



The Structure and Trends of the ISP Market

Elizabeth McPhillips
Extended Enterprise Laboratory
HP Laboratories Bristol
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E-mail: liz@mansci.strath.ac.uk

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Elizabeth McPhillips
University of Strathclyde, Glasgow and
Hewlett-Packard Laboratories, Bristol

liz@mansi.strath.ac.uk

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1. Introduction

An Internet Service Provider (ISP) is a company that provides individuals and companies access to the Internet and other related services.

This report aims to introduce the reader to the idea of Internet service provision, the services offered, the main players in the industry, and its current state and its trends.

Section 1 details the different types of ISPs, types of access, and the physical structure of an ISP. Section 2 describes the services offered by ISPs, both basic services and premium services. Section 3 looks at the ISP market, analysing the market forces and the influential environment. Section 4 looks at the main players in the market, examining each individually, and identifying their characteristics. Four general areas of threats to ISPs are outlined in Section 5. Section 6 identifies the main trends in the ISP market and suggests emerging trends, and Section 7 sums up the main ideas of the report.

Internet users access and send information either through individual connections or through organisations such as universities or businesses. Users are either those who use the Internet primarily to receive information, or content creators who use the Internet to distribute information. ISPs connect those end users to Internet backbone networks, which interconnect with other backbone providers. The users receive Internet Protocol Suite (IPS), the

Internet equivalent of dial tone, which routes traffic between ISPs.

ISPs fall into three broad groups: backbone providers, national providers and local providers.

Backbone providers are nationwide or multinational organisations that control Internet routing. They often own significant pieces of the backbone itself.

National providers buy capacity and routing services from backbone providers and run Points Of Presence (POPs, locations of access points to the Internet) across the country (or the world). National providers are often described as resellers since they are simply reselling bandwidth that they have purchased from the backbone provider.

Local providers operate in the same way as the national group, but on a smaller scale. Usually they work within a smaller geographic area.

1.1 Accessing the Internet by means of an ISP

To access the Internet, generally a user must periodically pay an ISP and pay any applicable set-up fee to connect to that ISP. Most ISPs (particularly in the US) charge a flat monthly fee, and some impose a per-hour charge above a certain monthly threshold.

The vast majority of users (mainly domestic users, who make up approximately 98% of all accounts) reach their ISP today through their telephone network, using a dial-up connection. Many businesses lease lines or use ISDN connections.

Types of Access:

1.1.1 Analogue Dial-Up

From a commercial perspective, dial-up access has a lower potential margin than dedicated access. This is because dial-up cost of service is high, while the revenue per customer is low. Service cost is high because modems and terminal servers (also known as access servers) are expensive and dial-up billing can be complicated. Dial-up equipment can account for over 10% of an ISP's total costs [1].

Per usage billing is expensive, but it encourages users to make more efficient use of the resources. Flat-rate billing is cheap and easy. Customers also seem to favour flat-rate billing, even if it means paying more than they would under the per-usage scheme. It is easier to budget when you know exactly how much you will spend, plus customers seem to enjoy the idea of 'all you can eat'.

In spite of the advantages of flat-rate billing, typical user behaviour is to log on and then stay online for long periods of time, even if they are not using the Internet. This leads to a great inefficiency and a degraded service, as users may be contending for resources (e.g. modems, bandwidth).

1.1.2 ISDN Digital Dial-Up

ISDN (Integrated Services Digital Network) dial-up has two main uses: as a fast pipe for individual users, and as a low-budget LAN Internet connection. When used by an individual user, it is just like analogue dial-up but the transmission is faster as it is over a digital line. When used for LAN connection, it is just like a leased line connection, except that the line is not dedicated – it is only brought up when there is data to be transmitted or received.

As far as the ISP is concerned, equipment costs are reasonably low for ISDN, but transport costs are relatively high compared to analogue. However, profits are significant, as compared with marginal profits in the analogue case.

1.1.3 Dedicated Access

An ISP typically has a number of ports on a router through which it offers dedicated access. The goal is to connect as many customers to these ports as possible. Although set-up costs can be high for dedicated access (price being proportional to the distance from the ISP to the customer) profits are high, generally bringing in over a quarter of an ISP's revenues, even though they may only account for 1% of actual account numbers.

Other traditional transmission methods are also finding their place in the world of Internet access.

Cable companies have already started offering Internet access over their networks.

Hybrid Fibre Coax (HFC) is used to provide this service. HFC uses cable modems. It employs analogue fibre to a node that will serve a few hundred houses, and coaxial cable to the premises. The position of cable companies in the ISP market will be discussed in section 4.4, Cable Companies SWOT Analysis.

Because mobility has been an issue of such importance in recent years, the combination of mobile and Internet services will be of great importance to customers. At present, the technology required for high-speed wireless access is unavailable. Wireless Internet access will grow rapidly once the technology is available at a reasonable price [2].

Many new last mile (i.e. from the telephone exchange or ISP to the customer) technologies are emerging and it is likely that they will have a significant impact on Internet provision. If using the telephone network to access an ISP, whether dial-up or dedicated, there is usually room for complaint in terms of speed and reliability. This is for a simple reason - the telephone network was designed to carry voice traffic and not high-speed data traffic. Therefore, many new technologies are being developed for local loop data delivery.

1.2.1 Digital Subscriber Line

xDSL is the family of Digital Subscriber Line (DSL) technologies that has been developed to provide high-speed links over twisted-pair copper telephone lines.

Because long copper loops distort signal quality, repeaters and amplifiers are installed on copper pairs at prescribed intervals to restore signal quality. What xDSL technologies do is use sophisticated modulation schemes to pack data onto copper wires, and do so without repeaters or amplifiers. xDSL leverages the telephone companies' investment in twisted-pair copper to nearly every home or business by providing the ability to send voice and large amounts of data over existing lines.

ADSL (Asymmetric DSL) is the form of DSL with the most potential for Internet provision. It is intended for the last mile into a customer's premises.

ADSL technology consists of a pair of modems on either end of a twisted-pair copper line, which provides asymmetric transmission of data up to 8Mbps downstream and 800kbps upstream.

1.2.2 WebTV

WebTV allows use of the Internet through a television set. A set-top box is installed and a special WebTV ISP must be subscribed to. It is controlled by a hand-held control or by a wireless keyboard. Although the TV is used as the output device, the information arrives through a telephone line and modem.

1.2.3 Digital Powerline

Digital powerline technology involves the utilisation of the electricity distribution network as a means of providing both power and telecommunications services to the home. An implementation of powerline communications has been developed in which an electricity distribution network may be conditioned such that it can simultaneously carry two or more electrical signals.

The advantage of this method is that it uses an existing infrastructure that is a system connected to almost every home and business.

1.2.4 Fibre To The Curb

Fibre To The Curb (FTTC) refers to the installation and use of optical fibre directly to the curbs near homes or any business environment.

This method uses digital fibre to a node serving 16-32 homes. The short link to the customer is through any number of transmission technologies - twisted pair, coaxial cable, optical fibre, microcellular microwave etc., depending on the bandwidth of the services required.

1.2.5 Satellite

Satellite Internet access is likely to be used for customers in geographically isolated regions.

Provision of two-way higher bandwidth capability over satellite is not common in residential markets because of the high cost, but hybrid solutions have recently been developed to deliver a high bandwidth capability via satellite with a return path to a service provider using conventional PSTN technology. This method is being used to provide interactive television services and may be used in the future to provide fast Internet access [3].

1.2.6 Radio Local Loop

In the UK, radio spectrum in the 10GHz region has been allocated for the delivery of high bandwidth services. Internet access by radio local loop would have its advantages and disadvantages. It is flexible in the building of its access infrastructure, but it has practical problems of reach and interference, and costs of terminal equipment can be high [3].

1.3 The Physical Structure of an ISP

Fig 1 shows a brief schematic showing the basic physical structure of an ISP.

The *ISP server* is the computer program (and computer) that serves requested Web pages or files.

The *DNS server* contains information to resolve Internet names and addresses.

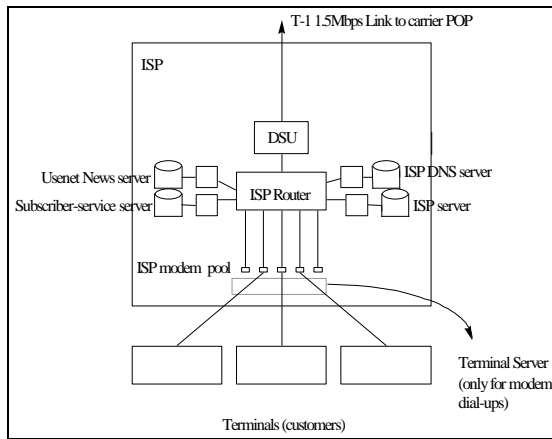


Fig. 1 Structure of an ISP [4]

The *news server* receives and processes Usenet news, and although this is just one function, it can take up an entire computer system on its own. It is not recommended that any other functions run on this machine.

The *subscriber-service server* is provided to authorise service, maintain billing records, and keep other administrative details.

The *terminal server* is a device that allows connection of modems to the internal network, and thus out to the Internet.

The *Data Services Unit (DSU)* takes data from the router and translates it into the format required by the leased line that runs to the carrier POP.

The *router* looks at packets in an internal network, finds the ones that are destined for the Internet, and sends them out. This is a simple function, but has to be extremely high-speed.

For traffic outwith the internal network, the router is used to send it to the carrier's closest POP. This is usually done over a T-1 line (1.544Mbps, used in the US), or a DS-1 line (2.048Mbps, used in Europe). A leased line is usually provided by a telephone company to connect with the carrier at their POP.

Enterprises such as universities and large businesses often have a T-1 (or DS-1) direct private-line connection to the carrier POP.

The carrier then concentrates the traffic from many ISPs and enterprises and forwards that traffic over a set of higher speed links (usually 45Mbps, but now as high as 155Mbps) to the closest Network Access Point (NAP) for connection to the Internet.

2. What Services do ISPs Offer?

Basic ISP services include E-mail, World Wide Web access and Bulletin Board Systems. Over the past couple of years, Internet services have gathered much greater value and scope, resulting in many premium services, which may be priced accordingly.

Below are detailed the principal Internet services provided.

2.1 E-mail

E-mail is the electronic sending, storage and retrieval of messages. Messages are addressed and sent to the computer where the destination e-mail account resides, and are stored there.

An e-mail message consists of three parts:

- The header gives information about the message (who sent it, when, who it was addressed to, carbon copies, how it got there, etc.)
- The body is the actual message itself.
- The signature is the part where the sender personalises the message and gives further information about themselves.

Because most PCs are not left on 24 hours a day, connected to the Internet, with their own host names etc, most e-mail accounts are usually on a host somewhere else. The e-mail reader contacts this host (using Post Office Protocol, or POP) to handle the e-mail when the user logs in. Once the e-mail is on the user's PC, then all the e-mail activities are local (folders, lists, etc.)

POP is a client-server application designed to transport e-mail messages between a network server and a PC based client computer.

2.2 The World Wide Web

The WWW is, like Telnet and FTP, a tool for accessing the information available on the Internet. It is composed of a collection of web pages residing on computers, called web servers. A web page author creates a document and encodes links (called hypertext links) into the document. By following these links, the reader can move from the original document to another document, which might be located on that same computer or on another web server anywhere in the world.

Web software is designed around a distributed client-server architecture. A web client (called a web browser if it is intended for interactive use) is a program which can send requests for documents to any web server. A web server is a program that, upon receipt of a request, sends the document requested (or an error message if appropriate) back to the requesting client.

Because the task of document storage is left to the server and the task of document presentation is left to the client, each program can concentrate on those duties and progress independently of each other.

2.3 Bulletin Boards

Bulletin Board Systems (BBS) are on-line services which allow users to read and post messages, usually organised around a single topic.

The best example of an Internet BBS is Usenet, the world's largest newsgroup. It contains more than 40,000 different topic groups (January 1999).

There are various ways you can read or take part in discussions on the Internet. One way is to subscribe to listservers. Another is to join a newsgroup. The main difference between the two is that you sign up for a listserver and the messages go to your e-mail box, while you must visit a newsgroup and read the messages. Newsgroup messages are posted publicly, available for anyone to read and respond to.

Programs exist to allow a user and another person to be on-line at the same time, trading real-time messages to simulate a

conversation. It is also possible to chat with many more than one person at once. The most popular chat program is Internet Relay Chat (IRC). On IRC, several people can simultaneously participate in a discussion over a particular channel, or even multiple channels. There is no restriction on the number of people that can participate, or on the number of channels that can be formed over an IRC.

With the growing familiarity with the Internet, and the explosion in the number of ISPs in the market, both access and primary services are becoming commoditised. Although it is human nature to be fascinated with a new service or product when first presented with it, it is equally natural to grow accustomed and demand more. As consumers become familiar with what is currently available and with what is possible, their service expectations will grow. Customers are no longer willing to pay a premium for basic access and services, so ISPs are having to offer more. They will compete to deliver more technically sophisticated and cost effective services to meet the ever-increasing needs of educated customers. In a short time, the market has gone from one being fought over access, to one in which more must be offered, in the way of new value-added services and benefits, technological or other.

2.4 Voice and Fax Services

Because of the idea of 'pay local, speak global', voice over the Internet (or Voice over IP, VoIP) has been a point of great interest over the last couple of years. Internet telephony users can speak with someone anywhere in the world, often for the price of a local telephone call. It has been the centre of much attention and optimism because it has the potential to significantly reduce the cost of long-distance telephone communication.

At present it is rather cumbersome to make a telephone call over the Internet, as computers were not designed to support it. The other main disadvantage is that quality, although improving, is not as good

as that of the PSTN (Public Switched Telephone Network).

The PSTN is a circuit-switched network that has been optimised for real-time or synchronous voice communication with a guaranteed QoS (Quality of Service). It guarantees the QoS by dedicating a full-duplex 64kbps circuit between the parties of a telephone conversation. Since the bandwidth remains constant whether or not the involved parties are speaking, the cost of a call on the PSTN is based on distance and time.

The Internet is based on packet-switched technology, so no dedicated circuit is set up. Because of this, the quality of VoIP is degraded somewhat compared to PSTN telephony. In spite of this disadvantage, many callers are more than willing to tolerate a slight reduction in quality in exchange for inexpensive calls.

As traffic prioritisation schemes improve, it is hopeful that VoIP will improve to such a level as to be indistinguishable from traditional telephony.

Because of the interest channelled towards VoIP, the provision of this service by ISPs will be essential in order to attract many customers. The threat of this service to telcos (telephone companies) has seen the entry of many of them, often by ISP acquisition, into the service provision market. Telcos and their entry into the ISP market will be discussed in section 4.3, Telco SWOT Analysis.

The use of FaxeIP (Fax over IP) is already well underway. Although fax is generally closely associated with the telephone network, it does not require real-time transmission. Because of this, there is no reason why FaxeIP should not be used. It is the simple transmission of data (which need not have a dedicated channel) over the Internet, and can be very cost-efficient compared with traditional fax.

2.5 Integrated Voice/E-mail/Messaging

A number of mobile telecommunications companies have already begun to offer some sort of integrated system, allowing customers to check their e-mail over their

mobile phones. These services may also allow the sending of messages from the Internet to a mobile phone directly.

The Short Message Service (SMS) allows users to send short e-mails or to notify the recipient to log into their e-mail account in order to receive an urgent e-mail or file.

Many companies, including Vodafone, Deutsche Telekom, and T-Mobil (partnered with T-Online) will automatically notify their customers when they have received an e-mail, usually giving date, sender and subject, provided they have the right software installed on their PC.

Deutsche Telekom have an extension of the above, by way of their NOVICE system, which uses voice-synthesis software to convert the e-mail messages into speech, and customers can have their messages read over the phone to them.

Other companies provide services whereby information such as football results or stock market quotes can be obtained on mobile terminals via SMS [2].

The demands of the mobile user are readily listened to, as the mobile telephony market is already so large, and is probably the fastest growing market in the world. The integration of mobile and Internet services is likely to grow rapidly, particularly when affordable wireless broadband technologies are available.

It is presently possible to use a mobile phone to access the World Wide Web, but is painfully slow and extremely expensive. Cisco Systems and Motorola recently announced a joint project to deliver a reasonable wireless Internet service, investing up to \$1 billion over the next 4-5 years [5].

This was announced the same day (8 February 1999) as Motorola, Nextel Communications, Unwired Planet and Netscape Communications gave details of their plans to offer a wireless telephone package combining voice, data and Internet services [6].

2.6 Web Hosting

The idea of web hosting can be broken down into two areas: web page hosting,

and the actual hosting of networks attached to the Internet.

2.6.1 Web page hosting, where an ISP will offer server space to a customer, is not a new idea. Some ISPs have been offering small amounts of web space, either at a price or for free, for a few years. However, it now appears that all ISPs will offer a reasonable amount of space (usually about 10Mb) in any initial package offered to a customer.

Residential users may wish to set up their own homepages for recreational or educational purposes. For businesses, the availability can be very much more important. While many businesses may require Internet services merely for e-mail and browsing capabilities, most businesses now want a web presence, which involves a number of company web pages. Although some establishments (in particular universities and large businesses) choose to set up their own servers, it is more economical for residential users and small businesses to acquire or lease space on an ISP's server.

2.6.2 The other area of web hosting is more complex, and adds much value for the customer.

An intranet is a network (usually belonging to a business) that is connected to the Internet in such a way that its users can use the Internet, but other users on the Internet cannot access the network. This security is usually accomplished by a technique known as firewalling.

The main advantage of an intranet using the Internet is that a company with many sites can use the Internet to connect these sites, rather than leasing lines expensively from the telephone company to ensure privacy.

An extension of the idea of an intranet is an extranet. If a company wishes to allow a customer onto its network, an extension can be made to the intranet to enable this. The customer's computer is then allowed access to the intranet, and that extension is known as an extranet.

A Virtual Private Network (VPN) is a private network that makes use of the Internet, maintaining privacy through the use of a tunnelling protocol and security procedures. Companies today are looking at using a virtual private network for both intranets and extranets [7].

Because leased lines tend to be very expensive, particularly in Europe, there is huge benefit to the company in using the Internet to connect their sites. From the ISP's perspective, intranets, extranets and VPNs are reasonably easy to set up, and can reap significant profits.

2.7 Web Page Design and Consultancy

Many business customers choose to outsource the design and maintenance of their web pages, at least until they believe it is reasonable to employ someone full-time to do the job. Many ISPs will, at subscription, offer to maintain a company website for a price. This does not just involve hosting the web pages, but designing, coding and updating them as is necessary.

It is reasonably easy to create a simple webpage, but many businesses do not want to allocate that job to a member of staff, lest it interfere with their other work. In the early stages, the work involved does not merit an entirely new member of staff, so it is left to the ISP to create a page with necessary company information, news and whatever else the company deems important. The ISP is then responsible for updates to these pages whenever the client requires this.

The amount an ISP charges for this service is dependent on how complex the pages are to be. A simple static page of text and images, requiring infrequent update, will cost relatively little. However, a complex page with Java applets, other dynamic content, forms and complex layout will be reasonably costly to the customer. It is when such pages become necessary that businesses tend to consider employing someone in-house to do the job.

2.8 Bundled/package services

Bundled services can be enticing to the customer who does not wish to go to the trouble of dealing with a separate company for each service or utility they require. 'One-stop shopping' has the potential to be an important area of the future, giving the customer the ease of having one provider for many services.

Bundled e-commerce might involve a package deal comprising web access, Internet services, banking and home shopping along with other services. Although this may not appeal to all, the idea of one bill for many services is often seen as a huge convenience.

Similarly, bundled utilities can be of great convenience. CableTel already offers cable TV, telephone and Internet access for a bundled price, and only one bill is necessary. Because of reduced overheads and administration costs, this type of deal can also be more economic, for instance, CableTel can offer the above bundle for the same price as BT line rental.

Although these deals are attractive, they are usually restricted to certain ISPs – those with the resources to provide them. Telcos that have acquired, merged with, or become ISPs can offer Internet access and services, but for the time being small ISPs cannot offer bundled services unless they set up certain contracts with telcos.

When digital powerline technologies are available, power companies will be able to offer power, telephone and TV services, and there is no reason to believe that they will not enter the ISP market to offer a total bundled service.

2.9 Quality of Service and Reliability

For many Internet users, particularly business users, the quality of service given by the ISP is of particular importance. When using real-time applications such as VoIP and video, it is important that delays are minimised so as not to degrade service. Although the Internet often causes unpredictable delays, new protocols can minimise the delays encountered and ISPs

are in a position to be able to guarantee a certain Quality of Service (QoS).

The current version of IP, IP version 4, does not allow for the prioritisation of traffic. The newer version, version 6, has a class field to distinguish traffic types. Although version 6 has been standardised, it has not yet been deployed.

Used with IP version 6 will be a higher-layer protocol known as RSVP (Resource Reservation Protocol). A host uses RSVP to request a certain QoS from the network, on behalf of a data stream.

For those customers requiring real time services, QoS is to be of great importance.

There are some concerns regarding the use of reservation protocols, the first being the capacity required for the protocols. In many instances, the capacity required will cause overload of switches and be detrimental to carriage. There is also the idea that many customers are requiring capacity reservation over the same pipe, and thus contending for capacity. If the required reserved capacity exceeds the actual capacity, Service-Level Agreements (SLAs, the concept that service providers give their customers a contract for a guaranteed level of network traffic delivery) cannot be kept.

3. The ISP Market – the Near and External Environments

The nature of competition in an industry is a huge determinant of strategy, especially business-level strategy. The profit potential of an industry is determined by competitive interactions. Where these interactions are intense, the profit earned is lessened by the activities of competing. Where they are mild, profit tends to be high.

Michael Porter of the Harvard Business School has identified five basic forces, which together describe the state of competition in an industry [8]:

1. The intensity of rivalry among competitors

2. The extent to which substitute products present a threat
3. The threat of new entrants to the market
4. The bargaining power of the industry's suppliers
5. The bargaining power of the industry's buyers.

In the ISP market, all these forces exist, some more intensely than others.

Fig. 2 shows these forces diagrammatically.

3.1.1 Rivalry Within the Industry

The centre area represents the rivalry in the industry. On the left are the main traditional players in the industry, with an indication that there is a large amount of consolidation occurring between these companies. On the right are the areas in which the market is being fought.

As in any industry, there is competition based on price. If one company can do something as well as another, and for a cheaper price, then the former will have an

advantage and thus be successful in competition. In the US, there appears to be a '\$19.95 per month flat rate' norm, which many companies are offering, although there are reasons to suggest that this will change, as will be discussed in section 6.3, Move to Usage-Based Pricing.

In the basic access/basic services arena, many companies are offering the same deal – access and basic services, and so those that are doing it more cheaply than others will attract customers. Otherwise, ISPs will have to offer something special to differentiate them from others.

As discussed already, guaranteed quality of service is of great importance where real-time traffic is concerned.

The availability of service-level agreements will soon be ubiquitous, and acquisition of customers will be fought over price of QoS rather than availability.

The speed of access, although improving with each new technology, is still far from being satisfactory.

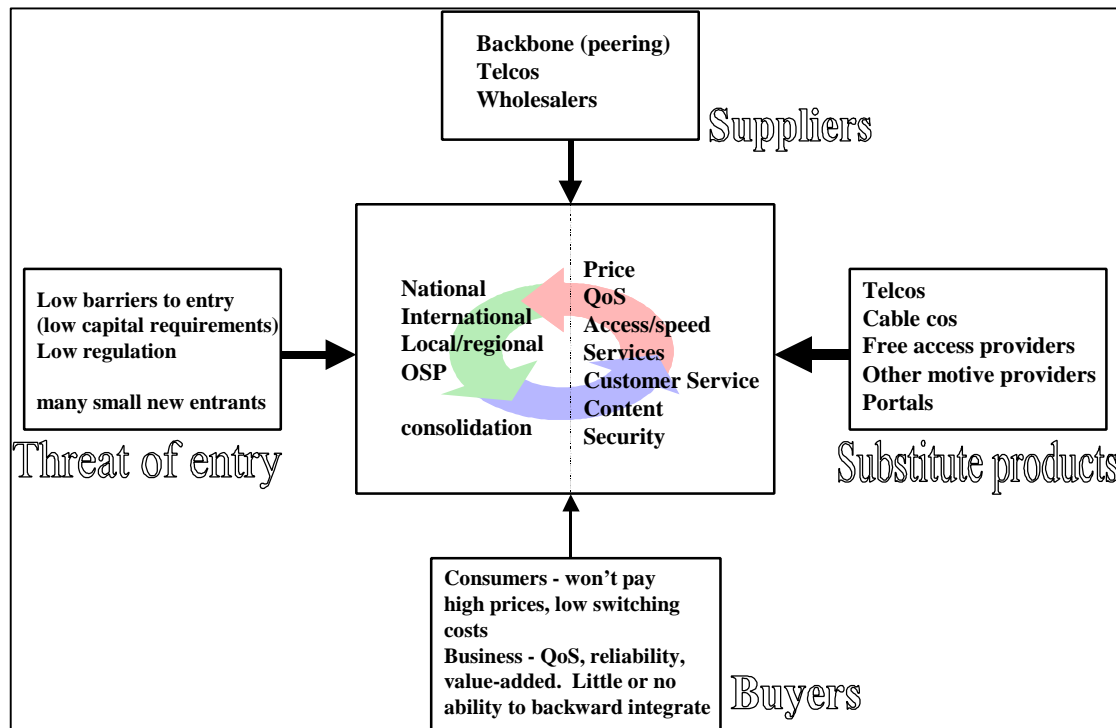


Fig. 2 Porter's 5 Forces Model for the ISP Industry

The Internet can be seen as a series of bottlenecks, with delays occurring at each junction. The speed of an Internet connection is also only as quick as the speed of its slowest link, which is usually the last mile from the ISP to the home. If an ISP can guarantee a certain speed to a customer, he may be willing to pay more for the privilege.

With the constant increase in bandwidth, it might be expected that at some stage there will be no shortage. Although this eventually may become true, the present increase in bandwidth is paralleled by an even greater increase in desire for bandwidth. Those companies that are able to keep up with newer, faster technologies are more likely to be able to keep up with the needs of their customers.

Services, as described previously, are the main area in which the market is being fought now. Basic services have become commodities and customers want more for their money. 'Value-add' is the key phrase, and if it does not add value, then customers will not pay for it.

Emerging in all industries in the recent past has been the need and desire for good customer service. Because customers may want to be online at any time, there is a distinct need for a 24 hour/7 day customer phone service. Many ISPs offer substantial online help, which may be of use, and convenient, to customers. However, if a connection cannot be made, online support is of no use.

There has also been an emphasis on customer support in the last year, when many computer-illiterate users joined the Internet. As computer familiarity decreases, the requirement for customer support increases greatly.

Prior to last year, most ISPs focussed largely on providing access-oriented services and have left content-related services to the online providers.

The problem ISPs have with content is that their network engineering skills have little relevance when it comes to building content. However, it has been established that content is to be one of the main differentiators in the ISP market. Those

that can secure lucrative and exclusive deals with popular content providers (entertainment companies, newspapers, music companies, stock market information) will have a distinct advantage over those that cannot.

The acquisition of Netscape Communications by America Online (November 1998) and the recent merger of @Home Network and Excite Inc. (January 1999) [9] are indicative of the fact that ISPs are moving into the content market.

At the same time, content providers and portals are looking to join the ISP market, and partnerships and acquisitions are the easiest way for them to join each other's market.

Lycos, which has been in talks with potential suitors such as NBC, Bertelsmann, Microsoft and Time Warner, will most likely be acquired in the near future. Although nearly as popular as Yahoo! (in terms of usage), its market capitalisation is just \$5.5 billion compared to \$33 billion for Yahoo! [10]

For business customers, security is a big issue. A business connecting to the Internet does not want its integrity to be compromised, and so will shop around until it finds an ISP that can as-good-as guarantee security. No matter how secure a connection appears to be, there is always some chance of an unauthorised user making his way over the connection. The only way to ensure absolute security is not to connect to the Internet at all.

Although the market is very segmented, there is an enormous number of companies providing Internet services. An explosion in the number of ISPs over the last few years has meant intense rivalry within the industry. Because there is such an enormous growth in the customer base, the market is still far from saturation. This is an attraction to still more companies wishing to enter the market.

3.1.2 Threat of Substitute Products

There is a tremendous attraction for companies other than ISPs to offer Internet access and services, especially if they

know they can enter the market at a high level.

Telcos have the resources and telecommunications know-how to be successful in this industry. They are also aware of the threats of not being a part of this industry, and are entering at a tremendous rate, either by acquisition, merging, or simply becoming ISPs. Their strategic positioning will be discussed in section 4, Who are the Key Players?.

As with telcos, cable companies see an opportunity that they can take advantage of. They can provide similar services, and sometimes at a reduced rate. They can offer bundled services which are most convenient to some customers. These too, will be discussed in section 4.

A number of free access providers launched in the US, have been advertising-based and have been unsuccessful. Companies such as @Bigger.net have granted free access to customers agreeing to have an advertising window active on their screens, and use targeted advertisements in order to fund their free service. However, this alone does not seem enough to fund the service, @Bigger.net going bankrupt twice within the space of a year.

In the UK, Dixons' Freeserve service was launched in September 1998, and is already the biggest ISP in the country, with 900,000 subscribers (January 1999). Dixons have many benefits emanating from this venture.

Their computer sales have increased since the launch of Freeserve, as customers are now more likely to buy a computer if they know they can connect to the Internet for free.

They have also adopted the strategy of distributing Freeserve's software in Dixons stores and other stores of the Dixons group, thus attracting potential customers into their stores.

There is tremendous ease of collection of data, which, without the Internet, is both time-consuming and expensive to generate. Each web site a customer visits can be noted, and a detailed profile of each customer can be easily built up.

Many new users, particularly those with little computer literacy, require much customer support. Dixons are generating profits here by charging £1 per minute for technical support.

Most importantly, Dixons are receiving a percentage of the revenue generated by BT for the local calls made in using the Freeserve service. Because local calls tend to be free in the US, no such agreements could be made, and this may suggest why such companies have failed to survive there.

In spite of all these points in favour of Freeserve, other aspects threaten its future. It is my own experience that the service has become incredibly slow recently, presumably due to overloading of their servers. With the emergence of a number of new free ISPs, one cannot afford to offer an unsatisfactory service.

A regulatory issue is perhaps the more threatening for free ISPs. Dixons can offer a free service because of the way in which the money paid for calls to local rate numbers (0345 and 0845) is distributed, BT getting a proportion of the money and the connecting operator getting the remains. These numbers were never intended to be used by ISPs, rather by companies offering information and service lines, and although they work very well under light load, large customer numbers and long holding times associated with Internet usage are causing problems. Next month (March 1999) the telecommunications watchdog, Oftel, is to ask the industry for ideas how to solve this problem. It is likely that BT will receive more money to offset the cost of handling large amounts of calls to ISPs, therefore making it harder for providers to offer a free service [11].

Non-technical companies have seen the opportunity to develop a web presence beyond just web pages. Companies such as Tesco have entered the ISP market, but not necessarily to make money from provision. As with Freeserve, Tesco enjoys the ease of information gathering regarding their customers. There is also the opportunity to develop an online

storefront. Tesco has also recently begun to offer a free service to its clubcard holders [12]. Supermarkets tend to have a name people know and respect. They have customer awareness and experience dealing with a large customer base. There also tends to be a great customer loyalty towards supermarkets, which is why they are moving towards banking, and now Internet service provision.

A portal is a gateway to the World Wide Web that is, or proposes to be, a major starting site for users when they get connected to the Web. Portal companies have started to show an interest in service provision. Because there is to be a great differentiation based on content, portals are setting up partnerships with ISPs, or becoming service providers as well as content providers. Yahoo! has launched a free access service in an attempt to win market share. It has also acquired GeoCities, a provider of free web sites, for \$4.6 billion (January 1999) [13].

The above entrants are capable of providing the same services as ISPs, usually at a discounted price or for free. Although they may not have the experience of established ISPs, they still pose a significant threat, particularly as access and basic services become commoditised.

3.1.3 Threat of New Entrants

Due to the nature of the ISP market, the threat of new entrants is reasonably strong. There are low barriers to entry - all that is needed to become an ISP is a small amount of capital and some technical know-how. Much of the ISP's activity can be outsourced, which can reduce initial costs.

Regulation in this area is low, meaning that anyone wanting to enter the market can do so easily. Due to the concept of interconnection, companies need not own any sort of network - they can use other networks at a price.

There have been, and continue to be many new entrants to the market. In the last 18 months, the number of ISPs has levelled off. However, there has been a tremendous number of mergers and

acquisitions within that time, suggesting that for every merger or acquisition there has been a new entrant.

Although many of these new companies will fail to survive in the long run, those that find a niche market and provide a satisfactory service will always have a sufficient customer base to continue.

3.1.4 Bargaining Power of Suppliers

The suppliers to ISPs are those that own the networks. These tend to be telcos and backbone providers. Backbone providers generally own what is the absolute backbone of the Internet, and control routing and switching of traffic. Telcos own the local loop copper pairs, which most customers use to connect to their ISP, the lines that ISPs lease to connect to the Internet, and much of the Internet backbone.

Large ISPs are often the suppliers of capacity to smaller companies, and the idea of peering and interconnection agreements between ISPs will be discussed in section 6.2, Interconnection and Peering Agreements.

Because it is impossible for every ISP to build their own entire network, it is necessary that companies use the existing networks. They have to do this, which gives the suppliers some power. However, because there are many suppliers offering the same service, this competition has led to their power being lessened.

3.1.5 Bargaining Power of Buyers

Although an individual consumer has little or no say about how much an ISP charges, due to the rivalry within the market, ISPs generally have to offer their services at reasonable prices. They will lose their customer base if they charge more for a service someone else provides more cheaply. Switching costs are low, and so churn rates are high.

Businesses have a little more bargaining power, particularly if they are a significant client of the ISP. However, if a business is happy with its ISP it is unlikely to change, and because there is essentially no ability to backward integrate, the customers tend to have little bargaining power.

3.2 The External Environment - A PEST Analysis

A PEST (Political, Economic, Sociological and Technological) analysis is a scan of the outside environment to try to spot changes that might impact upon business. These changes might be seen as opportunities or threats.

P – Political

This can be formal or informal.

Formal refers to government and regulation. Informal refers to areas outside of government where political activity occurs (such as the media).

E – Economic

This refers to the nature and direction of the economy in which a business operates. It can be basic up/downswings in the general level of economic activity, or changes related to structural change within relevant sectors.

S – Sociological

This can refer to demographics, lifestyles, social values, culture and the like.

T – Technological

This relates to research, development and operations. The emergence of a new technology can dramatically impact upon an industry.

ISP PEST Analysis

<p><u>Political</u></p> <p>Low regulation now Responsibility for content Access to schools, libraries, hospitals Universal service</p>	<p><u>Economic</u></p> <p>GDP Structural change since telecoms deregulation Recession: less computers bought? less spent by consumers and providers?</p>
<p><u>Sociological</u></p> <p>Language barrier Reluctance to accept new/foreign technology Demography: age (changing), ethnic mix Geography: urban/rural</p>	<p><u>Technological</u></p> <p>Rapidly changing technologies and services fuelled by the Internet: transport, switching, backbone, local loop Disruptive technologies Reliance on technology</p>

Fig. 3 ISP PEST Analysis

3.2.1 Political: the regulation of the Internet and associated businesses has always been low. This has allowed for the

Internet to flourish without being stunted. Low regulation of ISPs has meant low barriers to entry, and hence intense competition in the market.

There are many areas in which the regulator may have an effect.

Presently, ISPs are not responsible for content on their networks up to a certain point. If a customer stores offensive material on their web site, the ISP has no obligation to know of its existence or to remove it. If another user complains about this material, then the ISP can remove it without the compliance of the owner, or it is seen as a publisher of the material, and then becomes responsible.

Because there is no censorship of the Internet, and many users are concerned, it is possible that in the future ISPs will work in conjunction with the regulator to try to eliminate some content.

Presently free access is given to schools, universities, libraries and hospitals. It is the choice of the government which establishments to grant free access to. If any of the above are denied access in the future, a whole new target group will open up to ISPs. Similarly, if another group is granted free access, many ISPs may lose important clients.

The idea of universal service is one that has not really been discussed in relation to the Internet. Because the Internet is growing at such a fast rate, it is likely that it will soon be seen as so important that every citizen should be granted cheap and easy access, as they are to the telephone network.

Due to the breakdown of the NAPs (discussed later, see section 6.2), ISPs are entering into private agreements regarding the carriage of traffic from other providers.

Small ISPs tend to serve rural areas. This is because large companies seem to see these areas as 'not worth bothering with', even though a high proportion of small companies are making profits. Because small companies do not own their own networks, they have to lease capacity from others, and pay premium rates for this. The power of large companies may be

such that high charges to use their networks will have a severe effect on smaller companies, and oust them from the market. If this begins to happen, it is likely that there will be some intervention from the regulator. The regulator will not be concerned about the well-being of small ISPs, rather the ability of users in rural areas to connect to the Internet. If small companies are put out of business, then the only opportunity for the rural user would be to connect long-distance, which would be too expensive – not considered a universal service.

Because there has been so little regulation of the Internet, it cannot accurately be predicted how regulation will impact when it arrives. There are areas where many companies have lobbied for regulation, e.g. telcos demanding that VoIP be treated as a voice service rather than a data service. However, it is not known how and when any sort of regulation will occur. The above examples may be an indicator of the future, but ultimately, it will be left up to the regulator to decide.

3.2.2 Economic: in any market, the GDP can be an indicator of the potential uptake of a product or service. However, a high GDP has not necessarily meant high Internet penetration, as discussed below (see Sociological Environment).

Since telecommunications liberalisation (1996 in the US, 1998 in most of Europe), there has been structural economic change within the sector. There are many new entrants in all involved markets, and incumbents have begun to lose out to new entrants that have been granted use of the incumbents' networks.

Upswings and downswings in the level of economic activity may or may not have an effect on the ISP market. Although the UK is supposedly experiencing a recession, more computers are being sold than ever before, and more people are connecting to the Internet than ever before. An economic boom may enhance Internet penetration further, but it does not seem that the present recession is having a negative effect on the ISP market.

3.2.3 Sociological: a language barrier may be a deterrent to many from the Internet. Although other languages are now making their place on the Internet, there is still a strong bias towards English, as the Internet has its origins in the US. As other languages become commonplace on the Internet, the ISP market will grow in many countries.

The reluctance to accept new and foreign technologies has stunted Internet growth in some countries with high GDP. For example, Japan is a very wealthy country with an excellent telecommunications infrastructure, but Internet penetration there has been slow. The Japanese, although at the forefront of technological development, are not very accepting of foreign technologies, and this could explain why there is no strong desire to connect to the Internet. Similarly, the French tend to avoid foreign inventions, and penetration there has been low. This can also be attributed to the fact that the French have their own internet information system, Minitel. Before the Internet can be seen as a worthy alternative, it will have to provide much more than Minitel does.

The community of Internet users, in the course of a few years, has turned from one of computer scientists and academics to one comprised of a diverse mixture of cultures, ages and occupations. Access is freely available in most developed countries, and ease of use has become such that anyone owning a computer and a telephone can connect to the Internet with relative ease. Demography and geography do not play the role they used to in determining who uses the Internet, and who would be a likely target for an ISP.

3.2.4 Technological: Internet technologies are developing and improving at an enormous rate. In a feedback loop of sorts, new technologies are fuelling new services, which in turn are fuelling new technologies.

Each part of the Internet (backbone pipes, routers, local loop) is becoming faster, temporarily satisfying customer demand.

Although many new technologies have been hailed as the 'killer application' (Asynchronous Transfer Mode (ATM), videoconferencing, VoIP), these have not shown the uptake expected of them.

The phenomenon of the Internet could not have been predicted, and so it would be folly for an ISP to assume that a new technology capable of totally restructuring the industry may not appear. Such a technology would be regarded as disruptive. Disruptive technologies can be seen as those that initially present a package of performance attributes that, at the outset, are not valued by existing customers. Although the product area may be established, the disruptive technologies' value proposition is usually very different from that which was previously available. When launched, they will be targeted towards a whole new (and non-existing) customer base, one that is happy to pay a lower price and is willing to settle for lower quality. However, the performance attributes that existing customers value will improve at such a rate that the new technology can later invade the established markets. The idea of VoIP as a disruptive technology, and its effect on both the telco and ISP markets is to be the focus of a further study.

In a society that has become so reliant on and familiar with technology, new and better products are being developed continuously, and any ISP that hopes to succeed should be aware not only of what is available, but what is in development and production.

4. Who are the Key Players?

In an industry that involves so many players of all sizes, for the purposes of analysis it is difficult to define exactly who the key players are.

In a huge generalisation, traditional ISPs have been broken down into two key groups: large and small ISPs. Although many factors (revenue, geographical

scope, partnerships, customer base, growth) may influence the perceived size of an ISP, it has been decided to define size merely on the basis of customer base, with a bias towards number of business customers.

Although revenue can be an indicator of size, an ISP with few, but lucrative, business customers may generate more revenue than a company with significantly more, but residential, customers.

Generally the larger ISPs have a wide geographic scope, but specialist companies may have only one POP in each country, and so the most geographically diverse ISP may not actually have a great customer base.

An ISP may be in a number of partnerships in order to increase geographical scope, but may not be such a big company itself.

The growth of an ISP can be indicative of the potential of the company to succeed, but it is not really an indicator of its size.

Therefore, in the following discussion, the size of an ISP is defined in terms of customer base. Because of the profit associated with business customers, a bias has been given towards business customers in determining the size of an ISP.

At present, ISPs of practically every size ranging from a few hundred customers up to many millions of customers exist. However, medium-sized ISPs are being acquired by larger companies, or are merging to become larger. There is a general move in the ISP market towards big or niche, suggesting that within a few years, we will have a market that has a small number of large companies and a large number of small companies, catering for specialised markets.

For the above reasons, and for simplicity, the traditional ISP market has been broken down into two categories: large and small. A small ISP could be considered as one with less than, say, 10,000 customers, and a large ISP, one with more than 300,000 customers. As mentioned, it appears that intermediate companies will disappear.

At present, the two main threats to traditional ISPs are the telcos and the cable companies. These two groups will also be examined in the following sections.

A SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is used to identify where a company should place themselves in an industry, where they can improve, and what they should look out for from their competitors.

Each of the four ISP groups to be discussed (large, small, telco and cable company) have their distinct strengths, weaknesses, opportunities and threats.

Some factors, such as technological change (e.g. the introduction of advanced local access mechanisms) will act as generic opportunities or threats to all ISPs. Many others apply to one or more of the main groups.

4.1 Large ISP SWOT Analysis

<p><u>Strengths</u></p> <ul style="list-style-type: none"> Experience in the ISP market Known name (e.g. AOL) Innovation Peering agreements Experienced personnel Network management and economics knowledge 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> Customer service lacking somewhat No local content Usually don't own infrastructure
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> Relationships with telcos Mergers with content providers Buyout Acquire smaller enterprises Development of web applications 	<p><u>Threats</u></p> <ul style="list-style-type: none"> Entry of telcos/cable companies Some market squeeze Saturation of the market

Fig. 4 Large ISP SWOT Analysis

Strengths: because large companies are often those that have been in the market for quite a while, large ISPs tend to have much experience in the ISP market. They have come to be familiar with a large customer base, and generally know the industry.

A company such as AOL has a known name. New customers who know little about ISPs and the industry are more likely to subscribe to a company whose name they know, rather than look around for a deal that might be more suited to

their needs. This is one of the main reasons that AOL, with all its critics, continues to attract so many new users.

Large ISPs have the ability to carry out their innovation. Although small companies may have wonderful ideas, without resources and capital they are unable to deploy them. Large companies tend to have capital, and that paired with ideas can result in new, profit-making products and services.

Large companies are further up the Internet hierarchy (discussed in section 6.2), and can abuse this position by making smaller companies pay them for the use of their networks. Owning parts of the network can increase this strength.

Large ISPs can afford qualified personnel to deal with complex tasks such as network management and detailed economics. This can ensure a quality service for the customer, and smooth running of the business side of the company.

Weaknesses: in large companies, customer service is often lacking somewhat. This is a weakness in the ISP industry because, as computer literacy among customers decreases, the need for quality customer service increases.

Local content can be a big advantage for many customers, particularly small businesses. Large ISPs have a national base, and do not supply any sort of local content. They may provide content that will appeal across the board, but they are ostracising many customers by their lack of intimacy.

ISPs dealing with customers (as opposed to backbone providers who deal with ISPs) however large, don't tend to own any Internet backbone, meaning that they still have to rely on other providers.

Opportunities: there are massive opportunities in this industry for all companies.

For large ISPs, relationships with telcos are becoming manifold. Telcos want to

enter the market, and ISPs do not want to run the risk of losing out to the telcos, so many partnerships arise.

Mergers with content providers are also occurring. This is the easiest way for both types of company to make their way into the other's market.

Those who set up an ISP before the 'gold-rush' may wish to be bought out. Demon Internet was set up in 1992 and sold in May 1998 to Scottish Telecom for £66m. The owner, an entrepreneur, wished to move from the ISP market and channel his profits into other entrepreneurial ventures.

It has been established that the value per customer of an ISP increases with customer base, from £70-£100 per customer for small ISPs up to £220-£270 for large companies [14]. Therefore, if an ISP acquires a number of smaller companies, its increase in value far outweighs the price of the companies alone. As there are many small companies that may wish to be bought out, there is opportunity here for those that can buy them. Verio has hugely increased both its customer base and its geographic reach by acquiring many small providers.

Because large ISPs have the resources and the know-how, they may wish to develop web applications as well as new Internet technologies. Certain applications could prove to be very attractive, particularly if they were provider-exclusive.

There are usually opportunities for large companies to branch out into other industries. Large ISPs may wish to consider related industries in the general area of computing. When moving into a related area, brand name and customer base can be invaluable.

Threats: the largest threat to large ISPs is the entry of other established companies, such as telcos and cable companies into the market. These companies have good experience, may have large resources, and may have the ability to buy ISPs out.

There is to be some market squeeze, which will result in only those that are providing something special surviving. ISPs can merge, acquire and partner, but there is still the threat of losing out in an immensely competitive market.

Eventually the market will become saturated. This may not happen for some years, but small ISPs that have found a niche will survive, and large ISPs that have sufficient power will survive and there will be no place for others.

Large ISPs are in a position now where they can grow and make a profit, but there are still areas in which they can improve, and they are still at a great risk of losing out to new entrants.

4.2 Small ISP SWOT Analysis

<p><u>Strengths</u></p> <ul style="list-style-type: none"> Ability to change rapidly in dynamic marketplace Intimate services for niche markets Adept at dealing with problems and concerns of customers Understanding and knowledge of customers Features tailored for the market Can take advantage of best tariffs in their area 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> Cannot offer bundled services Purchasing behaviour dependent on profit Marketing generally only by word of mouth Difficult to make money without many business subscribers No control over backbone
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> Move into hardware/software sales Long term contracts Buyout Reselling offerings from larger players 	<p><u>Threats</u></p> <ul style="list-style-type: none"> Shakeout Acquisition Not having capital to expand services Breakdown of peering agreements

Fig. 5 Small ISP SWOT Analysis

Strengths: small companies have the ability to change rapidly. In a dynamic marketplace, this is a great strength. Although small companies often lack capital, with the emergence of a new technology small ISPs only have the problem of updating their small amount of equipment. Larger companies, which may have large capital reserves, must update much equipment, a task that is more labour intensive and time consuming.

The reason small ISPs will survive is that there are niche markets to be catered for, and small companies are in a good position to provide these services. Small companies like to do business with other small companies, so there will always be such a market.

Customer service, which is often so important, is generally of the highest quality from a small ISP. They have an understanding and knowledge (often on a personal level) of their customers, and are adept at dealing with their problems and concerns. Again, this intimacy is of great importance to many customers, particularly local businesses.

Small ISPs can offer features that are tailored for the market, such as local news and information, something a large company cannot do. Although many customers may wish to have the latest Disney or Financial Times information, local news is of equal importance to others.

Taking advantage of the best tariffs in the area is something that small ISPs are able to do. A large national company may set up a deal with a telco or backbone provider, and have to use the same provider all over the country. Although this may give them the best deal in some areas, it is unlikely that it will be advantageous everywhere. A small company may only need to provide service to one location, and therefore can ensure that they get the cheapest deal.

Weaknesses: unlike telcos and cable companies, small ISPs cannot offer bundled services of telephone, TV and access.

Their lack of financial resources means that their purchasing behaviour is dependent on profit, regardless of their growth or potential. There is generally little money available for marketing and advertising, so this has to be by word of mouth.

Small ISPs own no infrastructure and therefore have no control over the Internet backbone. They may be forced to pay high rates for using networks, this being a disadvantage that may put many small ISPs out of business.

Opportunities: the fact that small ISPs know their customers opens up opportunities that are not available to

larger companies. Because it is relatively easy for a company to expand into a related area, there is opportunity for small ISPs to become vendors of software and hardware. They know their customers, and their customers know and trust them, and would likely buy computer equipment sold by them.

As with larger ISPs, buyout is an option. For smaller companies that are threatened by larger ISPs, or for other reasons want to sell up, there are always many willing to buy them.

Although small companies do not have the resources to set up sophisticated services themselves, they may be able to resell offerings from larger players. Securing long-term contracts with larger companies could help provide more to their customer, as well as keeping abreast of what large ISPs are doing.

Threats: threats to small ISPs are mainly generic threats to any small company in a competitive environment.

There is a shakeout occurring in the industry, and the only way for a small company to survive bankruptcy may be to be acquired.

The breakdown of the NAPs, and the introduction of peering agreements (discussed in section 6.2) may lead to the downfall of many small ISPs who cannot afford to use the networks of others.

4.3 Telco SWOT Analysis

<p><u>Strengths</u></p> <ul style="list-style-type: none"> Own infrastructure (backbone and local loop) Understanding of scaled network management Global presence and/or outlook Huge capital resources, both existing and potential Large existing customer base Name recognition Some understanding of their customers Ability to bundle different services (1-stop shopping) 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> New networks not wholly analogous Business processes outdated Aversion to cannibalising existing lucrative business Main focus for regulatory attention
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> Sign deals and alliances to generate economies of both scale and scope Relationships with large ISPs Acquire small/medium ISPs Leveraging revenues at all points of the network Unified service and billing proposition for customer Squeeze competitors on price and service offerings 	<p><u>Threats</u></p> <ul style="list-style-type: none"> Effective marketing and customer service by competition Consolidation amongst competition Technical breakthrough on quality of IP voice Consumer choice Emergence of ITSPs Lack of corporate understanding for the new competitive environment Inability to adapt to volatile market conditions

Fig. 6 Telco SWOT Analysis

Strengths: telcos own the local loop, and often own parts of the Internet backbone. This is a huge advantage because a high percentage of costs can be eliminated.

Telcos have been providers of telecommunications services for a long time, and have accumulated knowledge of network management, dealing with large customer bases, and the general outlook of a multinational company.

They already have a large customer base, and due to loyalty and convenience, many customers of a telco will be happy to choose that company as their ISP, if possible. Because telcos can offer the convenience of bundled services, they may win many Internet customers from their existing base.

Telcos have names that are known. They also have huge capital resources, both existing and potential, and are big enough to undercut many other companies on price.

There is enormous potential for telcos wishing to enter the ISP market, but also many disadvantages that should be taken into account by the new entrants.

Weaknesses: the weaknesses telcos may experience on entry into the ISP market will be due to its expectation that telecommunications provision is the same across the board. They may fail to understand that the new networks and technologies with which they are dealing are not wholly analogous, and thus use processes which are unsuitable or outdated.

Many telcos may steer away from providing VoIP. There is huge profit opportunity in the provision of VoIP, but some telcos will have an aversion to cannibalising existing lucrative business. Although this may ensure maximum short-term profits, it will undoubtedly cause the companies to lose out in the long term.

Because of the controversy surrounding VoIP, telcos are the main focus for regulatory attention in this area. Although this may only be seen as a threat, it is

more than likely that VoIP will be regulated soon, disadvantaging telcos operating as ISPs somewhat.

Opportunities: telcos entering the ISP market will experience many of the opportunities of large ISPs, such as mergers, and acquisitions of small and medium-sized companies. Deals and alliances may be formed to generate economies of both scale and scope.

Large telcos that own much of their network will have the opportunity to leverage revenues at all points of the network: local loop, leased lines, backbone, as well as avoiding having to pay others to carry their traffic.

Because they have much experience in the telecommunications industry, and because they can offer one-stop shopping (bundled services), they may be able to squeeze much of their competition on price and service offerings.

Threats: because the telcos are to enter the ISP market at a high level, there will be not only competition amongst themselves, but competition from the established players.

Large ISPs have been in this market for a number of years, and know their customers. They have an understanding of the ISP corporate environment that telcos will have to learn. Customer service and marketing by their competition will be proficient.

The technical breakthrough on quality of VoIP has led to the emergence of ITSPs (Internet Telephony Service Providers), companies specialising in VoIP. With such a strategic focus towards one service, these companies may grab a large share of the VoIP market from telcos and ISPs.

Large companies may not be able to adapt to volatile market conditions and to update to the latest technologies as rapidly as smaller companies, and in such a dynamic area, this can be a great threat to them.

4.4 Cable Company SWOT Analysis

<p><u>Strengths</u></p> <p>High speed available Can offer bundled services (1-stop shopping) Own infrastructure High penetration rates in US and Western Europe Media-rich local content</p>	<p><u>Weaknesses</u></p> <p>Many homes have cable, but few businesses No experience with business customers Little consumer awareness Opinion of weak customer support Many customers contending for capacity Many networks have only 1-way broadcast No experience with quality of service guarantees</p>
<p><u>Opportunities</u></p> <p>Interactive content/entertainment Expand to businesses Mergers/Acquisitions</p>	<p><u>Threats</u></p> <p>High investment costs XDSL, emerging local loop technologies Digital TV</p>

Fig. 7 Cable Company SWOT Analysis

Strengths: cable companies have a distinct advantage in that they can offer high speed Internet access over their own existing network. The idea of leasing a line or employing some sort of fast local loop technology is not an issue.

Bundled services are also something that cable companies can offer. As mentioned previously, CableTel are offering a monthly deal providing telephone, cable TV and Internet access for one price, and with one bill.

There are high cable penetration rates in the US and Western Europe. The number of houses that can be connected to cable (i.e. are on the cable path, but not connected) is also far greater than the number actually connected.

Media-rich local content can be provided by cable companies, either on TV or on the Internet. As in the case of small ISPs providing local content, there is demand from local businesses for this sort of content, and cable companies are in a prime position to provide it. Many cable companies already have deals with local content providers such as local news channels and local newspapers.

Weaknesses: although many homes are connected to cable, in some countries few businesses are, and may wish to employ other methods of connection. Cable companies also have the disadvantage that they have no experience working with

business customers, and have little awareness of their residential customers. They also have no experience with quality of service guarantees.

Cable companies will have no problem telling customers of their cables' capacity, but what they may neglect to tell them is that a number of customers may be contending for this capacity. A 10Mb cable is attractive, but if a large number of users will be using this cable simultaneously, the actual capacity per customer is very much decreased.

Because cable systems were designed to transmit one-way television signals, many networks are only configured for one-way transmission. Although most Internet traffic is downstream, a channel is required for upstream traffic, such as sending http addresses etc.

Opportunities: there are opportunities for cable companies in offering interactive content and entertainment. Their networks are actually capable (when correctly configured) to handle two-way, high-speed traffic.

Because cables do not reach many businesses, there is an opportunity to expand to businesses to try to win their custom. However, this may involve significant sunk costs, which most cable companies simply cannot afford.

Threats: the necessity for high investment costs may prove to be the downfall of many cable companies. Although cable companies make enough money to survive, they do not tend to have large capital resources needed for large-scale expansion.

Emerging high-speed local loop technologies such as xDSL will have an effect on the cable industry. With the deployment of other high-speed technologies over existing infrastructures, cable systems will no longer have the access speed advantage they have now.

Digital TV, although indirectly, may be a big threat to cable companies offering Internet access. When the uptake of

digital TV becomes significant, many customers will move away from receiving their TV by cable. Because TV is the most notable service on cable, it is unlikely that customers moving from cable TV to digital TV will stay with their cable company for the sake of Internet access, particularly when other high-speed options are available.

As with the emergence of digital TV, cable ISPs are particularly threatened by new local access mechanisms discussed in section 1.2.

5. Threats to ISPs

Broadly speaking, ISPs face threats/challenges in four inter-related areas: customer relations, technology, regulatory framework, and resources [4].

<p><u>Customer Relations</u></p> <p>Volatile customer satisfaction Customer churn, customer trust Need for differentiated services</p>	<p><u>Technology</u></p> <p>Integrating ever-changing technologies Delivering new services in real time Developing and managing rapidly expanding infrastructure</p>
<p><u>Resources</u></p> <p>Telcos have more resources Acquiring capital investment for infrastructure Hiring experienced employees</p>	<p><u>Regulatory framework</u></p> <p>Censorship of the Internet Responsibility for content Possible charges for services such as VoIP Uncertainty</p>

Fig. 8 Threats to ISPs

All four areas are of significant importance.

5.1 Customer Relations

From a service point of view, good customer relations are necessary. There tends to be volatile customer satisfaction of ISPs, and no matter what technology and services are available, customers will not stay with a provider they are dissatisfied with.

Customer churn is a huge problem, particularly among large ISPs, and can be over 30%. Because it costs so much to win customers, it is very important that an ISP holds on to the customers it has.

Because customer demands are only temporarily gratified by new technologies, there is always a need for new services in order to keep the customer satisfied.

5.2 Technology

For obvious reasons, technology is of significance.

ISPs have to figure out how to integrate the available technologies and provide them in a satisfactory way. This is an ongoing challenge, as technologies continue to change.

As new services emerge, ISP must come to terms with delivering these in real time. They must always be aware of the developments and management associated with a rapidly expanding infrastructure.

5.3 Resources

Large ISPs, particularly those which are part of another company such as a telco, have large amounts of capital. This generally enables them to acquire necessary resources. Issues such as upgrading technology may be a huge challenge to small ISPs who, although they may be efficient and profitable, cannot afford to make large investments. Acquiring capital investment for infrastructure will be a great challenge for many ISPs.

The lack of experienced employees may also be a problem. In such a new area, it is not surprising that the number of totally qualified potential employees is low. This will, of course, change.

5.4 Regulation

The intervention of the regulator will raise new issues and challenges. Because the Internet is so unregulated, it is hard to predict what effects regulation will have, but it will probably result in some sort of collaboration between ISPs and regulators regarding content control and other issues. Charging above that of today is also likely to result, associated with value-added services such as VoIP.

Regulation of the Internet has also been discussed in section 3.2.1, concerning the political environment.

6. Trends in the ISP market

As the industry is maturing, differentiation and financial performance are becoming increasingly important. This is driving five major trends in the market:

- Consolidation: mergers and acquisitions
- Introduction of enhanced/value added services
- Company to company interconnection and peering agreements
- Differentiation based on content
- Web hosting

6.1 Consolidation

The trend of consolidation has been evident over the last 18 months, with many partnerships arising between ISPs, and between ISPs and other companies wishing to enter the market.

Large companies have been merging with other large companies, and have been acquiring medium-sized and small companies. This is a quick way to increase geographic scope and subscriber base, and hence to increase both the financial value and customer value of the company. To most of the larger companies, small rural ISPs are not seen as worth acquiring, however Verio has built up a huge geographic scope and subscriber base through the acquisition of small ISPs, and has made a great success of it, now offering services to 41 of the top 50 US Internet service areas (January 1999) [15].

As discussed in section 3.1, there looks to be an emerging differentiation based on content. Content providers and large ISPs are partnering and merging in order to enter each other's market as quickly as possible.

The reasons for the entry of telcos into the market are detailed in the Strengths part of section 4.3. They are entering the market quickly by acquiring ISPs and making partnerships with them.

The total number of ISPs in the US (the oldest and largest market) has stabilised. For each merger or acquisition there is a

new entrant. Many of these will be squeezed out over the next few years, but many will find a small market in which to thrive.

The new enhanced and value-added services which are to be offered by ISPs are detailed in section 1, 'What Services do ISPs Offer?'

6.2 Interconnection and Peering Agreements

Peering is the mutual sharing of resources through direct links between two ISPs, or an ISP and an exchange which acts as a hub peering point for several ISPs.

If one ISP has a packet for another, and they have a peering link or both participate in a peering exchange, then the packet is sent via the peering link rather than their external Internet link. There is no traffic cost.

Peering in this way saves both ends money, as the packets do not travel through external providers. It also reduces bandwidth requirements on the default Internet link, which may be more relevant to smaller providers.

Over the last couple of years, due to the explosion in Internet traffic, the main exchange points of the Internet backbone, the Network Access Points (NAPs) have become congested and many ISPs have chosen not to use them anymore. It is also the case that they have not received funding from the National Science Foundation since last year, 1998, and so there has been a move to privately operated exchange points.

These arrangements began as a means of convenience and are now breaking down as the larger ISPs and backbone providers realise that they can begin to charge other providers for using parts of their network.

A number of peering arrangements are explained below [16]:

6.2.1 SKA (Sender Keep All)

This is the method that existed while the NAPs were in full use. The Internet was a 'free for all', and everybody used

everybody else's network as if it were their own. This was either because a network owner did not care if traffic symmetry existed between ISPs, or because the overheads involved with metering and settling would outweigh the convenience of having no agreements.

6.2.2 Peer-to-Peer Bilateral

Here peering agreements exist between ISPs of similar size, experience, technology and customer base. These criteria usually guarantee traffic symmetry.

Although a large ISP might wish to enter into such an agreement with a smaller company for advantages such as less traffic from that company, there are also disadvantages. A smaller ISP may produce less traffic, but it is also likely to have a lesser network - both in terms of size and technology. Even if the technology is up to date, the disadvantage of a smaller network is that there will be more hops in traffic delivery (due to more networks being traversed) and this is likely to cause undesirable delays.

6.2.3 Hierarchical

Large companies that own much of the network are now beginning to treat smaller ISPs as clients. Similarly, backbone owners will treat large ISPs as clients.

The huge disadvantage to small ISPs is that they will have to pay for the use of others' networks, while not receiving any compensation from larger companies whose traffic they may carry. It is also the case that they may not be able to avail of wholesale deals, and will then pay more per traffic than larger companies. This may be a case for regulation.

6.2.4 Third Party Administrator

A paid administrator may set up and manage an access point, and for a fee any ISP may join and use that point to interconnect with others. Payment is by way of a fee rather than pay-per-traffic.

These types of interconnection points are fast becoming congested bottlenecks for two reasons: there are no criteria for joining these points, and because ISPs are not charged per traffic, they are sending as much as they can through them. The

following is a solution of sorts, but may be biased against smaller companies.

6.2.5 Private Peering

As above, except there is no administrator - all companies involved manage a point. The joint management also chooses which companies may join the point, and so are safeguarding against congestion by limiting the number and hence the amount of traffic.

The ideas of differentiation based on content and web hosting have been detailed throughout.

Two further trends that are expected in the ISP market, but have not yet begun to occur, are the move to usage-based pricing and the specialisation and service positioning of ISPs.

6.3 Move to Usage-Based Pricing

The original pricing model which came about in the US was flat rate pricing - a subscriber paid a flat fee and was entitled to unlimited usage. Because local calls tend to be charge-free, many subscribers have taken advantage of this. They will stay online for long periods of time, even if they are not using the Internet, and thus hold up resources that other users are contending for. Some ISPs have begun to time these users out after 15 minutes of inactivity, but this is still causing much inefficiency.

The reason for flat-rate pricing, as mentioned above, is that billing is easy, and customers like to know their budget.

Because usage of the Internet has become so widespread and heavy, ISPs are beginning to realise that the £19.95 pricing model so popular in the US simply cannot continue if they want to be profitable.

Until recently, billing other than flat-rate billing was complex, and insufficient software did not exist for many pricing structures. However, software has been developed with the ability to bill for quality of service, services, time of day usage and various other aspects that may effect billing [17].

The availability of this software will be a great push towards usage- (and service-) based billing.

6.4 Specialisation and Service Positioning

The term ISP is used very loosely. Any company supplying access or services falls under the description 'ISP'.

The present strategy of offering access, content, services etc. has a lack of strategic focus, and therefore may lead one to believe that companies focused on just one aspect of Internet service provision, working together, may be able to provide an end product of high quality to the user. If this were to occur to some extent, ISPs would fall into two broad categories: network-focused and content-focused.

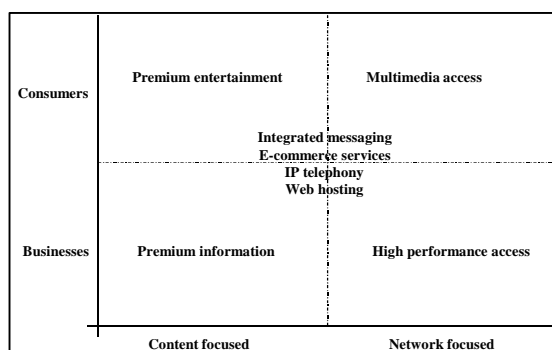


Fig. 9 ISP Specialisation

Network-focused companies would focus on connectivity for businesses and other ISPs. They would be able to offer business packages with service-level agreements.

For the consumer, these ISPs would integrate technologies to offer premium multimedia access to the Internet.

Content-focused companies, in their purest form, would have no network at all. They would manage customer accounts and operate services, while the connectivity services would be provided by a network-focused ISP.

Premium information would be provided to business customers, and premium entertainment to consumers.

It is believed that, with such strategic focus, these companies, working together, would offer a better service, both in terms of content and network quality, than a company trying to cater for everyone.

7. Conclusion

The above has discussed the structure of the market, looking at competition, regulation, introducing its main players, and looking at its trends, both those that are occurring and those that look likely to emerge.

Mergers and acquisitions have shown to be popular methods of growth, both in geographic terms and in terms of customer base. These have been occurring not just among ISPs, but among many companies entering the market. In spite of the large amount of mergers, the total number of ISPs has stabilised due to the huge number of new entrants.

Telcos, cable companies and others have entered the market, either by mergers and acquisitions, or by creating ISPs themselves. These companies, amongst others, are proving to be an immense threat to existing ISPs.

There has been a tremendous emphasis on value-added services and on content. Basic services have become commodities and customers are looking for new services to add value. ISPs securing deals with popular entertainment and information companies will have a great advantage in winning customers.

Additional offerings such as quality of service, bundled services, banking, e-commerce etc. are also becoming attractive to customers.

There is a clear change of strategy both within an ISP and between ISPs.

Pricing models are changing, as are service offerings. It is predicted that many companies may wish to specialise in one part of the market rather than trying to

provide everything involved with service provision.

Between ISPs, agreements regarding carriage of traffic have arisen due to the breakdown of the NAPs. These agreements will convenience some companies, but may put others at a disadvantage.

All in all, Internet service provision is an extremely complex and dynamic area, and detailed investigation of any part of it is beyond the scope of this report.

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