

INTERNET SERVICE PROVIDERS

CRUISING THE INFOHIGHWAY

Ever wondered why you need an ISP, or what it means to the Internet...

In another attempt to garner more subscribers and as an example of their commitment to customer service, your Internet Service Provider (ISP) just announced that they now have a 'direct gateway' to the Internet.

But weren't they connected to the

Internet all along?

The Internet is a worldwide network of computers connected to each other. To get on to the Internet, you need to connect to someone who is already connected. That someone for you is your ISP. When your ISP says that they now have a direct gateway to the Net, they mean that they now are bypassing their previous connection provider.

Like cable providers do for pay-channels, ISPs maintain expensive links to the Internet, and then distribute the cost among their users.

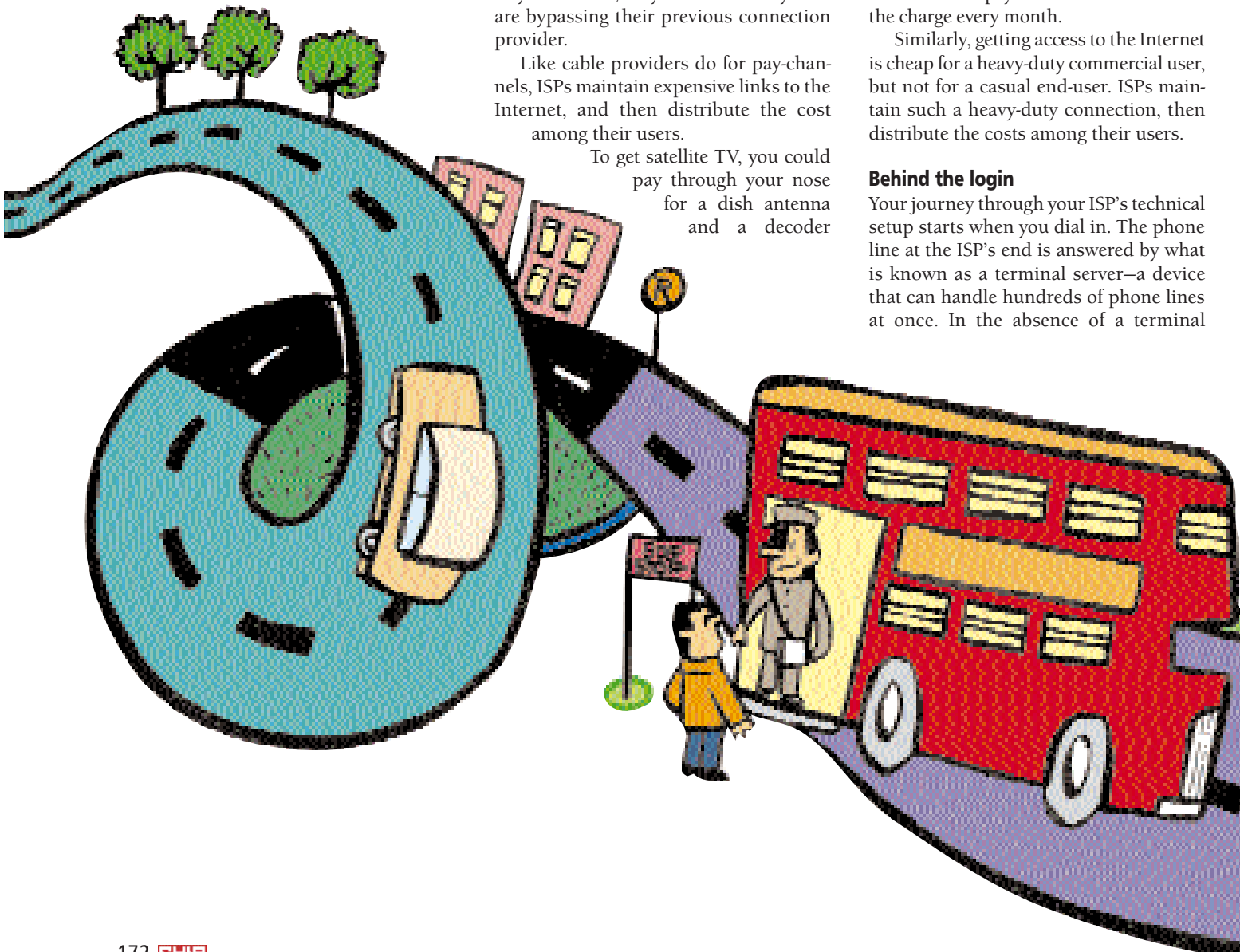
To get satellite TV, you could pay through your nose for a dish antenna and a decoder

chip for every channel that you want to watch, install it on your terrace, and then watch TV for a couple of hours every evening. If your neighbour wants satellite TV, he gets his own dish and set of chips. Alternatively, you could pool the cost of installing a cable network with your neighbourhood and pay less than a hundredth of the charge every month.

Similarly, getting access to the Internet is cheap for a heavy-duty commercial user, but not for a casual end-user. ISPs maintain such a heavy-duty connection, then distribute the costs among their users.

Behind the login

Your journey through your ISP's technical setup starts when you dial in. The phone line at the ISP's end is answered by what is known as a terminal server—a device that can handle hundreds of phone lines at once. In the absence of a terminal



server, a computer with a serial port extension card and multiple modems is used. The latter places heavy demands on system resources and is unreliable, and therefore rarely used today in spite of being cheap (the only specialised hardware required is a serial extension card).

Unlike terminal servers that are dedicated machines with external modems, the modem concentrator, a derivative of the terminal server, has modems built in along with the server in one neat box. Modem concentrators are expensive but are easy to maintain and therefore are the popular choice in the US.

Once connected, the terminal server asks for authentication. Once 'logged in' (authenticated), you are effectively connected to the Internet. The user authentication process is technically not a necessary step—it is required only for the ISP to maintain account usage statistics.

Choosing the 'router'

Data transmission between the ISP and the ISP's upstream provider goes via a router, which can be of two types: software and hardware. Software based routers are standard Pentium 200 MHz or better computers running some form of Unix. They work well for smaller networks but strain easily when the traffic increases. Most ISPs use dedicated hardware routers. These devices are expensive and tough to configure, but are very reliable once set up properly.

The communication medium between your ISP and the ISP's upstream provider

GLOSSARY

Backbone provider: A company that maintains a huge cross-country network. In India, VSNL is one such example.

ISDN/T1: Types of data transmission media. An ISDN (Integrated Services Digital Network) line is a digital fibre-optic medium that can transmit data at 64- or 128-Kbps, over twice the bandwidth of a normal phone line. A T1 line is also a digital medium, and can do up to 1 Mops and is now standard for companies in the US. A T3 line is thirty times as fast as a T1 line.

Router: A router is a device that connects one network to another. While software implementations are possible, routers are generally hardware devices with proprietary operating systems. They analyse all traffic passing through the network, determine what data packet goes where, and send the packets on their way.

Server: A server caters to client computers. Unlike as in the past, servers no longer need to be dedicated machines. Present-day computing standards require an ordinary desktop computer to have that kind of power. The new networking convention, therefore, is to recycle desktop computers for specialised servers. For example, a small peer-networked office might have the shared printer attached to someone's computer. That computer then becomes the print server for the network. Another computer might be running a proxy server for Internet access. That computer is your Internet access server, while also being a client to your print server.

Terminal server: This device answers the phone line at the ISP end and handles user authentication. Terminal servers typically can handle hundreds of phone lines at once.

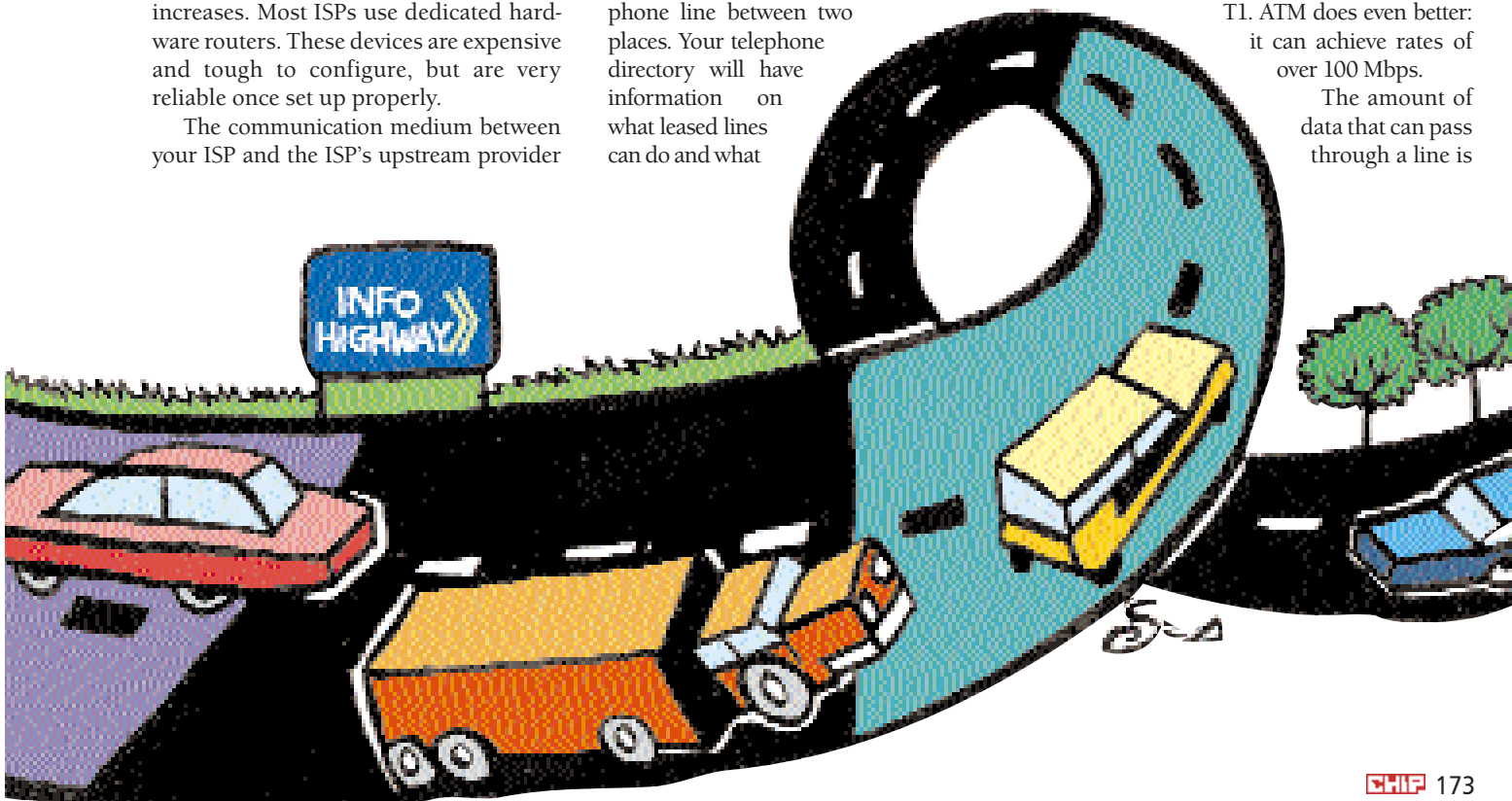
varies, depending on the size of the ISP. Startup ISPs usually have a 64K leased line to their upstream connection provider.

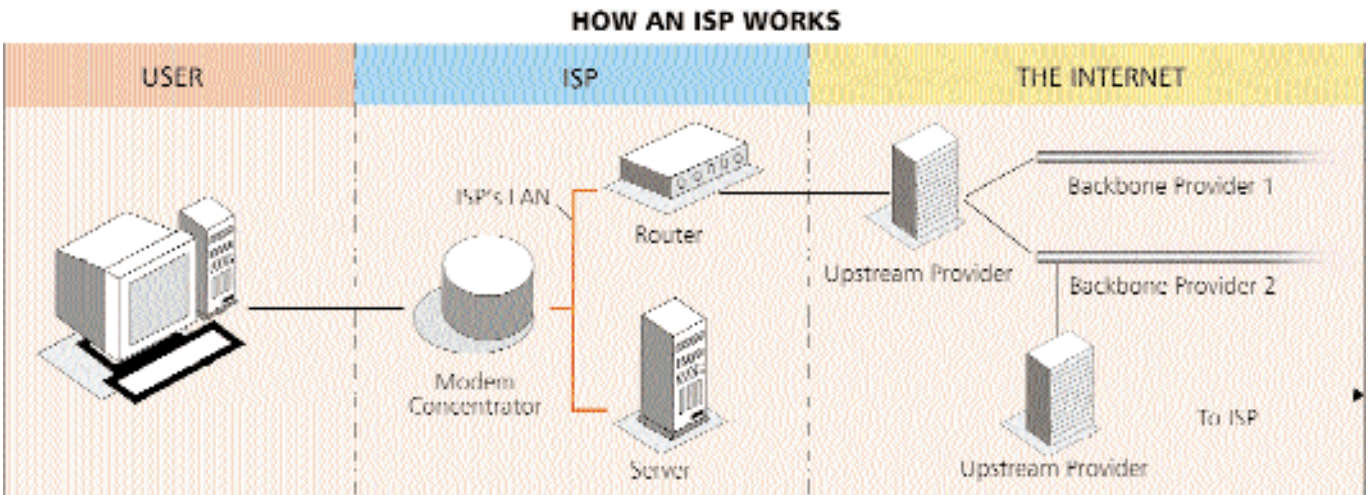
A leased line is a permanent phone line between two places. Your telephone directory will have information on what leased lines can do and what

they cost, in the general information sections.

Larger ISPs use T1, T3 or ATM (Asynchronous Transfer Mode) lines. A T1 line can do 1-Mbps and a T3, thirty times T1. ATM does even better: it can achieve rates of over 100 Mbps.

The amount of data that can pass through a line is





A user connects to an ISP, who connects to an upstream provider, who in turn connects to a backbone provider. Backbone providers form the core of the Internet, all Internet traffic passing between networks goes through a backbone provider.

called bandwidth. It has nothing to do with how much data is passing through the line at any moment in time, it is only a measure of the maximum data that can pass through it at a time.

Many ISPs the Internet make

An ISP is like a grocer who stocks wheat. He only sells the wheat that is bought from a wholesaler, who again does not grow the wheat, but buys it from farmers.

The Internet is similarly organised. Your ISP doesn't simply connect to the 'Net'; he connects to a wholesale provider, who in turn is connected to one or more backbone providers.

Companies like UUNet and AT&T in the US, and VSNL in India, run interconnected high-bandwidth networks across the country. Most such companies start off as either ISPs or phone companies and keep growing until they find that they can do better business by leasing out bandwidth on their network to other smaller ISPs rather than running an ISP business themselves. AT&T for example, once a telephone company, is now one of the largest backbone providers in the US.

Wholesale providers buy bandwidth from one or more backbone providers, then resell parts of it to ISPs. An ISP would find it cheaper to connect to a wholesale provider rather than directly to a backbone provider because a wholesaler connects to more than one backbone, and is also usually cheaper.

Smaller ISPs sometimes find that one T1 line is inadequate for their needs, and

a T3 far more than what they need. The solution is to get two T1 lines and set up the network to balance Internet traffic between these two lines. This method of splitting traffic into two lines is called load balancing. It is this ability, along with routing that makes the Internet stable. If one backbone provider experiences a technical problem and goes off the Internet, anyone depending solely on that backbone provider will also find themselves off the Internet. Good ISPs and wholesale providers, therefore connect to more than one backbone. That way, if one path to the destination is unavailable, traffic that was to go via that path is immediately re-routed through another path.

All-in-one

In India, VSNL takes on all three roles: backbone provider, wholesale provider, and ISP. They provide a backbone that runs across the country, provide wholesale services to private ISPs for connecting to backbone providers in the US (although VSNL prices can hardly be considered wholesale), and provide ISP services for end-users. Satyam Infoway provides a backbone and general ISP services, but no wholesale service. They depend upon VSNL to connect to the Internet and the world, but plan to have direct connections to backbone providers in the US rather than via VSNL (this is what is often mistakenly referred to as a direct gateway to the Internet). Backbone providers in the US form the core of the Internet. Their networks run across the country and connect

millions of computers via this model. The Internet therefore, is simply a collection of backbone providers whom everyone is dependent upon.

A vast potential

Out of over 950 million people in India, less than one million are connected to the Internet. That leaves plenty of scope for ISPs in India unlike in the US, where the market for ISPs is almost saturated and ISPs are being forced to use increasingly competitive methods to beat the competition.

The first step was to improve the infrastructure so that users got a better Internet experience. Then as everyone got on par with a fixed rate of \$19.95 a month, users started to get treats like free home pages and free e-mail accounts. Now some ambitious ISPs have also started to give away low-end Internet-ready PCs free, provided you sign-up for an Internet account. They hope to cover the cost of the PC from the service charges. The smartest moves however have been from those ISPs who have decided that they need to diversify into other sections of the Internet, like providing portals for their local users.

Dissatisfied by Internet access speed problems, some enterprising folks have started an ambitious project: Project Oxygen, an attempt to wrap planet Earth with underwater fibre-optic cable. Once complete, Oxygen promises to be the foundation of the new generation Internet where Web sites will load at the click of a finger and cyber-telecommuting will be a reality.

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