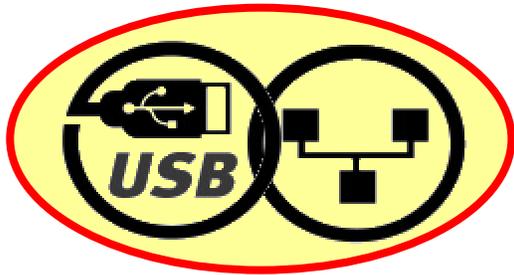


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## UNIVERSAL SERIAL BUS (USB) VERSUS ETHERNET CONSIDERATIONS WHEN CHOOSING A DSL MODEM



### *Technology Note*

When customers choose between USB and Ethernet modems, there are several questions they should consider. The purpose of this Technology Note is to provide the information necessary so that customers can make an informed decision.

### *Nuts and Bolts*

Universal Serial Bus (USB) technology is still fairly new. The current version (2.0) has made significant in-roads and is now standard technology on most new PCs. Before we can understand the implications involved with using USB as our DSL connectivity choice, a short explanation of how USB works in this environment is required.

With USB modems, a Digital Signal Processor (DSP) processes the Internet data to and from the modem. Essentially the DSP, a specialized microprocessor designed for fast math calculation, takes the analog signal (from the phone line) and converts it to digital signals (zeros and ones) that the computer understands. Ethernet DSL modems (and even analog dial-up modems) have DSPs that provide this same function. How they get this information into a computer is where they begin to diverge.

USB as a technology is almost infinitely flexible, supporting a wide range of peripherals including hard drives, cameras, scanners, printers, etc. The intelligence that allows those products to work with a computer typically resides in “drivers” provided with the equipment. Drivers are small programs that tell the computer how to interpret the data delivered from a USB device. Importantly, drivers are typically unique to a given Operating System (OS) and often even versions of that OS (i.e. a given driver may work with Windows 2000, but not Windows XP). As you can imagine, going across platforms such as Macintosh/Windows/Linux creates additional complexity.

Also, there have been three primary iterations of the standard for USB, providing a variety of changes including the speeds it supports. Versions 1.0, 1.1 and the current version 2.0 run at 1.5 Megabits per second (Mbps), 12Mbps and 480Mbps respectively.

Ethernet technology has none of these limitations. Ethernet was created as a networking technology, and while the speeds have constantly increased (some Ethernet products run at 10Gbps – Gigabits Per Second), the primary technology has remained the same. This focus on networking means that all manufacturers of network-capable equipment find it simple to include an Ethernet port in their gear (PCs, Macintosh, Linux, gaming consoles, etc.). Typically the port is provided via a Network Interface Card (NIC), which is often built in but easily added on. And this port is virtually universal.

## Technology Implications

Ethernet was developed and has matured as a networking technology. Its very purpose is to provide a communications path for computers and digital devices. USB, while supporting some networking capability has great strength in connecting various devices to a single computer, not sharing information among multiple computers. What does this imply in the decision to choose a USB versus Ethernet DSL modem?

If a DSL customer never expects to share the broadband connection, either with another computer or other broadband enabled device (i.e. wireless capable PDA, Internet radio, Xbox, etc.), then a USB DSL modem might make sense. The word "might" is used because if there is an operating system upgrade, or you change OS (become a Linux convert for instance), there is a real possibility your USB modem will no longer work in that environment.



The arrangement on the right is an example of the many types of devices that use a USB connection. While capable of supporting all these connections, there could be a bandwidth problem if too many are used concurrently. With USB ports on older computers, the shared nature of the technology (as you add devices each shares the available bandwidth) should be taken into consideration. Also, existing ADSL services provide speeds up to 8Mbps, which is fine for USB 1.1 (12Mbps) and 2.0 (480Mbps), but could be a bottleneck if your computer has USB 1.0 ports (1.5Mbps). Future ADSL speeds are expected to be even faster (15Mbps and beyond) creating additional bottleneck concerns.

However, a DSL customers that chooses to install their service with an Ethernet DSL modem are assured that they will have the maximum flexibility to take full advantage of the speed ADSL offers, to share their broadband connection and to be operating system independent. The minimum speed for most Ethernet gear is 10/100 Mbps (supporting both legacy 10Mbps equipment and more typical 100Mbps equipment). Adding a new computer or other Ethernet device and sharing the high-speed Internet connection is as easy as adding a broadband router (or even a wireless router like the U.S. Robotics 802.11g Wireless Turbo Router).

The decision to install ADSL service with an Ethernet ADSL modem provides a host of options that cannot be supported by a USB interface, primarily because Ethernet was developed specifically as a networking technology. Those options include:

- Installing an ADSL modem with integrated router (or adding one later) to provide Ethernet connections that can be used by any PC, Macintosh or other computer with an Ethernet port (i.e. Linux)
- Add a wireless access point to provide wireless connections for laptops or other WiFi compatible devices
- Connect a gaming console to your high-speed Internet for a powerful online experience
- Keep USB devices from competing with your networked computers for the bandwidth available through the USB port(s)



As the diagram above illustrates, USB and Ethernet coexist easily.

One last subject to mention is security. Scarcely a day passes that there is not news of a new hacker attack or a new virus proliferation. Often the first line of defense is a hardware firewall. By implementing an Ethernet ADSL modem solution you will have choices to either add a standalone firewall between the ADSL modem and your network or to install an ADSL modem with an integrated firewall. This is not an option available in USB modems.

## Summary

While USB ports are quite flexible and provide a host of options for computer users, the only advantage it has in a networking situation is cost (and only then if the PC doesn't have an integrated Ethernet port). With that in mind:

Choose USB if:

- You are confident your operating system won't change and
- You never expect to need to attach more than one device or share your Internet connection with more than one PC

Choose Ethernet if:

- You plan to share your Internet connection with additional computers, a gaming console or other devices
- You want the security of a hardware firewall, protecting your network and attached computers
- You plan to add wireless connectivity to your home network

With the continuing advancement of Internet applications, the expansion of available Internet appliances and the growing commonality of multi-PC households, it is clearly to your advantage to implement your broadband service with an Ethernet connection.

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