. They may also be keen to trial the effectiveness of new online learning materials and may offer the first users preferential or free usage in exchange for constructive feedback. This would give you access to a pool of partnership knowledge on connectivity options and issues as well as help in other areas.

Your comments

Processes continued

17. Do you know how you are going to connect non-FE learning centres?

Yes ○ No ○

You will still be able to connect non-FE learning centres to Ufi through SuperJANET. Ufi have negotiated with UKERNA that, provided traffic across SuperJANET is for the delivery of learning associated with Ufi, then that is acceptable to them. If you have any problems locally then contact your Ufi regional manager for help, there is list of these at the back of this toolkit. Alternatively you can contact David Higgins, Ufi's Technical Architect who has carried out the negotiations with UKERNA, his email address is dhiggins@ufi.com*

If you are likely to have a significant amount of other traffic i.e. commercial use of your bandwidth by other organisations, you may need to provide additional connectivity from a commercial telecoms company. UKERNA can analyse the traffic that comes over their network to ensure it is being used correctly. They are willing to discuss individually additional requirements, which you may have. They can also provide that same analysis as useful management information, which centres can use in their network management and planning.

Organisations who wish to connect to UfI and are not in a position to access SuperJANET could procure a connection from a suitable commercial teleco. The **learndirect** *server farm will be connected to the Cable and Wireless (CWC) commercial backbone. For details of the options and preferential UfI pricing you can contact Gary Quigley at CWC (email Gary.Quigley@cwcom.co.uk).*

Other telecommunications solutions, like BT's LearningStream, are using broad definitions of learning centres and access points to accommodate non-FE learndirect provision. They are allowing organisations to take advantage of this low-cost connectivity option as long as you are a learndirect learning centre. Costs associated with this are £600 connection charge and about £3000 annually depending on the size of the site and prices are all subject to survey. BT's LearningStream is a good cost-effective intra-hub connectivity option for linking learning centres to the hub or FE colleges, for onward connection to Ufi through SuperJANET. Further details of the LearningStream product can be found at http://www.bteducation.com/news/lstrmfrm.htm.

SuperJANET connections to colleges are typically 2MB into their backbone, which is 2.5Gb.

Your comments

People Satisfaction

18. Are you aware of the concerns your staff are likely to have about Ufi?

Yes ◯ No ◯

Staff that are used to delivering classroom based learning may have concerns about making the transition to online tutoring, they may also be concerned for their jobs and wonder whether more students can be supported by fewer tutors when learning is delivered online.

It will be worth highlighting that one of Ufl's key targets is to reach 'new' learners, people not currently engaged in learning in other ways. Ufl's vision is not simply to deliver the same learning to the same people, but online. This should increase job opportunities and job scope, giving staff new skills development options and leaving room for those who do not have the right attributes to mentor online students.

IT staff may be concerned about increased workloads or new systems and software that they do not feel equipped to cope with.

It may be worth exploring and evaluating the skills and experience that different staff members will need to deliver effective online learning. Their existing skills and experience levels can then be mapped against what will be needed to create development plans for individual staff members.

Your comments

People Satisfaction continued

19. Is there an agreed process for addressing these concerns with staff/unions?

Yes ◯ No ◯

Look at building awareness of Ufi and **learndirect** *in conjunction with other departments in your organisation as part of your overall personnel policy. Concerns are valid when people do not understand what new expectations and demands that may be made of them.*

Reinforce opportunities for personal skills development opportunities, which will become available.

learning centre and support staff may be required to accommodate changes in hours to support more flexible access times. Speak with personnel to see if it would be practical for this to be done on a volunteer basis in exchange for other concessions.

Your comments

20. How will you address the percentage of learners who have no experience or varying levels of knowledge of technology?

Yes ◯ No ◯

You might consider working with learning coaches, facilitators or mentors (you may call them something different in your own centre or hub) to ensure that they understand ICT connectivity issues and potential service issues to enable them to induct learners effectively and set appropriate expectations.

For example learners may be concerned that they have done something wrong if they press the enter key and nothing happens when they expect it to.

You may choose to have an assessment process linked to different levels of induction, depending on the ICT knowledge of the learner.

Your comments

People Satisfaction continued

21. Depending on the connectivity strategy that you have decided upon, e.g. through the Internet or directly into the Ufi server farm and the method of access that the learner chooses, e.g. through the learning centre or dialling up from home, have you considered how will you address the varying levels of speed of access to materials?

Yes ○ No ○

Comprehensive induction that sets a realistic level of expectation is vital. This is especially important depending on how media rich is the learning opportunity chosen and whether the learner will be doing some of their learning at home or work using lower speed modems etc.

Your comments

22. Have you explored customer expectation with regard to quality of delivery, response times, accessibility etc?

Yes ○ No ○

Part of the customer induction may be to establish their expectations. Maybe they have had a recommendation from a friend registered with another learning centre with faster telecommunications connections. Once they start comparing notes, they may be disappointed with the level of service they are getting and take their business elsewhere.

Your comments

Marketing

23. Do you have a strategy for engaging other agencies that could provide support/access to other markets, but do not want to be part of partnerships?

Yes ◯ No ◯

If not, you may wish to open a dialogue with a number of these that may include:

- *The new Small Business Service, in your region, who are providing support services and independent advice to small businesses. They are keen to address upskilling issues to improve competitive advantage within the companies they support.*
- *Commercial training companies who may be interested in referring customers to you for online training that they cannot provide and for whom you could do the same.*
- *Telecoms companies who may provide preferential connection rates for educational purposes or may be keen to trial new connectivity offerings in live environments.*
- *Local councils or libraries networks who may have had funding for community network that would be happy to share bandwidth with you for community education purposes.*

Your comments

24. Have partners considered how to drive demand among their own employees?

Yes ◯ No ◯

Employee development can be linked to performance related pay to encourage skills development, which benefits the organisation.

Your comments

Local Issues

25. Have you mapped populations in Ufi target groups across your area?

Yes ◯ No ◯

Are they in SME's, in business parks, where do they want to do their learning? Will you need to think about access points or learning centres locally if they are not going to access their learning opportunity at work.

Your comments

26. Is information on rates of learning or learning materials that will be popular, within those Ufl target groups in your area, available?

Yes ◯ No ◯

If they are quick learners and working in high technology industries they are likely to be able to work through the material faster, pressing the enter key more often and therefore, as a group, affecting the concurrent/active learner contention ratio, placing more of a download burden on the network. Conversely if they are not ICT literate and slower to assimilate what they are learning then the contention ratios may be more like 4:1.

Your comments

Local Issues continued

27. Do you know what they are learning or want to learn, how and where?

Yes ◯ No ◯

Are they in SME's, in business parks, where do they want to do their learning? Will you need to think about access points or learning centres locally if they are not going to access their learning opportunity at work? What they are learning and where they are accessing from will all place different loading on your networks and connections.

From 2001 when BT's transmission restrictions, regarding entertainment down phone lines, are lifted we will quickly see 2Mb connections to the home become a reality. This may mean that many of your learners will prefer to do their learning from home, which will free up part of your bandwidth. With this in mind It would be worth upgrading your network connectivity in stages, to give you the chance to see what effect these telecoms developments will have, to ensure that you do not buy more bandwidth than you need.

Your comments

28. Do local skill shortages in local companies suggest that an emphasis should be placed on particular types of learning?

Yes ◯ No ◯

Is core skills an issue or do high technology companies require specialist skills? As more learning opportunities are developed that take advantage of higher bandwidth availability, addressing these areas may have markedly different download requirement with consequent effects on the networks.

Your comments

Business Results

29. Have you identified how customers will benefit from learning?

Yes ◯ No ◯

Learners who progress to complete more than one learning opportunity will gradually improve in the rate at which they assimilate information, familiarity with the structure of the materials and improved keyboard skills will mean that they hit the enter key more rapidly. This means that over time a higher proportion of repeat business centres when servicing training needs of companies will again affect the concurrent/active learner concurrency ratio.

Your comments

30. Have partners systematically examined their own track record in driving demand for online learning and looked at what has worked in the past?

Yes ◯ No ◯

Of those, how has their satisfaction been affected by response rates, screen refresh times, peak time access speeds. The better there are the more likely they will become your competitive advantage over centres with poorer connectivity.

Your comments

4 Connectivity

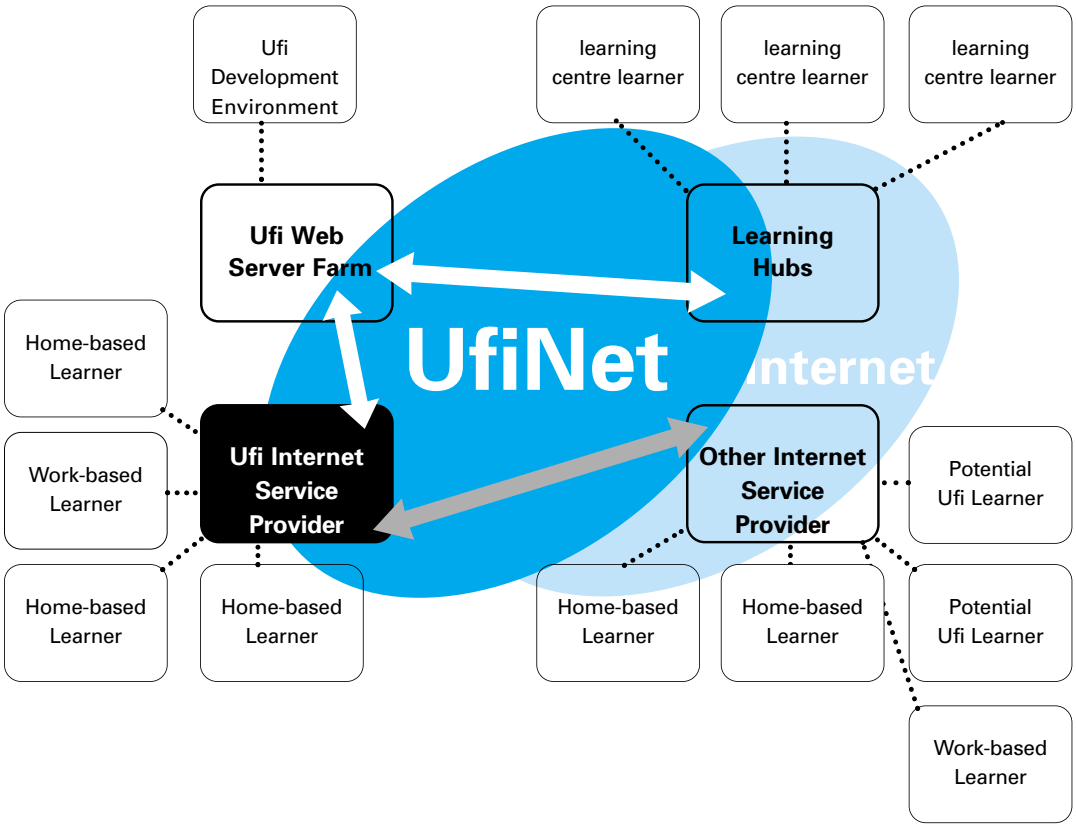
To assist hubs with developing intra-hub networking Ufi have suggested a number of possible options for connectivity strategies at hub level or learning centre level. The examples, which follow, are by no means the only possibilities for connectivity but should open up discussions to enable the hubs to establish the best solution for their organisations.

The first diagram shows how the Ufi server farm is connected to the Internet the remainder are possible connectivity models.

Source: Ufi ICT Connectivity Briefing, Dave Higgins

Connectivity Models

Access Topology

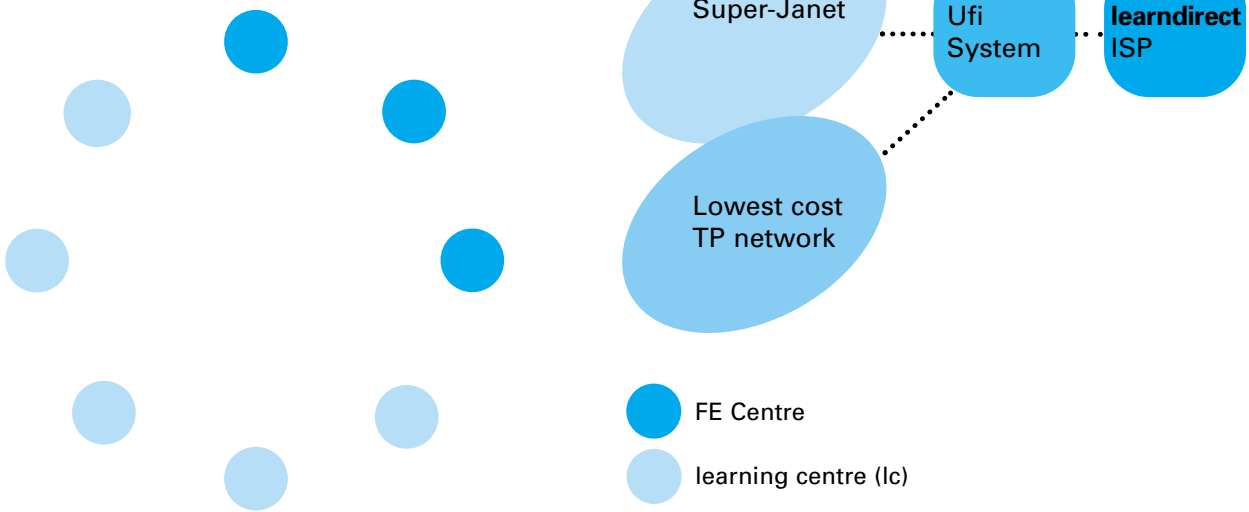


This diagram shows how the Ufl Web Server farm is connected to the Internet. The original model for Ufi was online learning delivered over the Internet, as shown by the grey arrow. Hubs and learning centres would have accessed learndirect systems via this route. Although connection through the Internet is still possible, it is unlikely to deliver the quality of service your learners will demand. Ufi do not recommend the use of the Internet as a primary method of access to their Learning Support Environment due to the well-known issues with Internet congestion and varying response times.
In addition the most popular **learndirect** courses require a higher level of bandwidth than the Internet can reliably and consistently provide.

For home and work based learners, on stand-alone machines, Ufi have set up the **learndirect** Internet Service Provider (ISP) - this allows home and work based learners to access the **learndirect** system directly, as the calls come straight into the learndirect server farm without routing through the Internet. If they come in via another Internet Service Provider they will come in through the Internet with the associated degradation in quality of service during busy Internet usage periods, when response times can be poor.

Quality of service (shown by the white arrows) between the **learndirect** system and learners in hubs, at work and at home, gave rise to the need for better connectivity than the Internet. The connection of the sever farm to the JANET academic network is one route by which quality of service connections between hubs and **learndirect** can be achieved. Another would be to procure a leased-line from Cable and Wireless, for example, to connect directly into Ufl's server farm. Either of these could be seen as a ' white arrow connection'.

Possible Connectivity Strategies



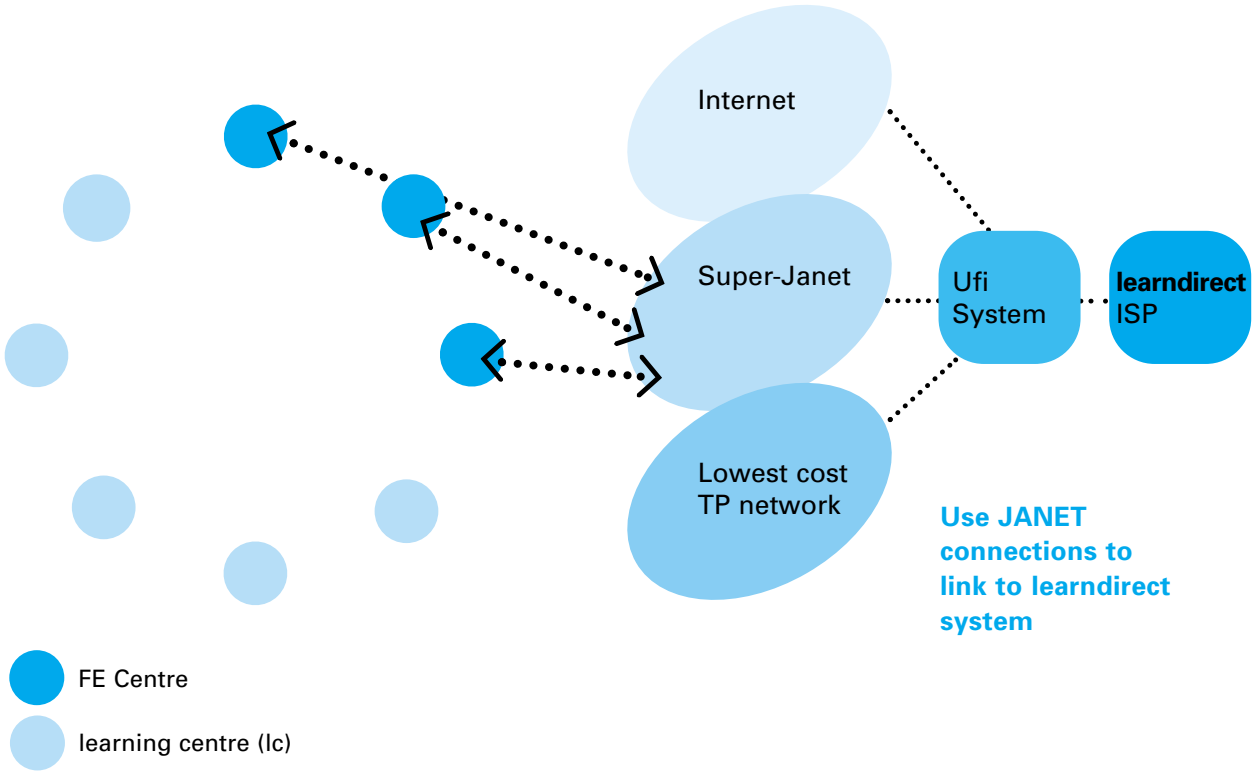
The Ufi "in house" name for the quality of service network (made up of all of the different access networks) is Ufinet.

This diagram and others which follow show the different elements of the delivery of **learndirect** services i.e. Ufi, FE Centres (learning centres within Further Education Colleges), learning centres, the Internet, SuperJANET, TP (Third Party) Networks, Ufi System and the learndirect ISP (Internet Service Provider).

This diagram shows how the Ufi system will be available at the end of a number of connections.

Hubs can be made up of FE and non-FE components as shown on the left. Non-FE organisations may include community centres, libraries, commercial training providers, SMEs and local authorities.

Possible Connectivity Strategies



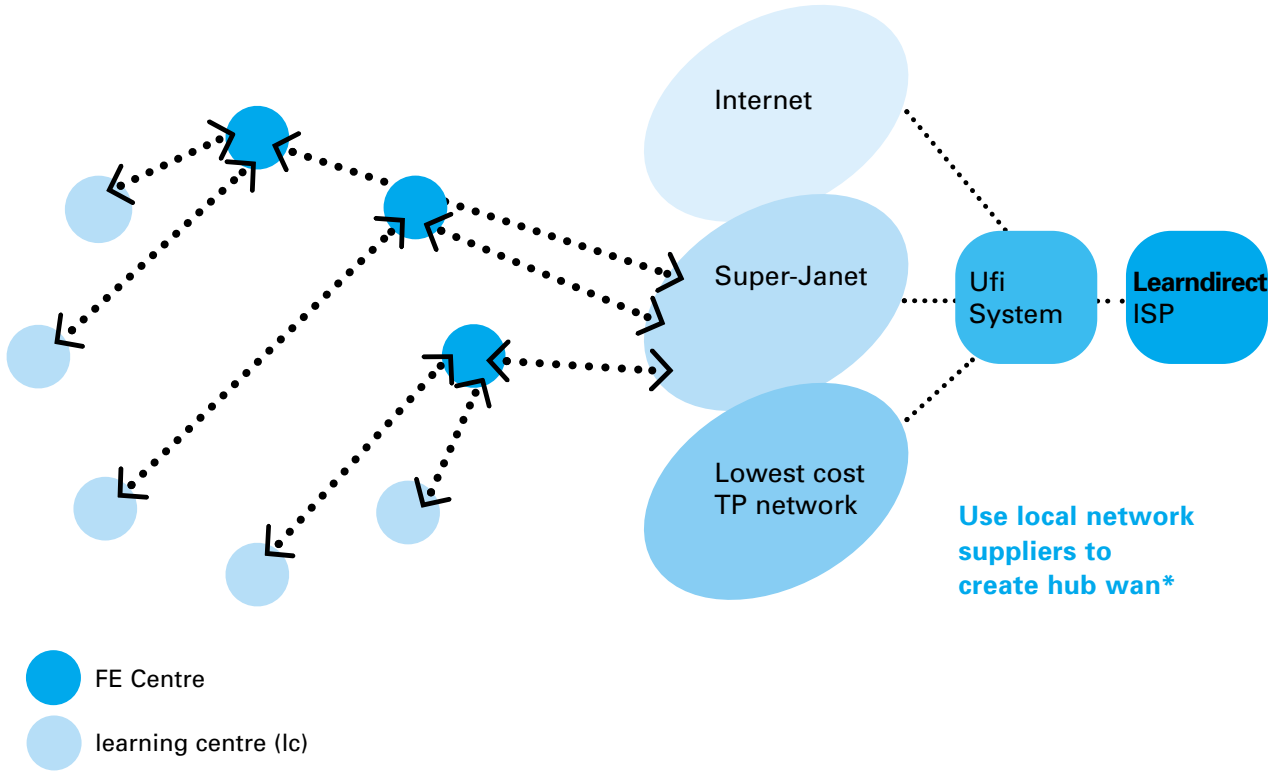
This list is not exhaustive.

This shows the SuperJANET connections between the FE locations and the Ufi server farm (labelled Ufi System).

SuperJANET connections vary in size but the current roll-out of free connections for all FE colleges in the UK are based on 2Mb connections, which will support approximately 200 concurrent learners working on learning materials with a download burden of 5-15Mb per learner per hour and 100 concurrent learners working on learning materials with a download burden of 25Mb per learner per hour.

Where this is not sufficient to deliver quality of service, due to a higher number of concurrent users, upgrades can be purchased from UKERNA. Upgrades are a more cost effective option than new connections and a 4Mb connection is likely to cope with more traffic than two 2Mb connections.

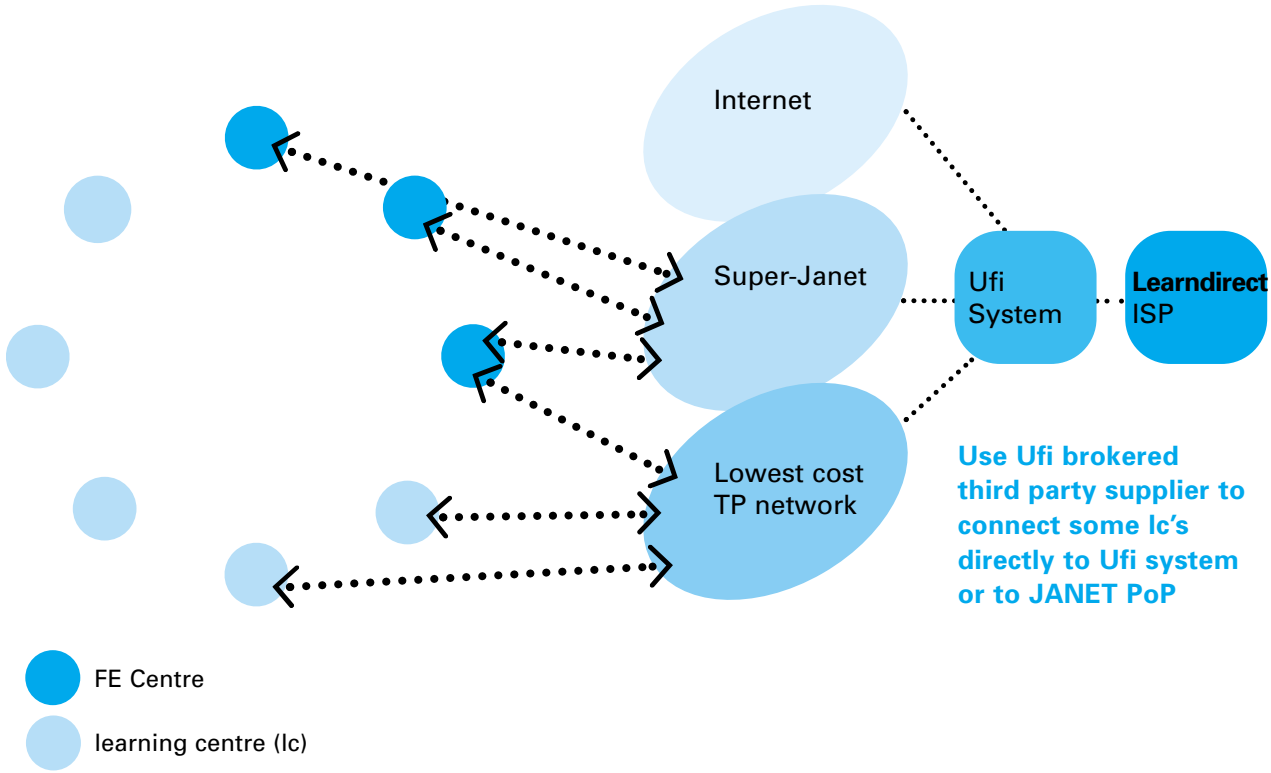
Possible Connectivity Strategies



In this model hubs link their learning centres to the JANET Points of Presence (PoP) (labelled Super-Janet) using their existing networks, local network suppliers or cable companies. Ufi do not recommend any one particular network supplier, as this will depend on local availability. All Ufi learners connect via the JANET link to Ufi.

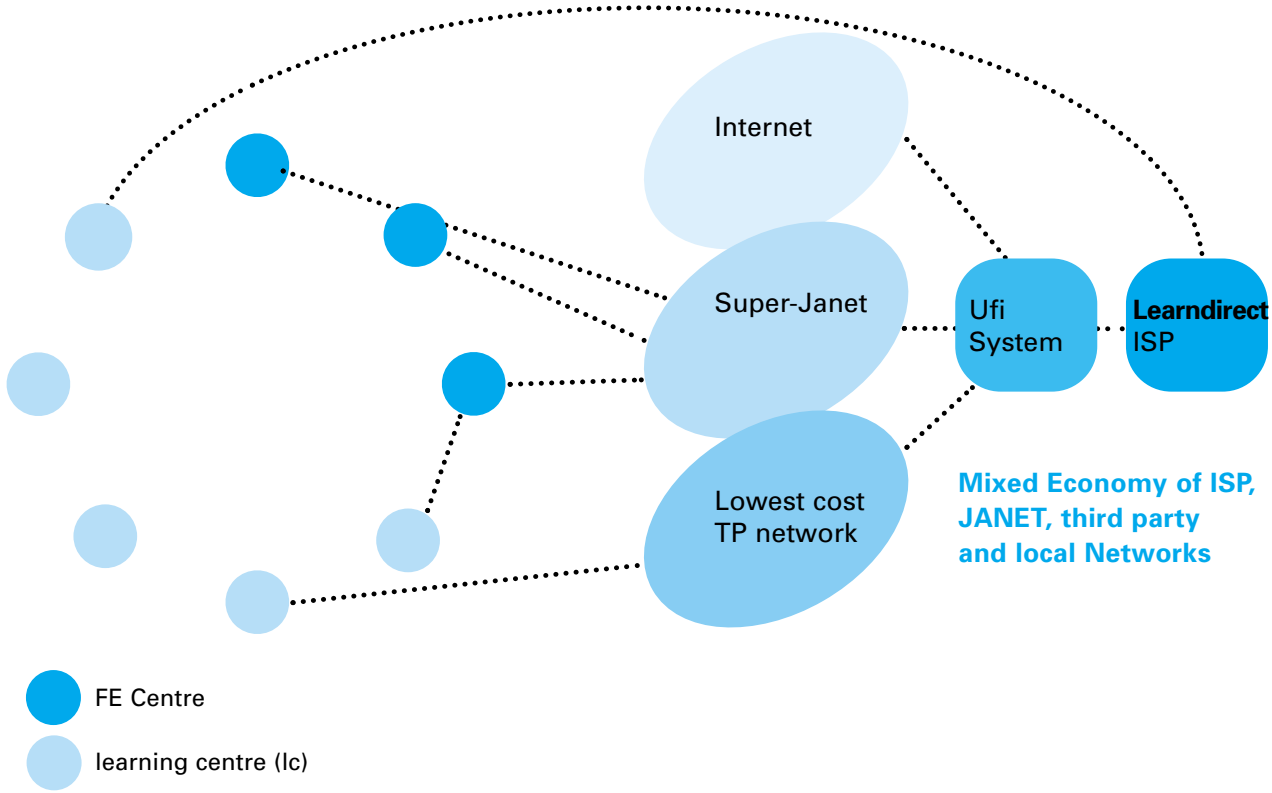
The size of connections from learning centres to an FE college will depend on how many learners will be using that LC. For example a 128k connection is likely to be able to support approximately 12 learners with early materials and 6 concurrent learners from autumn 2001 when the Ufi materials become more media-rich.

Possible Connectivity Strategies



In this model the hub has used a Ufi brokered contract to buy links between a FE centre and the JANET PoP (labelled Super-Janet). They have also used the same approach to link another learning centre (which might be a group of learning centres linked by another network- say a group of libraries) directly back to Ufi via the lowest cost third party network.

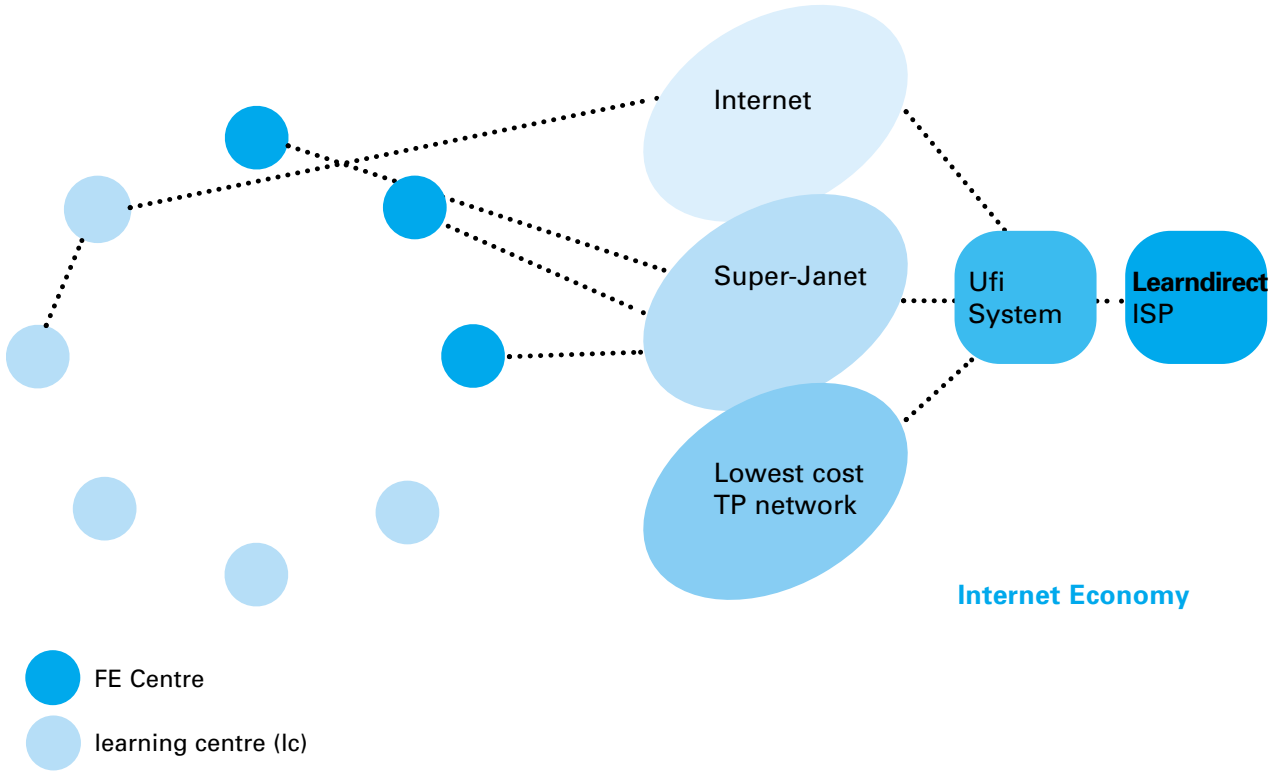
Possible Connectivity Strategies



In this scenario the hub has linked one learning centre to the JANET PoP (labelled Super-Janet) using a local network (FE Centre), another is linked via the **learndirect** ISP (its only a small access point) and the lowest cost third party network links another.

This is the most likely scenario for many hubs.

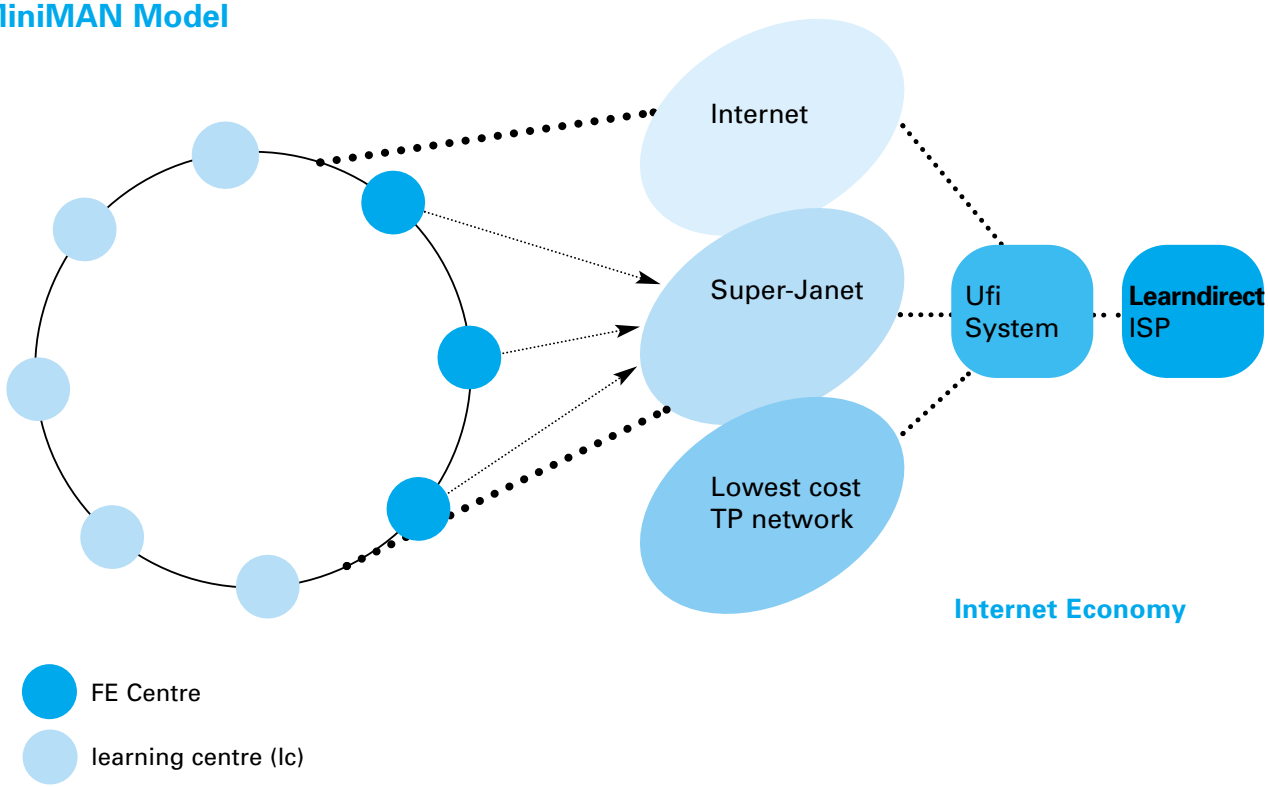
Possible Connectivity Strategies



This model shows Internet connectivity for some learning centres, perhaps these are access points that do not need access to the learning support environment. They may only need access to the website for accessing the Learning Opportunity database.

Possible Connectivity Strategies

MiniMAN Model



Investment for **learndirect** infrastructure should be made in the context of building towards the wider government communications strategy. The recent issuing of the Governments White Paper on Communications contains details of how education could be linked to business and individuals.

One possible proposal is to implement small pan organisational geographic networks (at least initially to connect the organisations within the hub to each other and to the **learndirect** system) via a "miniMAN". The miniMAN would be connected to the SuperJANET 4 core (where the highest speed network is located) by a dedicated network feed sized appropriately for the size of miniMAN.

This pan organisational network could link education (both FE and learndirect learning centres) direct to business (on the assumption that you can, of course, connect SME's direct to the miniMAN).

ADSL as an affordable model for hub sites

The costs itemised below are intended to provide readers with a perspective of the orders of magnitude of setting up a DSL* operation in 10 sites. An accurate quotation will be affected by which version of DSL is selected, the geography of the sites, the location of the BT exchange and the sites existing system. The costs used below to illustrate the model are from a local authority schools connectivity project. This is basically a do-it-yourself installation and not a BT managed service. BT's Learning Stream will provide a similar level of connectivity at affordable rates provided the distances to be connected are less than about 5km.

The Hub	One off Costs	Annual Costs
1x 6 Port Concentrator	£11,500	
1x Additional Line Card	£3,894	
Installation	£850	
TOTAL	£16,244	
EPSBaseband Analogue Connections		
10 EPS Installations	£10,800	
10 EPS Annual Rentals		£3,800
Site installation		
SDSL modems	£2,340	
Managed Service and Maintenance		£5,000
ANALYSIS		
One off Costs	£31,778	
Cost per site (amortised between 10 sites)	£3,177	
Annual Costs	£8,800	
Cost per site (amortised between 10 sites)	£880	

Further examples of costs can be obtained from telecoms websites like for LearningStream

Initial Specification of Equipment

The following outline is intended only as a guideline specification, which will allow access to the full **learndirect** provision from day one. It is not a recommended 'shopping list' or intended to imply that those using a platform other than Microsoft Windows, will be unable to access **learndirect** provision.

The minimum specification for IT equipment in a learndirect centre use computer-based learning material endorsed or commissioned by learndirect is:	
PC	
CPU	Pentium 233MHZ
RAM	64 Mbytes
Hard Drive	With 100 Mbytes of free space
CD Drive	24 x speed
Graphics Card	16 million colours and 1028 by 768 resolution
Sound Card	16 bit
Speakers and Headphones	
Keyboard and Mouse with Microsoft Compatibility	
Operating System	Windows 95 or later
Web enabled	Web enabled using either Internet Explorer (IE 5.5) or Netscape Navigator (v.4.76) browsers only. Full details on ICT issues for **learndirect** are available at http://www.ufi.com/partners/ict
Network connectivity, or dial-up* connection with minimum 56kbps modem	

Network Asset Audit

30. Have you carried out a network asset audit?

Yes ○ No ○

When looking at sizing your intra-hub or learning centre network cabling requirements, one of the first things you will need to do is carry out a network asset audit, in order to explore where all the loading on the network is likely to come from.*

A network asset audit is basically a map of your network showing all the locations where learning may be accessed, locations that learning may be supplied from and existing connections and their size, including those to other partners or outside networks like MANs (Metropolitan Area Networks) or other regional broadband initiatives.

One of the most useful ways of creating this map is to get all the partners together and pull all this information together on a flipchart. Often partners have external links that would be useful to other partners, and assume that everyone involved is already aware of them. This is often not the case. Changes in personnel, organisational restructuring, the creation of new community or regional networks and policy changes can mean that connections, which would not have been possible a few months ago, are now welcome, affordable and technically quite straightforward. Partners will have their own connectivity solutions that might provide the answer for other organisations and be happy to share their knowledge.

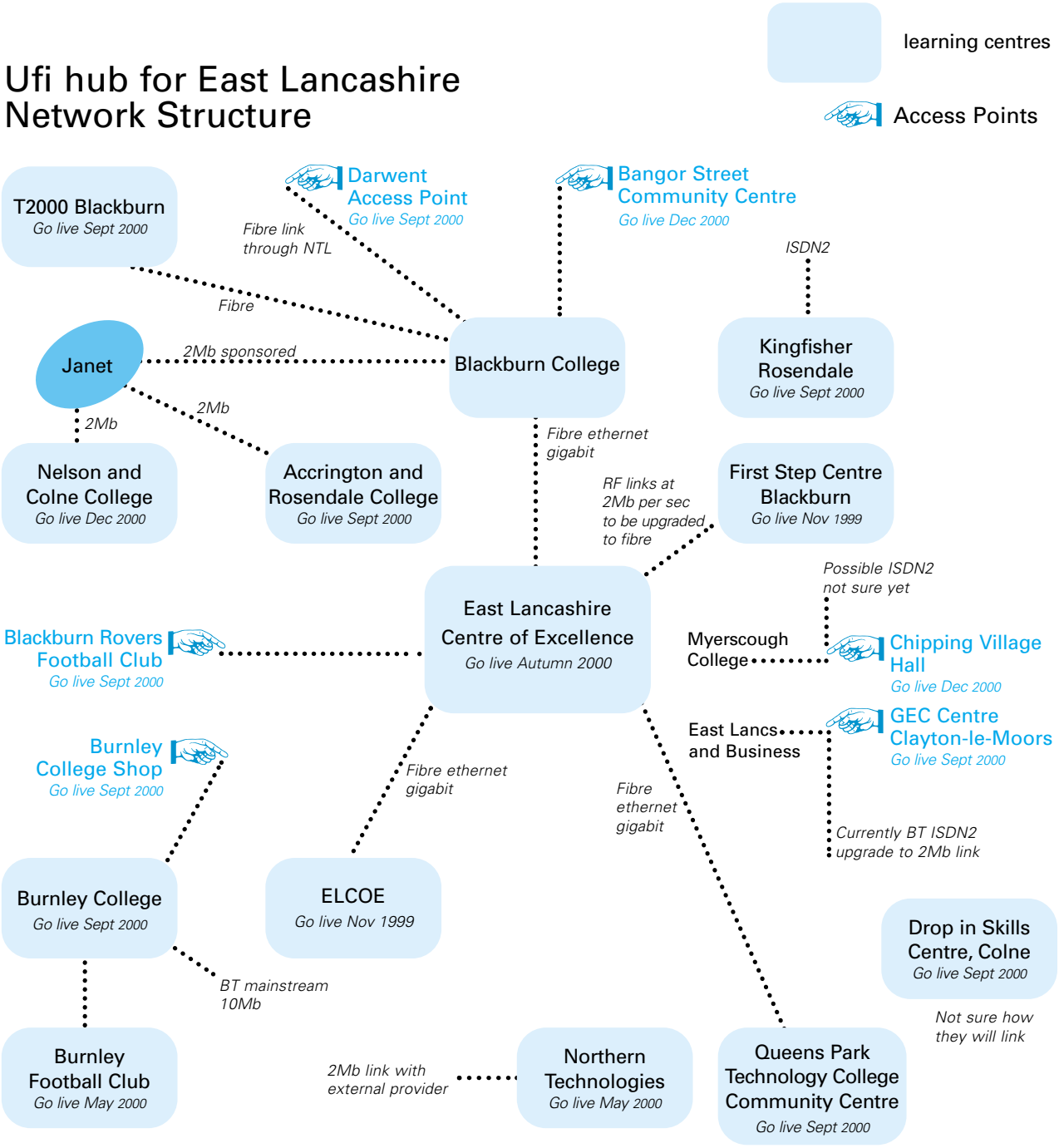
Another benefit of getting everyone together is to find additional ways of working together; for example, economies of scale can be achieved by partners choosing to procure telecommunications connections collectively.

A network asset audit, combined with the capacity planning spreadsheet, will show you where the gaps or bottlenecks are likely to be. It involves mapping where all the colleges, learning centres and access points are in the hub. Transferring those locations, and their existing or planned connections, and how many learners are in each one to the capacity planning spreadsheet in this toolkit will give you an indication of how much traffic is likely to be generated by each of them at peak times, and hence the size of cabling you may need.

Network Asset Audit Example

One example of a network asset audit is given here. It shows the locations and sizes of current and future connections in all parts of the hub. East Lancashire hub have agreed to be a case study for Ufi and this is a map of their network. This, their completed capacity plan and their ICT Strategy, can be found on Ufi website www.ufi.com

Mapping out the network like this makes it very easy to identify obvious gaps in connectivity as well as an early indication of potential bottle-necks. It also helps in completing the capacity plan, which is included with this toolkit as you can see exactly where the dependencies are, and hence where all the loading is likely to come from for any given centre, college or access point:



6 Capacity Planning

The capacity planning spreadsheet provided here, is completed with sample information to enable you to see what your own may look like once it is populated with your own information. A blank one that you can use to carry out your own sizing exercise can be downloaded from the Marchmont website at http:// www.lifelonglearning.ac.uk in the Publications section.

To use the capacity planning spreadsheet, list each location that will be used to access online learning, along with the number of PCs in each that can be used for online learning (including Ufi and non-Ufi use, together with any other others which are used for internet access and utilise the same external connections). Those locations may make up a Ufl hub or be learning centres or PCs used for learning across various sites of an SME or the different locations in a community learning network.

The spreadsheet contains cells with calculations based on assumptions for materials download burdens (both in the early days of learndirect and autumn 2001 when materials become more media rich, download burdens from commercial materials providers will probably be similar) and contention ratios for active versus concurrent learners (i.e. how many learners will press the enter button at the same time). Once you have populated the spreadsheet with this information the required bandwidth to support your **learndirect** traffic will be shown in the two columns headed 'Bandwidth reqs' (you may need to add or delete rows to ensure that the sum fields are adding up the correct number of learning centres/access points for each SuperJANET connection or other route to Ufi).

The spreadsheet assumes that the learning centre will be delivering a mix of **learndirect** and non-**learndirect** learning. It could be modified to calculate bandwidth requirements for exclusively non-**learndirect** learning centres or exclusively **learndirect** learning centres by inserting the total number of learners into the 'Concurrent Ufi Learners' column and using the figures in the 'Bandwith reqs for Ufl learners >Autumn 2001' column for planning purposes.

Any planning or purchasing decisions made using the capacity planning spreadsheet or other information, provided as part of this toolkit, should be verified by yourselves using your own learner and contention ratios and mix of materials and media before making any commitments based upon them. These are intended as guidelines only to show you the sorts of issues that need to be considered when planning your networks.

Appendix Capacity Planning Spreadsheet

Ufi Hub Capacity Planning

Volumes of learners mapped against network capacity

Location	Type	Concurrent Learners	Concurrent Ufi Learners	Peak active learners	Bandwith reqs for Ufl learners <autumn 2001 (Kbs)	Bandwith reqs for Ufl learners >autumn 2001 (Kbs)	Route to Ufi
learning centre 1	LC	50	12.5	4.17	116.67	233.33	College 1 2Mb SuperJANET
College 1	FE	40	10	3.33	93.33	186.67	own 1 2Mb SuperJANET
learning centre 2	LC	12	3	1.00	28.00	56.00	College 1 2Mb SuperJANET
Access Point 1	AP	10	2.5	0.83	23.33	46.67	College 1 2Mb SuperJANET
Access Point 2	AP	12	3	1.00	28.00	56.00	College 1 2Mb SuperJANET
learning centre 3	LC	14	3.5	1.17	32.67	65.33	College 1 2Mb SuperJANET
Access Point 3	AP	20	5	1.67	46.67	93.33	College 1 2Mb SuperJANET
Access Point 4	AP	20	5	1.67	46.67	93.33	College 1 2Mb SuperJANET
Total Download Burden for College 1		178	44.5	14.83	415.33	830.67	
learning centre 4	LC	20	5	1.67	46.67	93.33	own 2Mb SuperJANET
Access Point 5	AP	14	3.5	1.17	32.67	65.33	own 2Mb RF
learning centre 5	AP/LC	20	5	1.67	46.67	93.33	TBA
Access Point 6	AP	6	1.5	0.50	14.00	28.00	TBA
Access Point 7	AP	14	3.5	1.17	32.67	65.33	TBA
learning centre 6	LC	7	1.75	0.58	16.33	32.67	TBA
Access Point 8	AP	12	3	1.00	28.00	56.00	ISDN2
Access Point 9	AP	8	2	0.67	18.67	37.33	ISDN2
Access Point 10	AP	10	2.5	0.83	23.33	46.67	own 2Mb
College 2	FE	40	10	3.33	93.33	186.67	College 2 BT Mainstream 10 Mb
learning centre 7	LC	50	12.5	4.17	116.67	233.33	College 2 10Mb
Access Point 11	AP	12	3	1.00	28.00	56.00	College 2 10Mb
Access Point 12	AP	10	2.5	0.83	23.33	46.67	College 2 10Mb
Total Download Burden for College 2		112	28	9.33	261.33	522.67	
College 3	FE	16	4	1.33	37.33	74.67	College 3 2Mb SuperJANET
Access Point 13	AP	10	2.5	0.83	23.33	46.67	College 3 2Mb SuperJANET
Total Download Burden for College 3		26	6.5	2.17	60.67	121.33	
College 4	FE	40	10	3.33	93.33	186.67	College 4 2Mb SuperJANET
Access Point 14	AP	5	1.25	0.42	11.67	23.33	College 4 2Mb SuperJANET
Access Point 15	AP	10	2.5	0.83	23.33	46.67	College 4 2Mb SuperJANET
Access Point 16	AP	12	3	1.00	28.00	56.00	College 4 2Mb SuperJANET
Total Download Burden for College 4		67	16.75	5.58	156.33	312.67	

Assumptions

0-9 Months
5-15Mb/hr/learner download burden (approx 28Kbs)
25% Available seats used for concurrent Ufi learners
1:3 Contention ratio applied to estimate active concurrent learners

> 9 months
25Mb/hr/learner download burden (approx 56Kbs)
25% Available seats used for concurrent Ufi learners
1:3 Contention ratio applied to estimate active concurrent learners

"This is generally a good network with ample bandwidth for intra-hub networking. However the one area for concern is the 2Mb SuperJANET connection for College 1. Although Ufi traffic at peak loads needs less than half this bandwidth to deliver quality of service based on volumes given by the hub business. The connection is already overloaded at peak times with normal college traffic. An additional 2Mb upgrade to SuperJANET, 50% of which could be segmented for Ufi only traffic, would give Quality of Service for learndirect service delivery. The remaining 1Mb of additional bandwidth could be used to alleviate the existing peak time overloads from normal college traffic."

"Information given is intended to give an indication of potential bottlenecks and not a guarantee of capacity by Ufi, CNR or Marchmont. Recommendations should be tested and verified by the hub before making any decisions based on this."

7 List of Contacts

Region	Name & Title	Email	Phone
NORTH EAST	Susan Bickerton Head of Ufi (North East)	sbickerton@ufi.com	07867 500 673
YORKSHIRE & HUMBER	Peter Stagg Head of Ufi (Yorks & Humber)	pstagg@ufi.com	07867 500 659
NORTH WEST	Jette Burford Head of Ufi (North West)	jburford@jfi.com	07867 500 668
WALES	Jeff Greenidge Head of Ufi (Wales)	jgreenidge@ufi.com	07867 500 654
WEST MIDLANDS	Alison Knight Head of Ufi (West Midlands)	aknight@ufi.com	07867 500 663
EAST	Sue Betts Head of Ufi (East)	sbetts@ufi.com	01223 253 733
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8 Glossary and Source of Terms

Many of the terms below have not been used in the text of this document, but we have included them as they will be useful for referring to technical documents of this kind.

Access Provider A company that sells Internet Access

Analogue Refers to a signalling technique in which a transmission is conveyed by modulating the frequency, amplitude, or phase of a carrier. Contrast with digital.

ATM - Asynchronous Transfer Mode Is a high bandwidth technology and has been selected as the base technology for the future Broadband-ISDN.

Backbone A backbone is a larger transmission line that carries data gathered from smaller lines that interconnect with it.

Bandwidth The capacity of data, that a line or channel can carry every second. Digital bandwidth is measured in *bps* (bits per second).

BIB British Interactive Broadcasting

BLOB Binary Large Object. A collection of binary data stored as a single entity in a database management system . BLOBs are used primarily to hold multimedia objects such as images, videos and sound, as well as programs.

BPS (bits per second) The rate at which one bit can be carried, normally expressed in thousands, Kbps, or millions, Mbps.

Broadband Refers to any transmission at a speed higher than 2 million bps. A broadband network can carry voice, data and video signals simultaneously.

Browser A software programme, which allows your computer to download and display documents from the World Wide Web, such as Netscape or Mosaic.

BBS - Bulletin Board System Is an electronic pubic notice board, which can be used for posting messages and information to interest groups.

Business Excellence Model (BEM) It is becoming generally accepted in the UK public and private sector that the Business Excellence Model (BEM), is the most useful and comprehensive quality framework. This model, developed by the European Foundation for Quality is summarized in the diagram at the end of this glossary.

Cabling Used to link computers together so that they form a network and can communicate with each other.

CAD - Computer Aided Design Software that helps graphic designers and draughtsmen in creating their designs.

CAGR Compound Annual Growth Rate.

CAM Computer Aided Manufacture. A generic term used to refer to shop floor automation.

Carrier Communication company or authority providing circuits to carry traffic.

CATV Community Antenna Television refers to television signals transmitted to subscribers by a cable network.

CD-Rom Compact Disc-Read Only Memory is a compact disc format principally devoted to text and data. It has become a major electronic publishing platform for business information. CD-ROMs can store vast amounts of data and can fit into a standard PC, behaving like a very large read-only floppy disc.

CDMA Code Division Multiple Access - a technology used in cellular networks to increase capacity and security within a given bandwidth.

Cellular A communication service in which voice or data is transmitted by radio frequencies. The service area is divided into cells each served by a transmitter, which are then connected to a mobile switching exchange, which is linked to the worldwide telephone network.

Circuit Means of two-way communication between two or more points.

Circuit Switching Temporary direct connection of one or more channels between two or more points in order to provide the user with exclusive use of an open channel with which to exchange information.

Client/Server A network topology in which one computer acts as a central repository for files and programs that can be shared by a number of client PC's connected to a network.

Co-axial cable The transmission media typically used in cable television.

Contention Ratio The number of concurrent learners that will press the enter button at the same time (active learners).

CPE Customer Premises Equipment - terminal equipment, supplied by either the telephone common carrier or by a competitive supplier that is connected to the telephone network.

CT2 Second generation (hence the 2) of Cordless Telephone based on digital radio technology.

Dark fibre Is optical fibre infrastructure (cabling and repeaters) that is currently in place but is not being used. Optical fibre conveys information in the form of light pulses so the "dark" means no light pulses are being sent. Dark fibre can refer to infrastructure that is in place but not yet ready to use. For example, some electric utilities have installed optical fibre cable where they already have power lines installed in the expectation that they can lease the infrastructure to telephone or cable TV companies or use it to interconnect their own offices. To the extent that these installations are unused, they are described as dark.

Data Mining The technique of sifting through huge quantities of data, typically using powerful computers to find useful information.

Data Warehousing The storage of very large amounts of information.

DCS-1800 Digital Communications System at 1,800 MHz. A specification for digital cellular radio systems conforming with GSM (qv.) network architecture and radio interface, but operated at the higher frequency of 1,800 MHz, and with a lower maximum limit on fixed and mobile transmitter power output. Adopted as a pan-European standard for personal communications networks.

Dial up The process of establishing a temporary connection via the switched telephone network.

Digital The term describes the technology used by cellular phones. Here phone conversations and information are converted into digital format: a series of electronic numbers. The benefit of this is that the digital information can be transferred quickly.

DSL – Digital Subscriber Line Is a technology for bringing high bandwidth information to homes and small businesses over ordinary copper telephone lines. There are several variants of DSL: ADSL - Asymmetrical Digital Subscriber Line - can carry voice and data, high-speed copper wire connections at up to 6 Mbps downstream and 640 kbps up.

XDSL - Describes the variants of DSL available.
HDSL - High bit rate Digital Subscriber Line - A form of Digital Subscriber Line providing connections over two or three twisted-pair copper lines.
SDSL - Single-line Digital Subscriber Line - similar to HDSL, but providing connections over a single twisted- pair copper line.
IDSL - ISDN Digital Subscriber Line - digital data is transmitted on regular copper telephone line from user to destination.
G.Lite - Splitterless DSL - lines does need to be separate to carry different types of information.

DTH Direct to Home. Satellite television and radio broadcasts delivered direct to the home via a small dish.

DTT Abbreviation for Digital Terrestrial Television, digitally encoded television signals carried through standard television transmission systems.

DVD Digital Versatile Disc - a high capacity form of compact disc.

Email Electronic mail, the electronic transmission of letters, messages from one computer to another.

EDI Electronic Data Interchange - electronic exchange of forms, such as invoices and orders, between geographically dispersed locations.

EITO European Information Technology Observatory

Encryption The process of systematically encoding a bitstream before transmission so that an unauthorised party cannot decipher it.

EPOS Abbreviation for Electronic Point of Sales Systems, which are systems, used for managing purchases at the point of sale in a retail environment.

ESPRIT European Strategic Program for Research and Development in Information Technologies

Ethernet A popular standard for linking computers into a network. Thin Ethernet uses the same coaxial cable that is used to connect a TV to an aerial.

European Computer Driving Licence (ECDL)
The ECDL is a new concept, which is now widely recognised throughout the European Union. It holds courses to teach users basic knowledge of computers in seven different modules, and carries out tests on the courses. It means that there is now a common standard on which employers can judge users and is fast becoming a must for “Young Europeans”.

Extranet An extranet is an extension of a company’s intranet that allows external users to access some parts of the intranet.

Fibre optics A technology that uses light as a digital information carrier. Fibre cables occupy far less physical volume than coaxial cable for an equivalent transmission capacity.

Firewall Technology to prevent unauthorised access to company networks from outside.

FTP File Transfer Protocol. A service providing a family of commands for performing file and directory operations over the network.

Frame relay Packet-switch technology that is simpler and more powerful than the X.5 standard.

Gateway A device that translates data between two different systems on a network.

GDP Gross Domestic Product

GMPS Global Mobile Personal communications System - a wireless communications standard designed specifically for satellite mobile communications.

GSM Abbreviation for Global Systems for Mobile, a technological standard for digital mobile technology.

HDLC High level Data Link Control - bit orientated communication protocol.

HDML Hand held Device Mark-up Language - a computer language used to create documents for data-on-the-move devices. (Similar to HTML)

Host The computer that provides the services and facilities used by the other computers/terminals.

HTML Hypertext Mark-up Language - the computer language that the Web is written in.

HTTP Hypertext Transfer Protocol, HTTP is the standard way of transmitting HTML-encoded documents over the Internet.

Hypertext Text that need not be read from beginning to end but can instead be browsed in a number of different orders through the use of internal route marks called links. The most popular application is in WWW pages.

ICT Information and Communications Technology - a term used to describe the Information Technology Industry and the Communications Industry including service providers and equipment manufacturers.

IDN Integrated Digital Network - a network employing both digital switches and digital transmission.

Interactive A term describing the mode of transaction with a particular information service. An interactive service allows for both input and output. It is sometimes referred to as a two-way, as opposed to a one-way service.

Intranet An internal computer network that operates using the same protocol as the Internet. Its main benefit is seen as being a means of sharing information between company employees.

ISDN - Integrated Services Digital Network Is the integration of both analogue or voice data together with digital data over the same network.

ISP Internet Service Provider - a company providing public access to the Internet, usually by leased line, ISDN, and/or modem.

IP Internet Protocol - allows any number of computer networks to link up and act as one.

IRC Internet Relay Chat is a system where you can chat, that is type, to other Internet users in real time.

ITU International Telephone Union - is responsible for setting standards for telephone communications.

Java A computer programming language that works on any platform (i.e., any type of computer)

Joint Information Systems Committee (JISC) The mission of the JISC is: 'To stimulate and enable the cost effective exploitation of information systems and to provide a high quality national network infrastructure for the UK higher education and research councils communities'

JIT Just In Time - a manufacturing technology aimed at reducing inventory levels stored at a site

JPEG Joint Photographic Experts Group - is the consortium of hardware, software and publishing interests dedicated to developing international standards for the compression of still photographic images in digital systems.

LAN Local area network. LANs are usually privately maintained computer networks covering a small geographic area, typically a building.

LEC Local Exchange Carriers are the US companies that bring telephone services to a region: e.g., Pacific Bell.

Leased Line Dedicated circuit, typically supplied by the telephone company or transmission authority that permanently connects two or more user locations, and is for the sole purpose of the subscriber.

LEO Low Earth Orbit satellites that are in orbit much lower than standard communications satellites. These are the basis for satellite mobile communications systems.

Local loop The part of a communication circuit between the subscriber's equipment and the equipment in the local exchange.

Megastream MegaStream is the brand name for BT's portfolio of digital leased lines, or private circuits, operating at bandwidths of 2Mbits/s and above. MegaStreams are available nationally, except for the area served by Kingston Communications in Hull. Generally, BT will provide the whole leased line from end to end. It is very rare for BT to acquire part of a leased line from another teleco. MegaSteam2, a 2Mbit/s leased line, is the standard product. Other leased lines available within the MegaStream portfolio are 8Mbit/s, 34Mbits/s, 45Mbits/s, 140Mbit/s and 155Mbits/s.

MIS Management Information Systems are computer systems that provide information to assist managers in decision-making or process tracking.

MMX An 'add-on' technology for Intel manufactured computer processors that allows for easier and faster manipulation of multimedia content.

Modem A device that translates the digital signals from your computer into analogue signals that can travel over a standard phone line.

MPEG Motion Picture Experts Group - is a consortium of hardware, software and publishing interests dedicated to developing international standards for the compression of moving video images in digital systems. MPEG 1 is designed for use in CD-ROM drives, whereas MPEG 2 address broadcasting and video conferencing.

MSN Abbreviation for the Microsoft Network

Multimedia Refers to systems that support the interactive use of text, audio, still images, motion, video and graphics. The common factor is that each of these media types is essentially not native of the digital computer environment, and must therefore be converted from analogue to digital. Hence multimedia is the convergence of previously diverse systems.

Narrowband Narrowband communications use little 'space' in the spectrum and therefore are limited in the quantity of information that can be carried.

NGfL National Grid for Learning, UK Government programme to link all secondary schools to the Internet.

NII National Information Infrastructure - is a synonym for the Information Superhighway.

Online A generic term referring to interactive services, which are delivered or accessed from a remote source via an electronic communication link.

PBX Private branch exchange - a telephone switch providing speech connections within an organisation, whilst also allowing users access to both public switches and private network facilities outside the organisation.

PCN Abbreviation for Personal Communications Network.

PoP Points of Presence. A site where there exists a collection of telecommunications equipment, usually modems, digital leased lines. An ISP may operate several PoPs distributed throughout their area of operation to increase the chance that their subscribers will be able to reach one with a local call.

PSN Packet Switched Network. A data communications network where data is divided into small segments, known as packets, in such a manner that each packet forming part of a complete message may be routed to its destination independently of all other packets in the same message through a network of switches.

PTSN Abbreviation for Public Switched Telephone Network. The term 'public' relates to the customer rather than ownership

RAM Random Access Memory is memory that the computer holds until it is switched off.

RFID Radio Frequency Identification Tag - is a tag attached to products that 'communicates' information carried on it to base stations through radio waves.

Screen Refresh To provide the latest up-to-date version of a web page.

Server Farm A network topology in which one computer acts as a central repository for files and programs (in this case, the Ufi's central systems unit) that can be shared by a number of client PC's connected to a network.

Small Business Service (SBS) The Small Business Service is a new organisation with a new way of working and a new mission, which has been in existence since April 2000 and operates across all Government Departments SBS operates a number of schemes and initiatives that are designed to help small businesses in a variety of ways. They encourage firms to be more innovative, and to exploit new technologies. They can help small businesses to obtain finance more readily and can provide ways so that businesses can make better use of the expertise that is available to them from colleges and other organisations.

SME Small & Medium Enterprises - Businesses with fewer than 250 employees.

SMIL Synchronous Multimedia Integration Language - a language used to define and synchronise multimedia elements at a variety of bandwidths.

SMS Short Messaging Services. A standard for passing text messages via a mobile telephone.

Standalone Devices or systems that can function on their own, without depending on a central facility for power, data, or other services.

SuperJANET JANET is the network for the education and research community within the United Kingdom. The JANET network and services are managed by UKERNA (see below) on behalf of the Joint Information Systems Committee. UKERNA are able to provide traffic analysis information for JANET to enable you to refine your bandwidth requirement and utlisation management information.

TCP/IP Transmission Control Protocol/Internet Protocol - is one of the protocols used on the Internet and governs the use of email and the manner in which one computer can access another.

Teleworking A term used to describe the ability to work away from the office and use ICTs to maintain effective communications and give access to all the facilities required to work remotely.

Twisted Pair Twisted Pair is a networking cabling system that uses the same kind of cables as a phone system.

UKERNA UKERNA manages the operation and development of the JANET networks under a Service Level Agreement from the Joint Information Systems Committee (JISC) of the UK Higher and Further Education Funding Councils.

VAS Value Added Service

VANS Value Added Network Services. Telecommunication services provided over public or private networks, which, in some way, add 'value' to the basic carriage, usually through the application of computerised intelligence, for instance, reservation systems, bulletin boards, and information services.

VOD Video-on-demand. A service whereby a subscriber can order and almost immediately view films and other entertainment from a television set. In 'true' video on demand, the film can be paused, rewound or fast -forwarded. In 'near' video-on-demand these facilities are not possible.

VPN Virtual Private Network - the provision of facilities normally associated with a private telecommunications network over the shared lines, exchanges, and switches of a public network.

WAN Wide Area Networks are enterprise wide, or distributed, computer networks that allow signals (data and text) to be transmitted from LAN to LAN via a public or private network.

Wireless Local Loop (WLL) A form of fixed telecommunications link that uses radio communications instead of copper wires to form the link.

XML Extensible Markup Language is a flexible way to create information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere. For example, computer makers might agree on a standard or common way to describe the information about a computer produce (processor speed, memory size, and so forth) and then

List of Acronyms

ADSL	Asymmetrical Digital Subscriber Line
ATM	Asynchronous Transfer Mode
BISDN	Broadband ISDN
DNS	Domain Name Server
FDDI	Fibre Distributed Data Interface
G.Lite	Splitterless DSL
GPRS	General Packet Radio System
HTML	Hyper Text Markup Language
IDSL	ISDN Digital Subscriber Line
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
SDH	Synchronous Digital Hierarchy
SDSL	Symmetrical Digital Subscriber Line
SONET	Synchronous Optical Network
VCI	Virtual Channel Identifier
VPC	Virtual Path Connections
VCC	Virtual Channel Connections
WAP	Wireless Application Protocol
XDSL	Variations of DSL
XTML	Extensible Telephony Markup Language