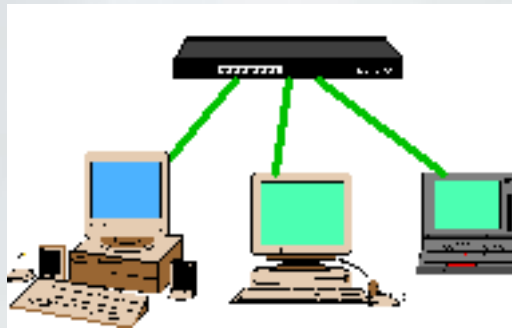# Introduction to Home Networks


WiFi and Bluetooth

# Why Would I Want a Home Network?

A network allows you to:
- Share one Internet connection between several computers
- Share files between computers
- Share one or more printers between all computers
- Store media (TV, music) and stream it from one computer to any other computer on the network
- Add a wireless access point to give you a wireless network - usually known as WiFi
  - A wireless network allows you to use your laptop computer anywhere in your home without having to connect to the Internet by an Ethernet cable

-

Simple Cable-connected Network
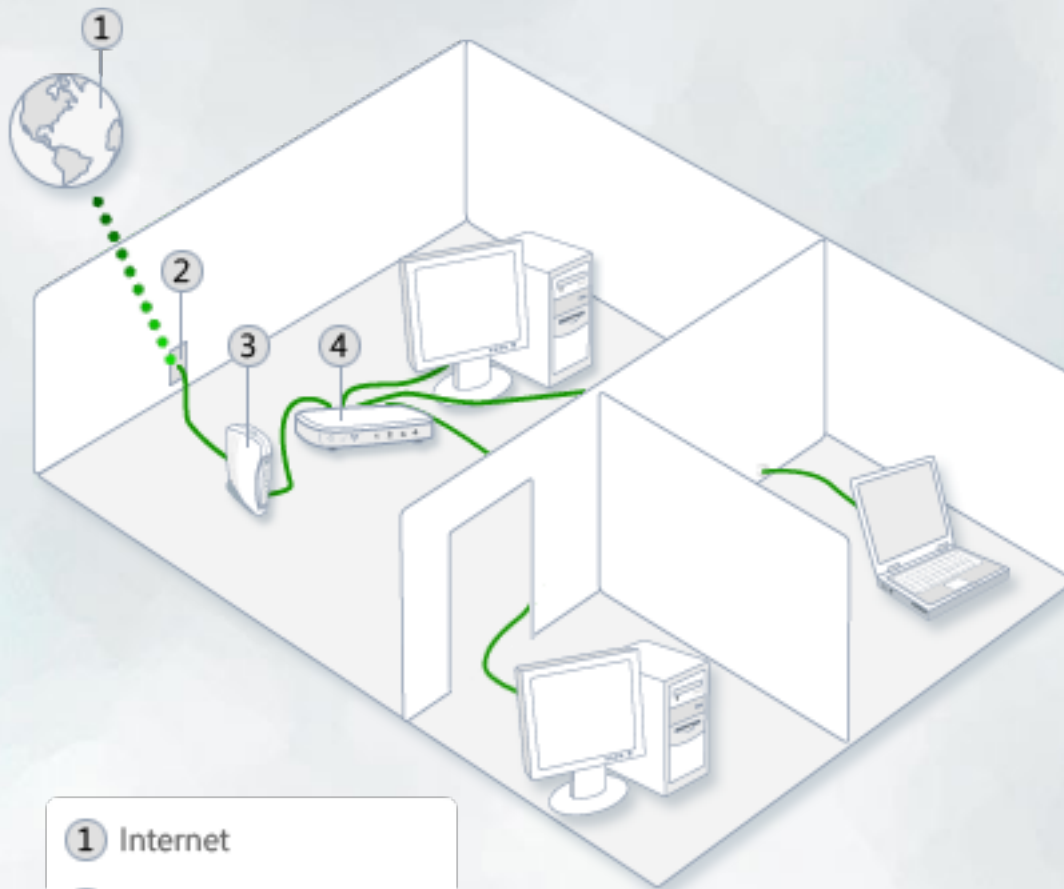
1. Internet
2. Cable or DSL jack
3. Broadband modem
4. Wired router

Simple Wireless-connected Network

1. Internet
2. Cable or DSL jack
3. Broadband modem
4. Wireless router
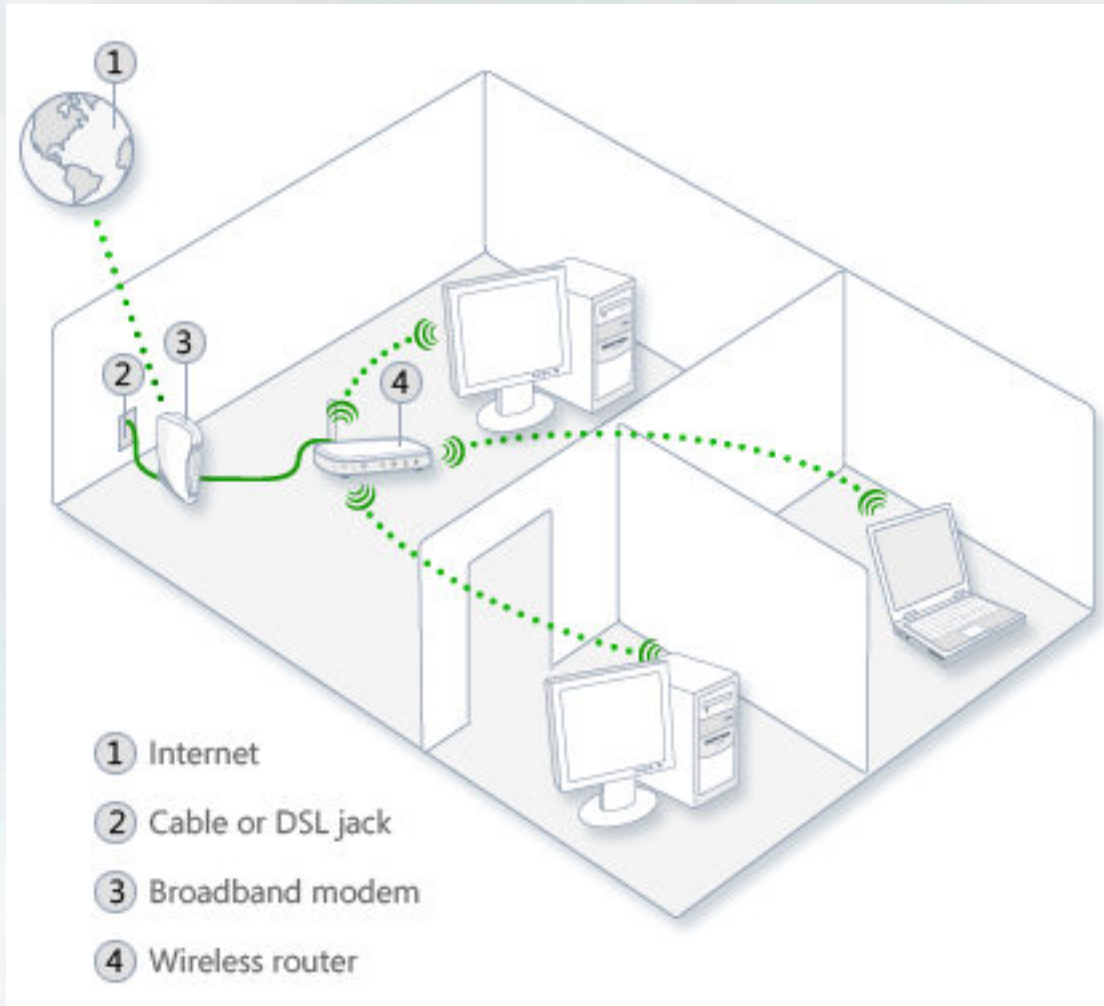
Usually, at least one computer should be connected to the router by an Ethernet cable and there will be at least one printer on the network.
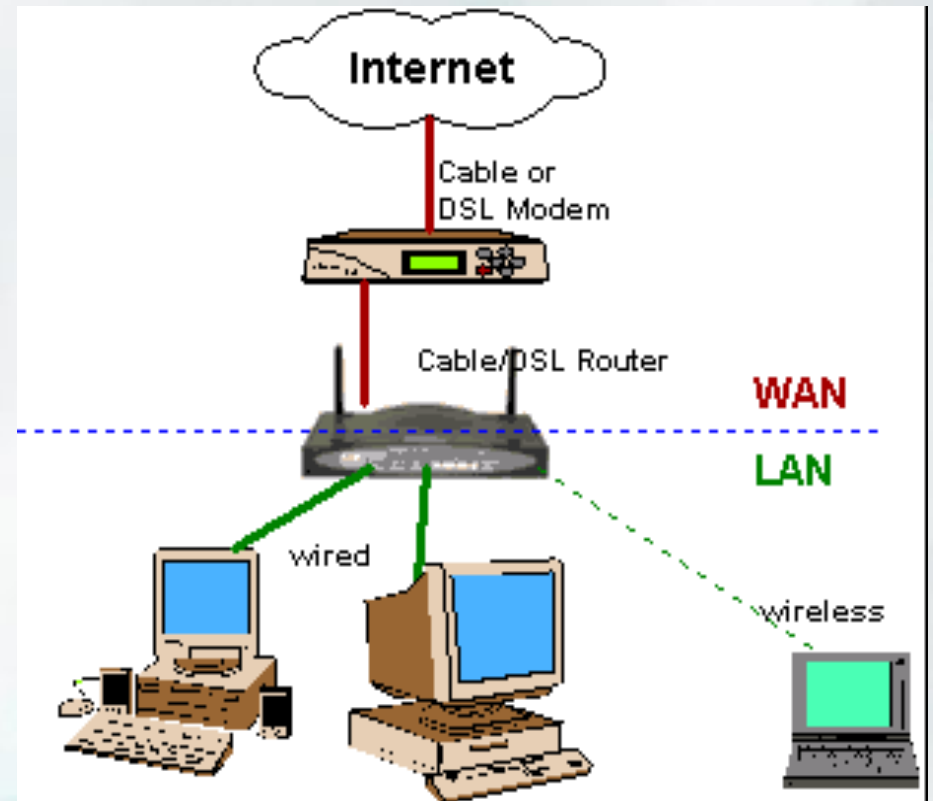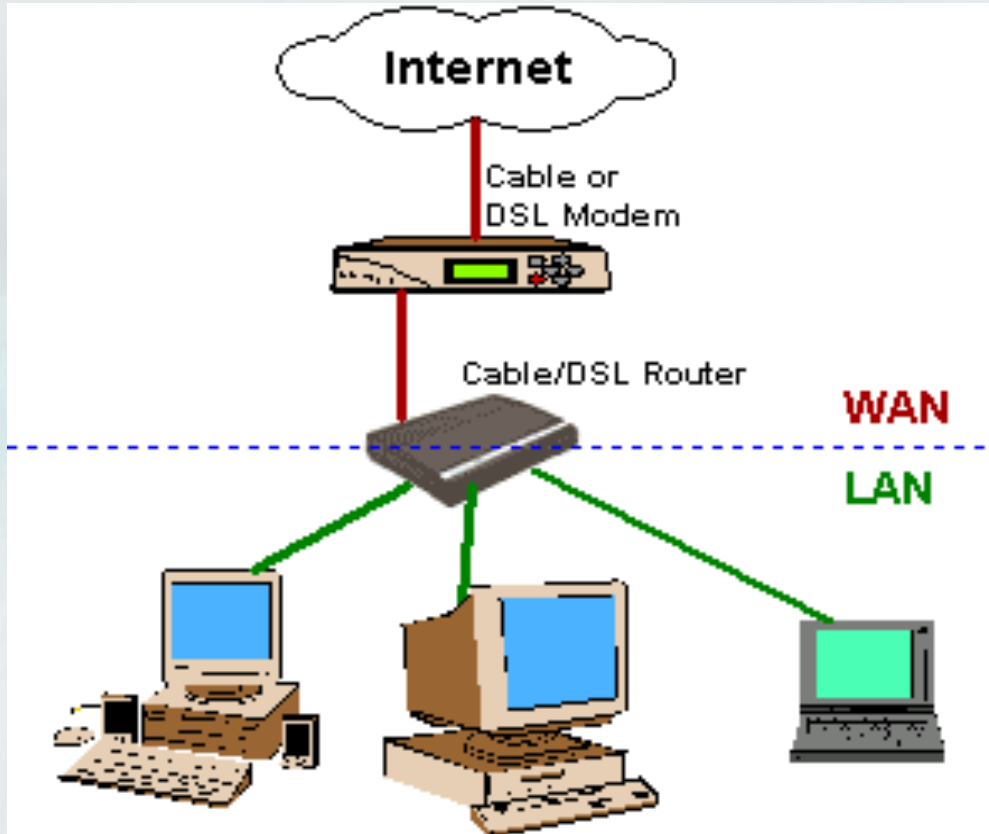Your network can be "mixed"- wired and wireless

Installed Cable Wall-Jacks
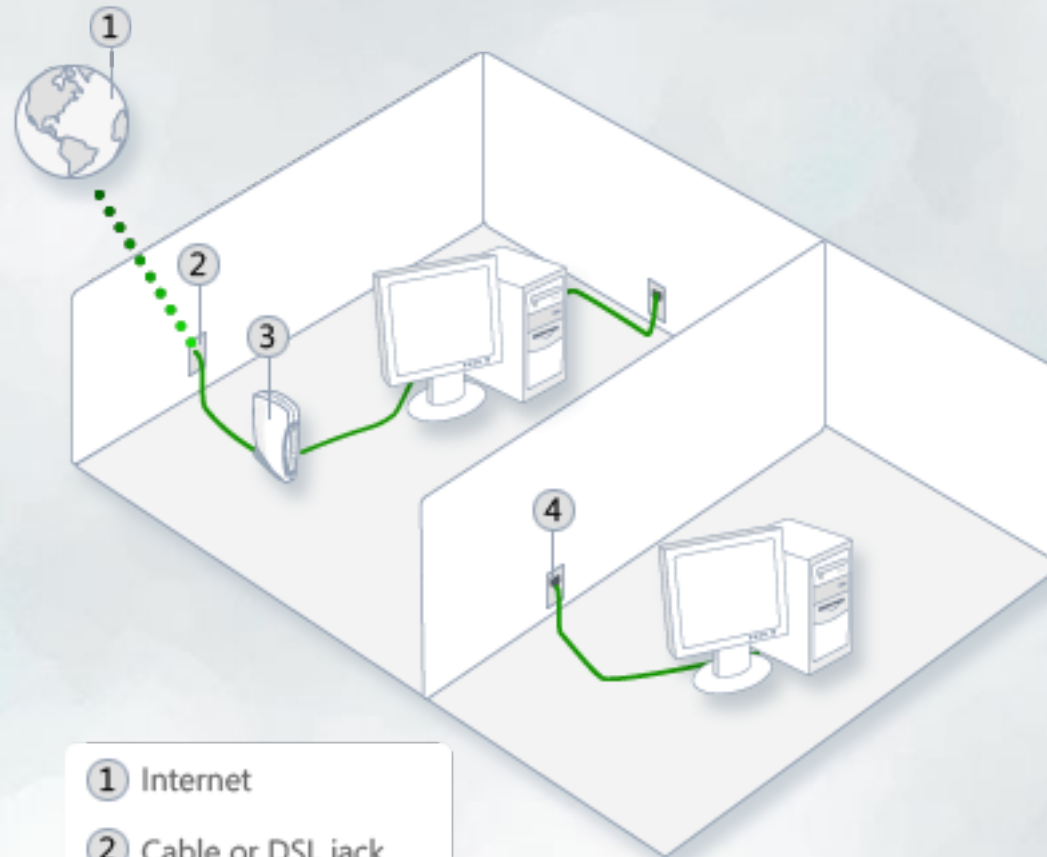
1. Internet
2. Cable or DSL jack
3. Broadband modem
4. Ethernet jack

WAN and LAN

With and without a Wireless Access Point

Major Options from the ISP

1. DSL - This provides the slowest connections speeds but is the least expensive. With this technology, the Internet data is carried by your existing telephone line.
2. Cable - The provides intermediate connections speeds and is more expensive than DSL. With this technology, the Internet data is carried by your existing TV cable.
3. Fiber-optic (Verizon FiOS and RCN?) - This provides the fastest connection speeds and is generally the most expensive. With this technology, Internet data (plus TV and Phone) is carried by an optical fiber. Also, Verizon has to install a new (optical fiber) line to your home.

Note: With FiOS a range of upload and download speeds are avilable at different prices.

How Do I Select Which Technology

- If your use of the Internet is minimal and you are happy with your current TV service, you might choose DSL or Cable
- If you want to see TV shows using the Internet, you should probably select Cable or FiOS
- If you'd like a snappy Internet connection and Internet TV and the convenience of one bill, select FiOS. There may be a "bundle" (Phone, TV and Internet) that is attractive.
- Check your budget ;-)

What do I need for a simple network?

1. A fast Internet connection - DSL, Cable, or Fiber-optic (FiOS)
2. A "modem" usually supplied by the Internet Service Provider (ISP) Locally - RCN, Comcast, Verizon
3. A router (with/without a Wireless Access Point)

In the case of DSL and Cable service (RCN - Comcast) the ISP may provide one "box" that contains the modem and the router.

In the case of Verizon FiOS there will be a large box with battery backup (usually in the basement) and the router will usually be installed near your primary computer (frequently a desktop system)

If you are planning a renovation, you might consider locating the router/wireless access point centrally in the house and running a few Ethernet cables.

How Do I Get One?

(Don't try this with Dial-Up)

- If you are happy with your current DSL/Cable you can elect to:
    - ○ add a router/wireless access point yourself or
    - ○ call your ISP and they will schedule an installation
- If you want to upgrade to FiOS, call Verizon and they will schedule an installation.
    - ○ Remember that they will want to do the installation in one visit so it would be prudent to have some idea where each of the two pieces of Verizon equipment will be located by the time the technician arrives at your home

Adding More Computers

- Desktop and laptop computers can be connected to the network by cable or by wireless
- Modern laptops have wireless capability built-in
- Most desktop computers and old laptop computers do not have wireless capability built-in but....
- Wireless capability can be added to desktop and laptop computers for a moderate expense

Adding a Printer to the Network

- A printer can be connected to a network in one of two ways:
    1. Connecting directly to one of the computers
    2. Connecting directly to the network
- NOTE:
    - Option 1 requires the computer connected to the printer to be "always" ON
    - Option 2 does not

- All consumer-printers can be connected directly to a computer (usually via a USB cable)
- Some printers can be connected directly to the network
    - by Ethernet cable
    - by wireless link
        - Details......

Expanding the Network

More devices can be added to the network
- computers
- printers
- scanners
- X-box and other gaming systems
- Network hard disk drives (NAS)

This may require the use of:
- Ethernet hub
- Ethernet switch
- A wireless access point

All operate in a "similar" way to a power strip in that
they increase the number of ports (connections) available

Wireless Networks (WiFi)

- In a wireless network, a radio transmitter-receiver pair located inside the Wireless Access Point replace the Ethernet cable
- The wireless "service" is usually given a name (by the owner) this name is called the SSID
- The service is usually given an encryption key or password to prevent unauthorized use of the service (by hackers)
- Some networks are not protected by such a key and are said to be Open Networks (for example in a cafe like Panera)
- A list of available open networks can be found on the web

Inside Your Home Router

- In the "old days" electronic boxes had knobs, switches and dials.
- These days many electronic boxes are managed by a computer interface. That is, you examine the status and change the settings of the box by using a keyboard and mouse
- This is done be building a "web server" into the electronic box. In our case the box is the router.
- The owner or technician "talks" to the box by using a browser program to connect to the web server in the router.
- (Try typing 192.168.1.1 into your browser)
- Usually the web server will require a user name and password to by given to gain access. (It would be usefull for you to know that infromation for your router)

ActionTec Wireless Router - screen

Verizon

Main	Wireless Settings	My Network	Firewall Settings	Parental Control	Advanced	System Monitoring

My Router

☑ **Router Status**
GO!

Your Router is Ready for Internet Access

🌐 **Broadband Connection**

Coax Status: Connected
Connection Type: DHCP
IP Address: 72.74.248.31

Quick Links

- Port Forwarding
  (Enable Applications: Games, IM & Others)

- Change Wireless Settings

- Change Login User Name / Password

- Adding a Webcam

- Verizon Help

- Logout

My Network

PC Name: Jupiter
Connection Type: Ethernet
IP Address: 192.168.1.2
Status: Active
Remote Access: Enabled

PC Name: Orion
Connection Type: Wireless
IP Address: 192.168.1.4
Status: Active
Remote Access: Enabled

PC Name: solaris
Connection Type: Ethernet
IP Address: 192.168.1.3
Status: Active
Remote Access: Enabled

PC Name: Earth
Connection Type: Ethernet
IP Address: 192.168.1.5
Status: Active
Remote Access: Enabled

PC Name: saturn
Connection Type: Wireless
IP Address: 192.168.1.6
Status: Active
Remote Access: Enabled

PC Name: asus-682978608
Connection Type: Wireless
IP Address: 192.168.1.7
Status: Active
Remote Access: Enabled

Device Name: IP-STB2
Connection Type: Coax
IP Address: 192.168.1.101
Status: Inactive
Remote Access: Enabled

Action Zone

⚠ **See Security Hazard**

🌐 **GO TO THE INTERNET NOW** ›

verizon

- Verizon.com
- Verizon Central
- Verizon Business Center
- Verizon Surround

🛒 **Shop Actiontec** ›

🎵 **Music** ›

🎥 **Videos** ›

The Telegram Analogy
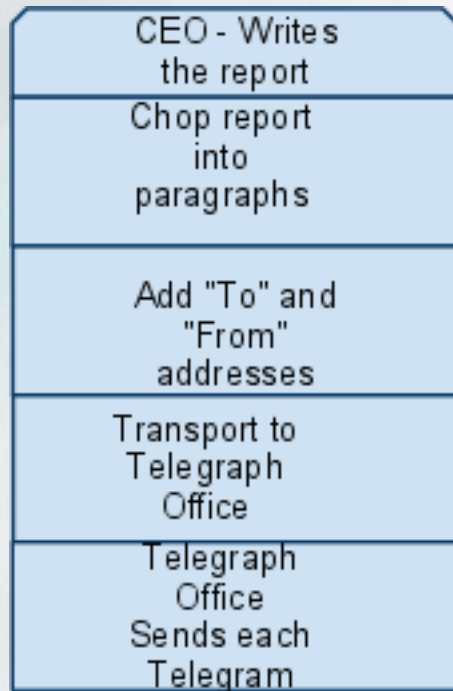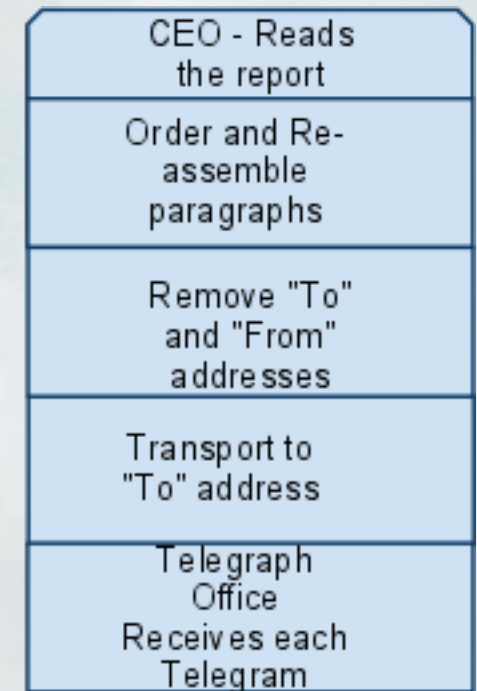
Send a 10-page report using a series of telegrams

Pacific Coast   Atlantic
Coast
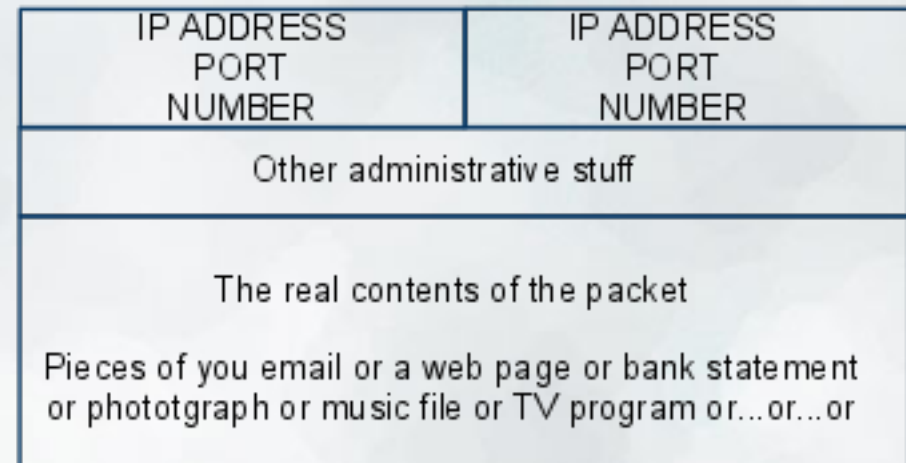
Pacific Coast	Transport a File Across the Internet – SIMPLIFIED Analogy	Atlantic Coast
CEO - Writes the report		**CEO - Reads the report**
Chop report into paragraphs		Order and Re-assemble paragraphs
Add "To" and "From" addresses		Remove "To" and "From" addresses
Transport to Telegraph Office		Transport to "To" address
Telegraph Office Sends each Telegram		Telegraph Office Receives each Telegram

Compare Real Package and Internet Packet
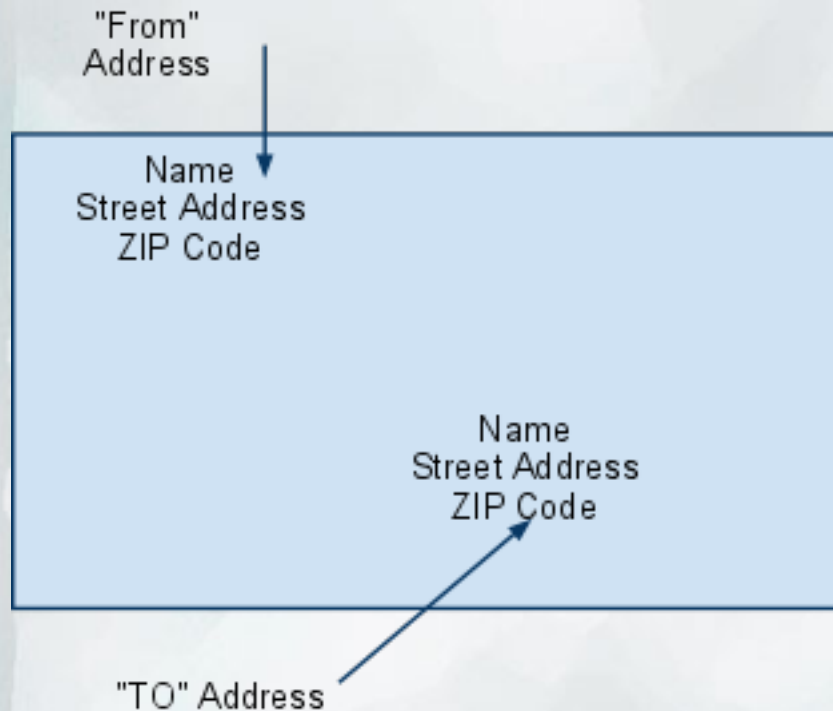
How Does it All Work?

Answer - Just like the regular mail system ;-)
How does a package get across the country to your home?

The telegram analogy
TCP/IP Packets and ports
OSI Model Layers
IP Addresses
DNS resolution
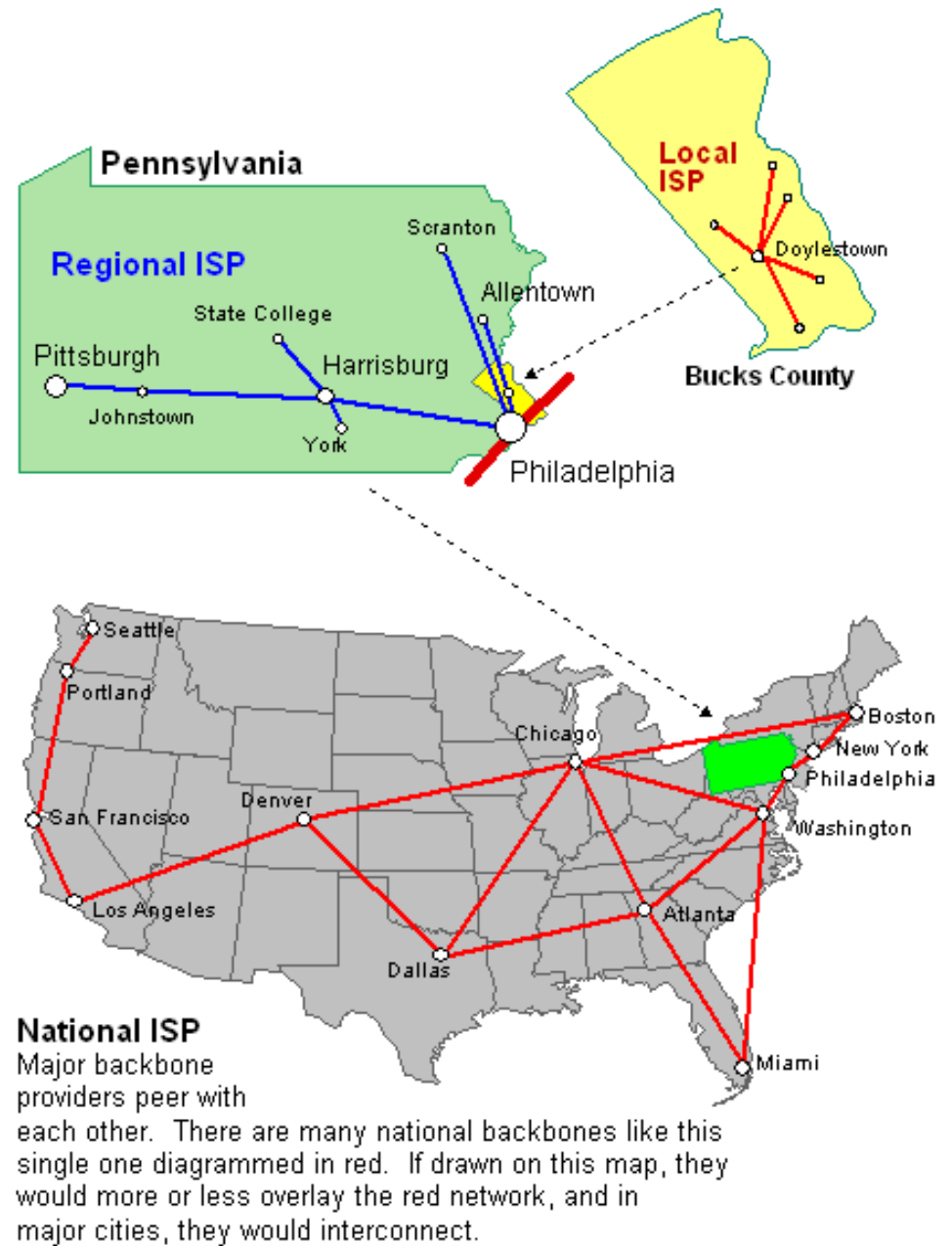NAT and IP address sharing

Verizon Global Backbone

US Backbone

Diagram for ONE ISP
Other ISPs have similar
Backbones which will
approximately overlap this

Bluetooth - Main points

Bluetooth is a short range wireless digital communication technology. It was developed as a low cost, low power way of removing many of the data wires between devices. This concept is called a PAN or Personal Area Network.

Bluetooth can remove the wires from your printer allowing your computers or PDA to print directly to it wirelessly. It can remove the wires from your mouse, your joystick, your digital camera and can replace the cradle you drop your PDA into to synchronize your calendar. On an even more personal level, it can remove the wires between your cell phone and a hands-free headset.

Bluetooth has a range of about 30 feet. It also has a maximum throughput of 1.5Mbps. Bluetooth might be good to put in a Webpad to surf the internet, but it's too slow to move good size files between your computers. A typical MP3 file is 3Mb. That would take about 20 seconds or so to move between two bluetooth devices. In contrast, 802.11b could have moved 5-7 of those files in that time.

http://www.bluetooth.com/English/Pages/default.aspx

Links to related web pages

Setting up a home network
http://windows.microsoft.com/en-US/windows-vista/Setting-up-a-home-network

How Stuff Works
http://computer.howstuffworks.com/home-network.htm

About Networks
http://www.microsoft.com/windowsxp/using/networking/default.mspx

Hubs Switches and Routers
http://www.duxcw.com/faq/ics/diffrout.htm
http://duxcw.com/faq/network/hubsw.htm