

A Practical Approach to Inexpensively Link Distributed Facilities of New Horizon College of Engineering for Data Communication

Indrajit Mukherjee

BE, Comp. Sc., Systems Manager, NHCE, India, from.indrajit@gmail.com

ABSTRACT: Remote networking, by nature, is relatively very expensive. So much work has been done behind linking remote stations to either support distributed applications or administer/monitor remote systems. Most small to midsize companies who require remote computing, find themselves handicapped by the enormity of costs involved both in terms of cost for setup (One time cost) and maintenance costs (Recurring cost). While we are all unanimous in accepting the undisputed speed and quality of long distance leased lines/ channels as one of the best prevalent mediums for remote computing, even though the infrastructure always comes at a premium as the speed increases. On the other hand cheaper, long distance networking solutions do exist in form of a) Dial-up Lines and b) DSL lines. Dial-up lines are cheap but very slow and unreliable for data transmission, thus they do not always find favour among serious data communicators. The second alternative can though be considered as a poor-man's alternative towards effective data communication. Here, we are indicating the DSL connection or more popularly, the BroadBand approach. [The Journal of American Science. 2006;2(4):49-52]

Keywords: DSL; RDP; Internet; IP; Address Advertisement

1. Introduction

Connecting remotely to other locations is a prevalent practice today by large organisations using T-series or the leased lines. But these lines prove to be very expensive more so in developing countries and small to mid size organisations of even developed countries. What these leased lines offer is static IP addresses so any TCP/IP application can approach the servers located at the endpoint of these lines. For majority of consumers looking for cheaper alternatives the DSL lines are like a boon. But these lines do not have fixed IP addresses.

1.1 An alternative approach

This paper highlights a way by which a DSL consumer machine could advertise its current IP Address and service seekers could take note of the most current IP Address before they connect to the DSL consumer and enjoy services provided. At New Horizon College of Engineering we have employed a method for achieving this dynamic IP advertisement and are using a Remote Desktop Client sitting on one corner of Bangalore city to connect to a Terminal Server situated on another side of Bangalore. The paper suggests and details a sequence of very few steps that we employ for capturing the screen of various host computers remotely for purpose of Systems administration, Viewing of reports and File transfers. But first we should take a look at some explanation of the technologies used in this fantastic and successful experiment.

2. What is Broadband?

At New Horizon Group of Educational Institutions (of which New Horizon College of Engineering is the foremost institution) we have employed several BroadBand lines for WAN solutions, one line for each of our institutions, all of which are spread out through-out the city of Bangalore, India. BroadBand is also our means of connecting to the Internet. With an average speed of 1 Mbps most of our WAN related work is accomplished regularly. Everyone of us is aware that there is numerous such mid-size organisation like ours who are thriving on the DSL services for WAN connectivity, since sufficient bandwidth is delivered at reasonable cost. Millions of us are using Broadband for connecting to Internet and utilising resources, which the author terms as One-Way service utilization. But, can we use this medium for 2-way service utilization? Which means, can anybody on the other side of the network connect to us, and utilise our services? Of course if we have some network application resource to provide and the server at our end is powerful enough, we too can serve from our end to seekers across Net by virtue of rich TCP/IP features.

A broadband connection (ADSL) provides high-speed Internet access over a standard phone line. The advantage of a broadband connection over a standard dialup service, is that Broadband is considerably faster, and is 'always-on', meaning that once you're logged on, your PC is online until the PC is turned off again. Broadband offer high-speed Internet access and allows telephone calls and a permanent Internet connection to share a single phone line simultaneously. While the Internet has often been jokingly referred to as the "World Wide Wait" on account of slow downloads, Broadband connections allow people to view streaming

media at speeds closer to what might be associated with television, rather than the herky-jerky experience that characterizes dial-up modems. Transfer speeds for Broadband are up to 50 times faster than via dial-up modems, creating the opportunity for people to download mp3s (compressed digital audio files) or films without having to wait for hours. While the Internet has often been jokingly referred to as the "World Wide Wait" on account of slow downloads, Broadband connections allow people to view streaming media at speeds closer to what might be associated with television, rather than the herky-jerky experience that characterizes dial-up modems. Transfer speeds for Broadband are up to 50 times faster than via dial-up modems, creating the opportunity for people to download mp3s (compressed digital audio files) or films without having to wait for hours.

According to JD Power and Associates, "High-speed ISP subscriptions account for 13 percent of all residential ISP subscriptions in the United States. This penetration increased significantly from 5 percent in 2000. Among current dial-up subscribers, 10 percent state that they are 'extremely' or 'very likely' to switch to a DSL and/or cable modem connection in the next six months." Analysts believe that the number of Broadband users will rise dramatically between 2001 and 2004, estimating over 60 million users in the United States (source: eMarketer). Within 5 to 10 years, Broadband will replace dial-up modems as the standard means of Internet connection.

2.1 Common Carriage

Dial-up modems allow for the transfer of information over phone lines, and are thus governed by a set of nondiscrimination rules applying to telephone networks. Mirroring the US policy for the public highways, the telephone industry has been required to serve consumers as "Common Carriers." The policies of common carriage--particularly the requirement that phone companies not discriminate against information by halting, slowing, or otherwise tampering with the transfer of data--have been central to the growth of the Internet into a diverse, competitive medium. Common carriage permitted the development of the Internet Service Provider (ISP) marketplace, affording users the opportunity to go online via one of the more than 7,000 companies that compete with such giants as AOL and Microsoft.

2.2 Open Access

Open Access is the principle that has governed the Internet since its inception. It is synonymous with the idea of open architecture. The Internet was originally designed as a pipeline that would treat all information in a nondiscriminatory fashion, a design referred to as "end-to-end" because no gatekeeper could control how

the data would be treated. The common carrier rules governing telephone networks contributed to the Net's open access design. In general, broadband refers to telecommunication in which a wide band of frequencies is available to transmit information. Because a wide band of frequencies is available, information can be multiplexed and sent on many different frequencies or channels within the band concurrently, allowing more information to be transmitted in a given amount of time (much as more lanes on a highway allow more cars to travel on it at the same time). Related terms are wideband (a synonym), baseband (a one-channel band), and narrowband (sometimes meaning just wide enough to carry voice, or simply "not broadband," and sometimes meaning specifically between 50 cps and 64 Kpbs).

2.3 BroadBand: The pros and cons

Most of the marketing for broadband sells the fact that broadband is a fast, always-on service. So what are the real advantages, and what's wrong with your existing home dialup access? If you're considering broadband for home, here's a summary of the key differences between broadband and dialup:

Cost - There are no call charges so you don't have to worry about hanging up when you're finished. On the downside, you have to pay a monthly subscription fee to use broadband, and you have to buy a special broadband modem.

Connection time - This is where the 'always-on' bit has benefits - you establish a connection, and hang on to it. You don't have to worry about logging off to save money. This saves all the hanging about waiting for your modem to dial in, connect, establish a connection and authenticate with your password

Speed - Standard dialup modems have a maximum speed of 56k, and broadband typically offers between 1meg and 8meg connections - up to 160 times faster than dialup. Note that you're sharing your bandwidth with other users in your area, so data transfer speeds vary, and you're unlikely to achieve the maximum throughput (this is known as 'contention', and eases bottlenecks at phone exchanges and ISPs).

Phone line - When you're online with broadband, your home phone line isn't tied up.

Extras - With Broadband, there's the option to watch TV over the Internet, make voice calls over the 'net, and even take control of your home PC from work .

3. Virtual Server

We have used a Virtual server to channelize TCP/IP requests once they come from the clients.

A Virtual Server is a computer on the local network, behind the gateway, that has to be publicly accessible (e.g. Web Server, FTP Server etc). A Virtual

Server can be set-up simply by entering the last digit of the IP address of the Virtual Server computer and selecting the service to be allowed through to the computer. All traffic on the service will then be sent directly to the defined Virtual Server. In this way, you are able to host Internet services from your private network. Virtual Server feature allows Internet users to access standard Servers on your LAN, via the Internet IP Sharer. Normally, Internet users would not be able to access a server on your LAN because your Server does not have a valid external IP Address. Attempts to connect to devices on your LAN are blocked by the firewall in this device. The "Virtual Server" feature solves these problems and allows Internet users to access to your servers. However, your LAN must have an existing connection to the Internet. We can divide Virtual Server in two types. One is Port Forwarding Virtual Server. There are some standard service ports for most popular applications.

Service Ports

- Echo 7
- FTP 21
- TELNET 23
- SMTP 25
- DNS 53
- HTTP 80
- PoP3 110
- NNTP 119
- SNMP 161

There is also NAT Virtual Server mapping. If your ADSL account within multi-real IP Addresses then Multi-Global IP mapping function is a useful feature for Internet application. The Multi-Global IP mapping function helps you dividing the client PCs on the LAN into several groups and each group access Internet through one real IP Address. You also can set single local IP Address map to single Global IP Address. Thus it empowers the management and provides much wider application over ADSL line.

4. Remote Desktop Protocol

4.1 What is a Protocol

In information technology, a protocol (from the Greek protocol on, which was a leaf of paper glued to a manuscript volume, describing its contents) is the special set of rules that end points in a telecommunication connection use when they communicate. Protocols exist at several levels in a telecommunication connection. For example, there are protocols for the data interchange at the hardware device level and protocols for data interchange at the application program level. In the standard model known as Open Systems Interconnection (OSI), there are one or more protocols at each layer in the

telecommunication exchange that both ends of the exchange must recognize and observe. Protocols are often described in an industry or international standard. On the Internet, there are the TCP/IP protocols, consisting of: Transmission Control Protocol (TCP), which uses a set of rules to exchange messages with other Internet points at the information packet level Internet Protocol (IP), which uses a set of rules to send and receive messages at the Internet address level. Additional protocols that include the Hypertext Transfer Protocol (HTTP) and File Transfer Protocol (FTP), each with defined sets of rules to use with corresponding programs elsewhere on the Internet.

4.2 Terminal Server

To test for access of the server behind DSL lines after correctly acquiring the DSL endpoint's IP address we can use any TCP/IP service on the server. For our requirement purpose we used the RDP protocol to deliver the server screen to the on the client's monitor. Let us take a look at what RDP means:-

RDP is the code name for the Remote Desktop Protocol that the Terminal Server uses to communicate with the Terminal Server client. The Terminal Server Remote Desktop Protocol is compliant with the International Telecommunications Union (<http://www.itu.org>) suite of T.120 communications standards. It is based on the T.128 legacy-mode standard. For a basic explanation of T.120, see <http://gw.databeam.com/ccts/t120primer.html>. In its first implementation, RDP will run only over TCP/IP . Microsoft® Windows® Terminal Server (formerly code-named "Hydra"), is a new product that adds UNIX-like multiuser capabilities and support for thin-client Windows-based terminals to the Microsoft Windows NT® Server 4.0 operating system. With Terminal Server, applications run 100 percent on the server. Terminal Server has three components: the multiuser server core, the Terminal Server client software, and the Remote Desktop Protocol (formerly code-named "T. Share"). The multiuser server core provides the basic ability to host multiple, simultaneous client sessions, and also includes administration tools for managing both the server and the various client sessions. Terminal Server will ship with three software clients in the box: one for Windows NT Workstation 4.0, one for Windows 95 operating system, and one for Windows for Workgroups (3.11). These clients will use the Remote Desktop Protocol, a protocol based on the International Telecommunications Union (ITU) T.120 suite of standard communications protocols. The Microsoft Remote Desktop Protocol (RDP) provides remote display and input capabilities over network connections for Windows-based applications running on a server. RDP is designed to support different types of network topologies and multiple LAN protocols.

5. The File transfer Protocol

In our experiment we have uploaded the server end IP address to a text file on a Standard FTP server on Internet and then downloaded the same file on the client. In this process we have used the FTP protocol.

FTP, a standard protocol, is the simplest way to exchange files between computers on the Internet. Like the Hypertext Transfer Protocol (HTTP), which transfers displayable Web pages and related files, and the Simple Mail Transfer Protocol (SMTP), which transfers email, FTP is an application protocol that uses the Internet's TCP/IP protocols. FTP is commonly used to transfer Web page files from their creator to the computer that serves the pages to everyone on the Internet. It's also commonly used to download programs and other files to your computer from other servers. As a user, you can use FTP with a simple command line interface (for example, from the Windows MS-DOS Prompt window) or with a commercial program that offers a graphical user interface. Your Web browser can also make FTP requests to download programs you select from a Web page. Using FTP, you can also update (delete, rename, move, and copy) files at a server. You need to log on to an FTP server. FTP is usually provided as part of a suite of programs that come with TCP/IP. FTP is commonly used to upload Web page files. Those files are normally created on a Web author's computer and then uploaded to a Web server, a computer that allows Web users to view those pages. FTP is also used frequently to download programs and other files. FTP also allows you to delete, rename, move, and copy files on a server. Using standard FTP, you will be required to log in to the FTP server you are trying to access, before you will be able to upload or download any files. However, when using anonymous FTP, publicly available files are easily accessed without any need to log in to the FTP site by using a private username and password.

6. The Solution Algorithm

We have developed a software that has a IP Uploader and a client module. We all know where the problem glaringly lies. While leased lines have fixed IP Address, same can't be said for the case of DSL or Dial-up lines. These lines are assigned an IP Address through a DHCP server and each day or even each new hour could possibly see a different IP Address assigned to the consumer's end of the DSL line. So, how does another person across the network determine the Remote IP address in order to connect to this end of the DSL line and enjoy services? Our IP Uploader sits on

the server sends this dynamically acquired IP address to one standard FTP server on Internet.

The steps are as follows.

First Step : Have a background utility run on the server computer located on one end of the DSL line that would periodically send its IP Address to any standard server on the Internet. The periodicity of this transfer is configurable. In our case we use 30 minutes.

Second Step: Have the client that wishes to connect to the server at any point of time, refer to this standard server on the Internet and procure the IP Address.

Third Step: Use this IP Address to connect to the server and requisition necessary services.

The implementation for the above algorithm has been done on the .Net platform and an executable client is being distributed with the complete paper so that readers can test the idea using our specific application. The client software that links with New Horizon College of Engg. Test Servers can be downloaded from the following site: <http://briefcase.rediff.com/bn/br/yourstocktips///GetRemoteScr.zip?d=0> and can be used between 10:00 am till 3:00 pm IST on weekdays. The Software requires .Net Platform's presence on the client machines.

Correspondence to:

Indrajit Mukherjee, BE, Comp. Sc.
Systems Manager, NHCE, India
Email: from.indrajit@gmail.com

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