TELESTREAM

Application Note

Connecting your LAN to a WAN using DSL or Cable Modems

Introduction

This Application Note provides a general discussion of connecting your local area network through an internet-sharing DSL or Cable modem connection using a broadband DSL/Cable modem router. Currently, there are a growing number of xDSL/Cable modem router manufacturers, each offering a widening array of features beyond simple internet sharing. Brands such as UMAX/UGATE, and Linksys now offer multiport xDSL/Cable modem routers including extra features such as DHCP, NAT, port filtering, virtual servers, port monitoring LEDs, and administration via LAN attached PCs. In addition to reading this application note, we recommend you study vendor documentation and websites for further information on router features and operation.

Basic Interface Elements

To implement an internet-sharing connection in between your ClipExpress/ClipMail Pro and an ISP offering DSL or Cable provider, you'll need the following items:

- xDSL line and modem or a Cable modem and cable connection—which of these you use may be determined by availability and price in your regional area. Talk to your local ISPs, Telephone company, and Cable TV provider to find out about pricing and availability, as well as connection speed. In any case, the provider will usually arrange for the line to be connected to your home or office and supply you with the hardware modem (xDSL or Cable modem).

  xDSL/ADSL/Digital Subscriber Line services employ copper line connections and thus must be close to the telephone company office providing the service, usually within 20,000 feet (under ideal conditions) of a connection point. Data rates vary depending on the service. ADSL, which is rapidly becoming available, promises typical speeds as follows:

  0 to 18,000 feet: 1.544 Mbps (T1/DS1 rates)
  0 to 16,000 feet: 2.048 Mbps (E1 rates)
  0 to 12,000 feet: 6.312 Mbps (DS2 rates)
  0 to 9.000 feet: 8.448 Mbps

  An ADSL circuit consists of an ADSL modem on each end of a twisted-pair telephone line with three information channels carried on the line. The three channels consist of a high speed downstream channel, a medium speed duplex channel, and a POTS (Plain Old Telephone Service) or ISDN channel. Filters split the POTS/ISDN channel from the modem, effectively assuring uninterrupted POTS/ISDN service even in the event ADSL fails. The ADSL high speed channel to you ranges from 1.5 to 6.1 Mbps, while duplex rates (uploads) range from 16 to 640 kbps. Each channel can be submultiplexed to form multiple, lower rate channels, depending on the system implementation in your area. The minimum ADSL configuration provides 1.5 or 2.0 Mbps downstream and a 16 kbps duplex channel. Products with downstream rates up to 8 Mbps and duplex rates up to 640 kbps are available in some areas.

Cable modems provide data rates comparable to ADSL lines, although performance varies depending on the cable TV operator and equipment being used. Most cable TV networks are designed to send information in one direction only. Those that do support bidirectional communication can only offer asymmetrical data rates (downloads will be much faster than uploads).

- xDSL/Cable modem router with 10/100 ethernet LAN ports and a WAN port (optional)—this is the ideal way to connect the ISP-DSL or Cable-provided modem if it doesn't provide enough internal ethernet ports and/or you need one-to-many internet IP sharing. Manufacturers now offer under $300 hardware routers that allow you to easily make a one-to-many internet connection very simple. These devices generally have a 10/100 WAN port that connects to ISP/Cable company provided modem. Your router also has 10/100 ports for local LAN connections. In the case where you only need to connect a ClipExpress or Clipmail Pro, you can simply plug it into one of these ports and you're done. However, if you want to interface other devices, you can also plug them into the remaining LAN ports. Some xDSL routers have an integrated hub providing 4 or more LAN ports. If not, you can always connect a multiport hub to the router for additional connectivity.

  Besides these basic router features, you should also try to get one with extra features such as a built-in DHCP server, network address translation (NAT), and port filtering. For example, the UGATE Plus has support for up to 250 IP addresses via its built-in DHCP server. This allows you to easily add devices onto your LAN and have the DHCP server dynamically allocate all the IP addresses for these devices.

- PC with multiple 10/100 ethernet cards and router software (optional)—this can be used in place of the hardware router mentioned previously. The catch in using this method is that you have to have separate ethernet cards for the WAN and LAN ports and most PCs only come with one. Also, software routers can be slower and more failure prone than hardware routers, although they do have many flexible features that vary from one vendor to another. Wingate, IPRoute, Vicomsoft Softrouter, WinRoute, and WinProxy are some examples of such products. Features vary widely so thoroughly research features/requirements/pricing prior to purchase.

- 10/100 ethernet Hub or switch (optional)—this is only needed when the hardware router (or PC with software router) does not offer enough LAN ports for your site.

Procedure for Basic Configuration

1. Set up components as shown in Figure 1 or 2. Plug the incoming line modem into your hardware or software routers 10/100 WAN port. Connect your ClipExpress/ClipMail Pro or LAN devices into the routers 10/100 LAN ports (use an interconnecting 10/100 hub if your router doesn't have enough ports).
2. Configure your hardware or software router NAT (Network Address Translation) to map your single IP address (or multiple addresses) to all internal LAN IP addresses. The single address is the address that outside ClipMail/ClipExpress units will be sending media to. By employing NAT, an entire network of devices can use a single IP address. NATs can also be used to remap whole groups of IP numbers to other IP numbers by changing parts of the IP address. This feature allows illegal internal IP numbers to be remapped to legal external numbers (for example the first three or six digits of the IP number could be altered). Like a proxy server, NAT resides between the Internet and the network it serves, constantly reading and rewriting port numbers and IP addresses inside of IP headers. This action is performed automatically and transparently as data packets move across the NAT (usually existing inside your xDSL/Cable modem router).

Since ClipMail Pro/ClipExpress devices communicate with each other by sending data to static IP addresses, the addresses must be exclusive or reserved for them. NATs can confuse ClipMail systems by translating IP addresses—resulting in their not being found by other ClipMail systems. If you do have a NAT in your router, or between you and the internet, ensure that it's configured to allow your ClipMail/ClipExpress device(s) to have static and unique IP addresses that can be found by devices outside your network.

Although NATs may present a problem for ClipMail/ClipExpress systems that receive data, they do not affect ClipMail/ClipExpress systems that send data. A system with a changing IP address can always send media parcels as long as the destination systems have static IP addresses. As long as the ClipMail/ClipExpress systems that receive media have a known fixed IP at the time it is sent, media will transfer properly. The key to successfully using NATs with ClipMail is understanding how they can alter IP addresses so that devices outside your network can locate and communicate with devices inside your network.

3. DHCP (Dynamic Host Configuration Protocol) can be present at ISP (where it's the DHCP server and your DHCP router is the client) and at your router (where your router is also a DHCP server and your IP devices–including ClipMail and ClipExpress—are clients). If your ISP is using DHCP, you'll need to configure the router as a DHCP client and arrange with your ISP to have the DHCP allocate a known/repeatable IP address. DHCP is a network protocol that enables a DHCP server to automatically assign an IP address to an individual device's TCP/IP stack software. DHCP assigns a number automatically based on a defined range of numbers (i.e., a scope) that belongs to a network. DHCP does not need DNS (Domain Name Server) to function, although many IP services (such as TCP wrappers) require that there be a DNS entry.

   If your router has a DHCP server, it will assign a TCP/IP address when an IP device such as a ClipMail/ClipExpress, PC or other IP device is started. When you turn on a ClipMail that has been configured to use DHCP, it looks for a DHCP server. The ClipMail/ClipExpress and the DHCP server exchange some information resulting in the server issuing an IP number. The server must have been previously configured to assign a repeatable known IP address so that other ClipMail/ClipExpress systems can find it. If this hasn't been done, the DHCP server will assign an IP number to the ClipMail/ClipExpress from the range of numbers defined for the server.

   To enable ClipMail/ClipExpress to use DHCP you must click the Set Up button on the Network Controller application, go to the Network tab, and check the "Get IP Address from DHCP Server" checkbox. This causes your system to get its IP address and network configuration from the DHCP server on the router.

4. If your router has a firewall, you'll need to configure it so that it passes HTTP (TCP port 80) inbound and outbound, and FTP (TCP ports 20, 21) inbound and outbound. Ideally, TCP port 23 should also be opened to allow Telestream to remotely diagnose your ClipMail/ClipExpress system via Telnet. If using a Proxy Server within your LAN, refer to your ClipMail Pro/ClipExpress User Guide's documentation on "Working with Proxy Servers" in *Chapter 3—Installation.*

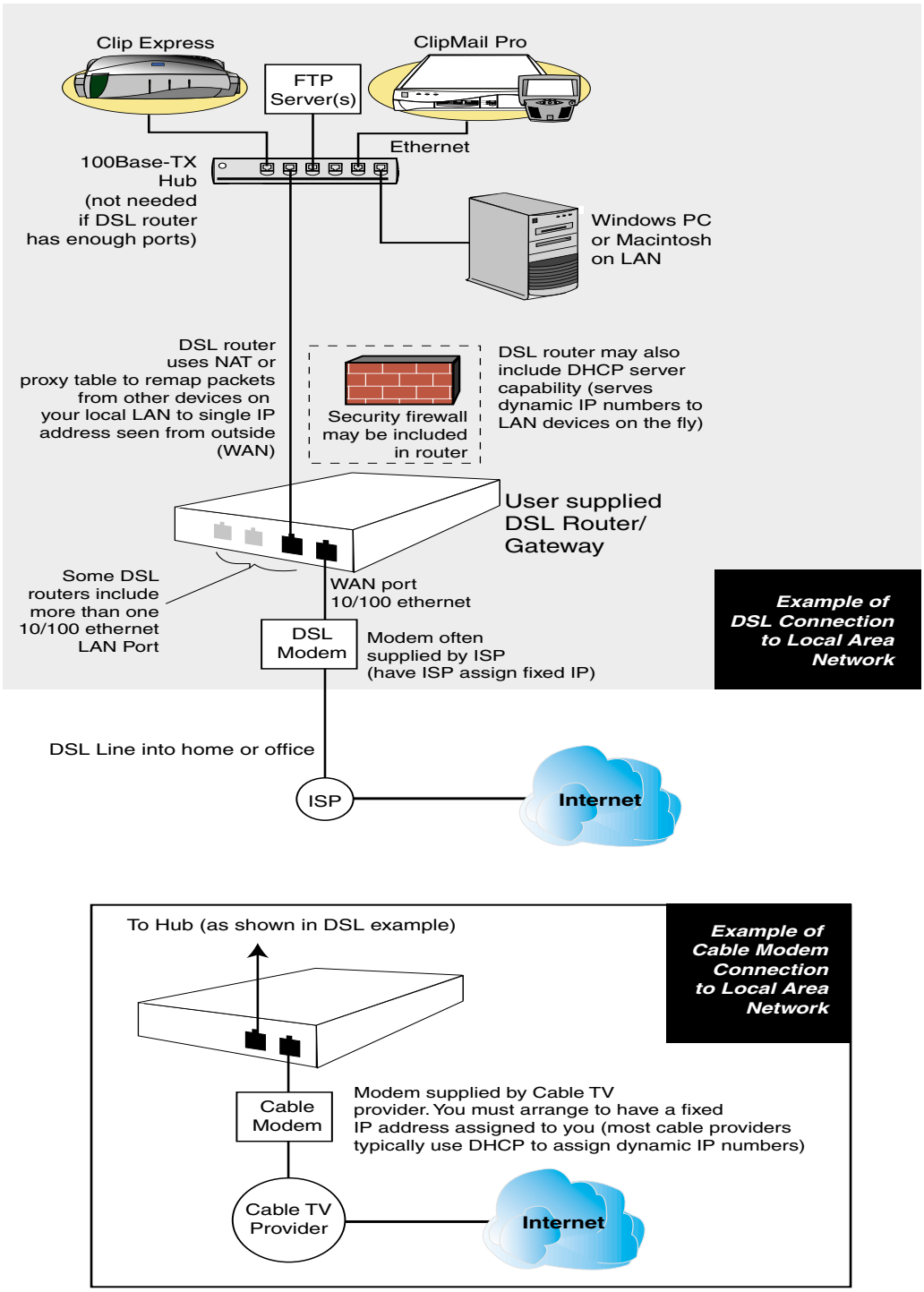

Figure 1. Example of a DSL or Cable Modem and Router Configuration

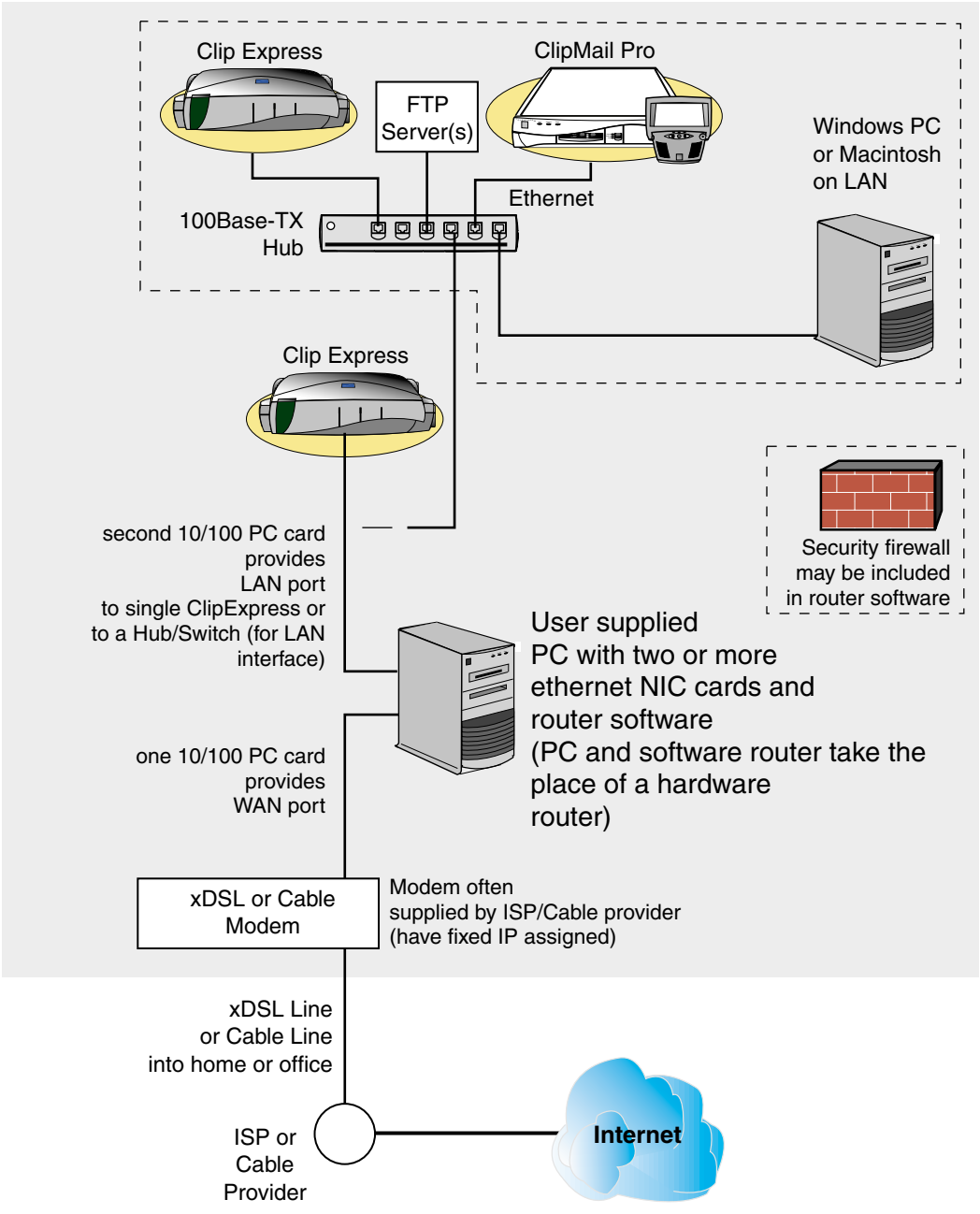

Figure 2. Example of a PC used as a Software Router/broadband gateway

Software Firewalls

Some xDSL/Cable modem routers include special software that actively works to protect you from unauthorized outside access; this feature is usually called a "firewall." Even if you don't have this feature in your router, you can run firewall software on your PC; this makes perfect sense if you're already using a PC to run a software router. Here is a list of software firewall solutions (these haven't all been tested by Telestream, so study them carefully before purchasing or using):

- AnalogX PortBlocker (free, port blocking only)
- BlackICE Defender
- ConSeal Private Desktop for Windows 95/98 (now part of McAfee.com)
- ConSeal PC Firewall (now part of McAfee.com)
- eSafe Protect Desktop
- Guard Dog Deluxe
- Internet Firewall 98 For Personal Computers
- Internet Firewall 2000 For Personal Computers
- NetWatcher 2000
- Norton Internet Security 2000 (derived from WRQ AtGuard)
- SOS Best Defense
- Sybergen Secure Desktop
- WinRoute Pro
- WRQ AtGuard
- ZoneAlarm (free)

For More Information

For more information on ClipMail products, please contact us via any of the following methods:

web: www.telestream.net
e-mail: information@telestream.net
USA Phone: 1 877 CLP MAIL or 1 530 470-1300
USA Fax: 1 530 470-1301
USA mail:
Telestream
848 Gold Flat Road
Nevada City, CA. 95959
International: See our web site for your regional authorized ClipMail distributor

For information on DSL/Cable modems, try these websites:

- http://www.cablemodeminfo.com/
- http://ugate.umax.com/
- http://www.linksys.com/
- http://www.zyxel.com/html/product/xdsl/xdsl.html