



The Basics of Computer Networking

The Computer Network



Arguably, the greatest advancement in technology and communication over the past 20 years has been the development and advancement of the computer network. From emailing a friend to on-line bill paying to downloading data off the Internet to e-commerce, networking has made our world much smaller and changed the way we communicate forever.

The Computer Network

What is a Computer Network

net-work: [*net-wurk*] – *noun*, a system containing any combination of computers, computer terminals, printers, audio or visual display devices, or telephones interconnected by telecommunication equipment or cables: used to transmit or receive information.

Navigation Links

Network Diagram – Basic Layout and map of a traditional computer network.

Network Types – Computer networks vary in shape and size depending on usage.

- **WAN**
- **LAN**
- **Peer to Peer**

Fiber Optic Cable – One of the Latest innovations in network cabling.

Switches and Hubs – The central device within a network that transmit data.

Servers – The central storage device for the names and locations of various data.

- **IP Addresses**

Topologies – The layouts of various network designs.

- **Star**
- **Bus**
- **Ring**

Firewalls – The network software that keeps destructive forces from a network.

Routers – The device that let messages flow between networks.

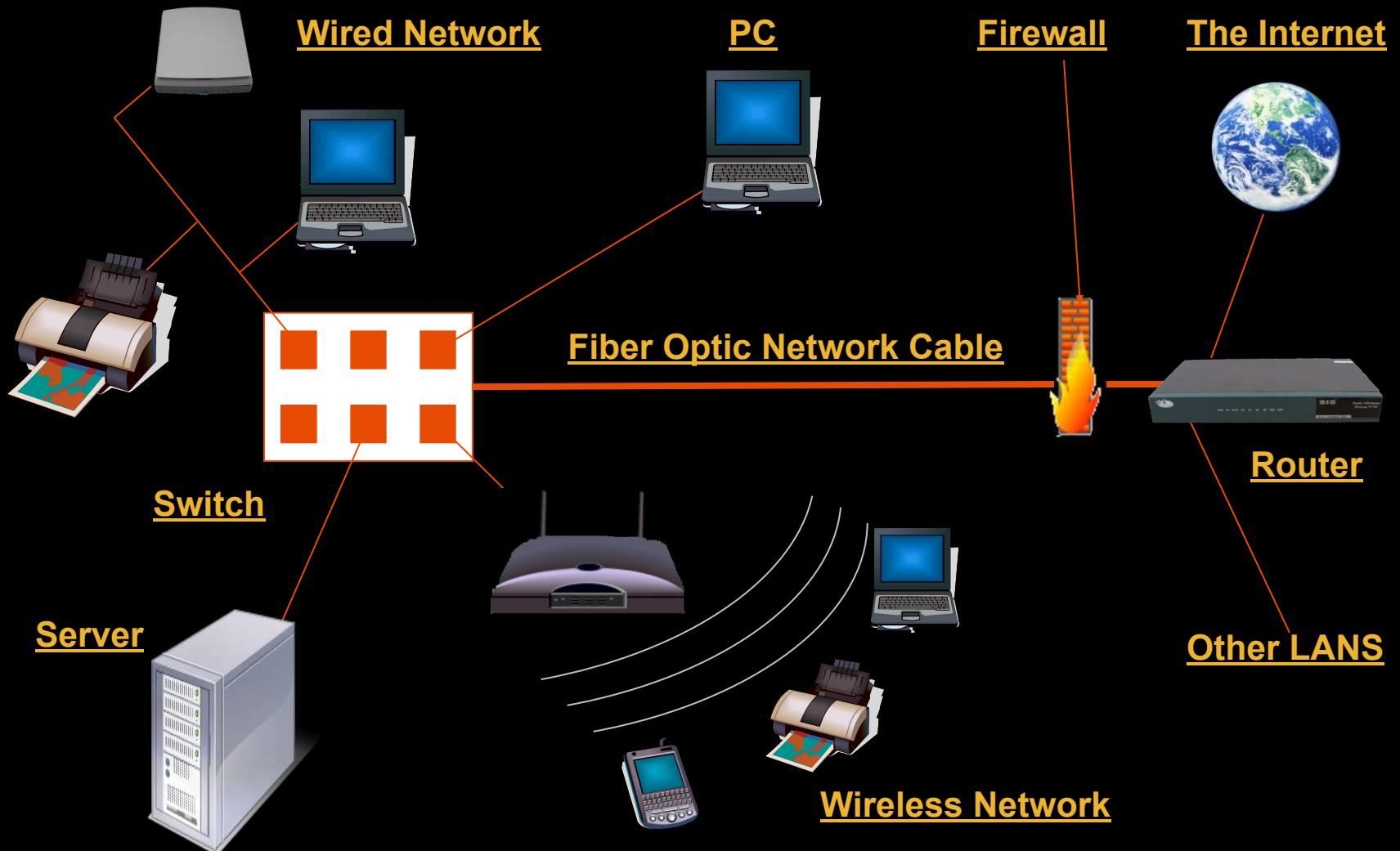
Wireless Networks - *Allows computers to be moved without wires or cables.*

The Internet – The world's largest network.

References

The Network Diagram

(Click on the Words Below and Learn More About Each Component)



The Three Types of Networks

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Network Diagram

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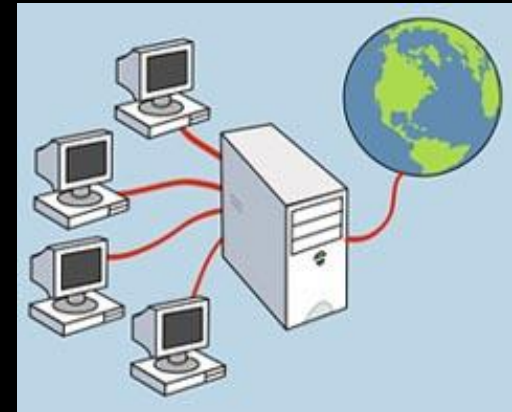
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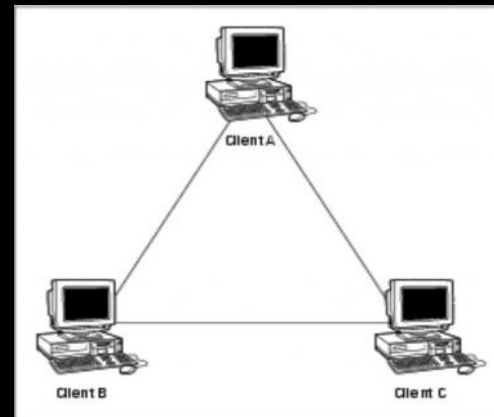
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WIDE AREA



LOCAL AREA



PEER TO PEER

Wide Area Network

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- A Wide Area Network exist over a large area
- Data travels through telephone or cable lines
- Usually requires a Modem
- The world's largest Wide Area Network in the Internet

Local Area Network

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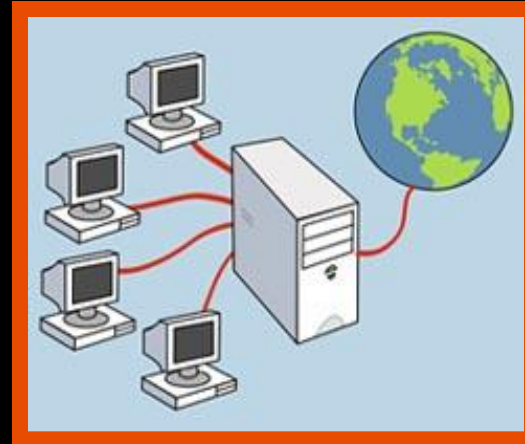
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- A Local Area Network spans a relatively small area
- LAN are usually confined to one building or a group of buildings
- Data travel between network devices via network cables.
- The most common type of Local Area Network is called Ethernet

Peer to Peer Network

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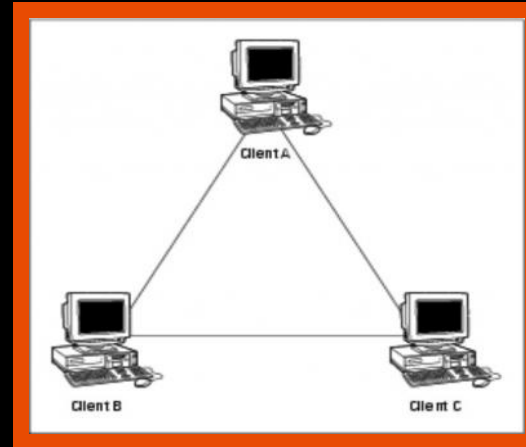
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- Usually very small networks
- Each workstation has equivalent capabilities and responsibilities
- Does not require a switch or a hub.
- These types of networks do not perform well under heavy data loads.

Fiber Optic Cable

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Standard
Network
Copper Cable

- Reduces interference in the network
- Transmit data faster than copper network cable
- Allows for more bandwidth
- Smaller and more fragile than copper cable

Switches and Hubs

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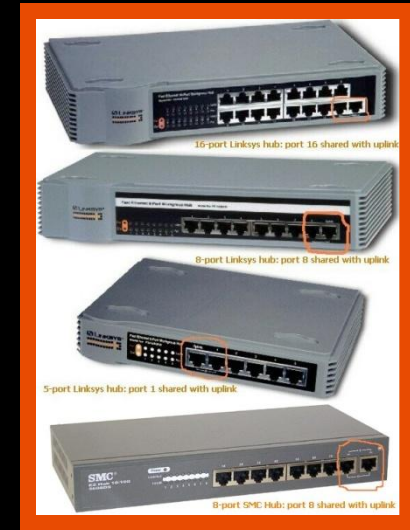
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Network Switches

- Data travels faster through switches because data is not sequenced as it is in a hub
- The information is more secure when it passes through a switch as opposed to a hub.
- Information travels more efficiently through a switch because travels directly to it's destination as opposed to being broadcast to all PC's on the network hub.



Network Hubs

Servers

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Rack of Servers

Users are connected to certain servers which will fulfill the required request.

There are 3 Principle Types of Servers

Print Servers

Contains the name and location of all printers that are on the Network

File Servers

Contain the location and names of the various drives, files, and folders on a Network

Web Servers

Contain the Programs, Files, and Internet Web Sites

Web Servers

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IP Addresses

“IP” stands for Internet Protocol. IP Addresses serve as the location of websites on the Internet as well as the workstations that are connected to the web. IP addresses are made up of four sets of numbers called “**Octets**”. There are two types of IP Addresses: Static and Temporary. Below is a description of both.

Static IP Addresses

Static IP addresses are found only on servers and remain the same.

A **Domain Name Server** assigns a “human readable” web address to each static IP address to make it more user friendly.

Temporary IP Addresses

Temporary IP addresses are found only on PC's are constantly changing each time it is logged on.

Temporary IP addresses are assigned by an ISP (Internet Service Provider) each time it is logged on to the Internet.

Network Topologies

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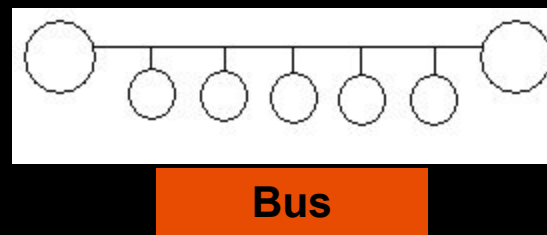
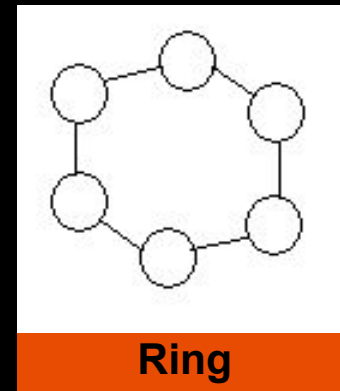
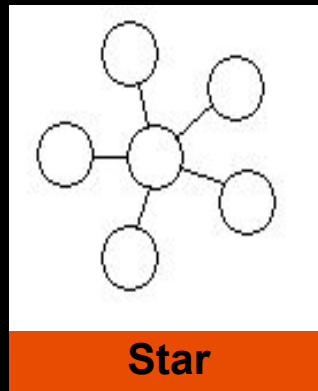
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Network Topology refers to the shape of a network, or the network's layout. How different nodes in a network are connected to each other and how they communicate are determined by the network's topology.

There are three basic topologies:



Star Topology

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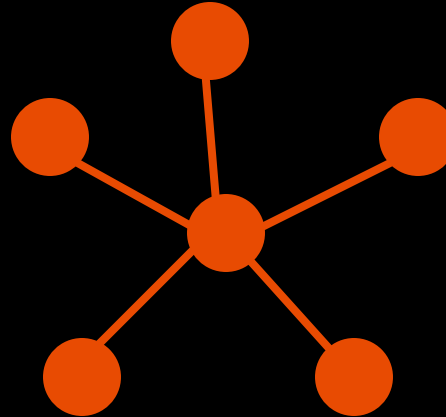
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- All devices are connected to a central hub.
- Nodes communicate across the network by passing data through the hub or switch.

Ring Topology

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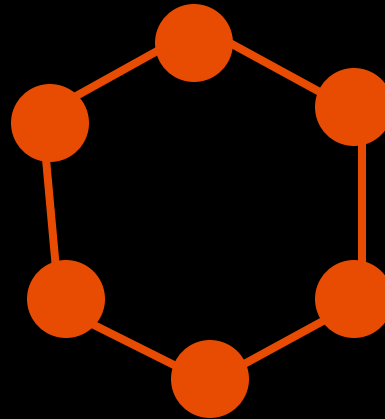
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- All devices are connected to one another in the shape of a closed loop.
- Each device is connected directly to two other devices, one on either side of it.

Bus Topology

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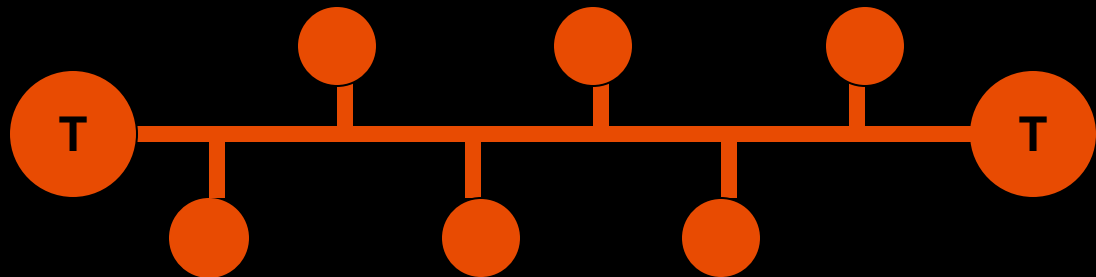
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- All devices are connected to a central cable, called the bus or backbone.
- There are terminators at each end of the bus that stops the signal and keeps it from traveling backwards.

Firewalls

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- A firewall is a software that can be loaded on to a network that can serve as a barrier that keeps destructive forces away from a network of computers.
- Packets of data are analyzed against a set of criteria or standards called filters.
- Filters block certain designated IP addresses.

Routers

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Standard Router



Wireless Router

Whether a Router is traditional or wireless, its purposes remain the same.

Routers are specialized computers that send your messages and those of every other Internet user speeding to their destinations along thousands of pathways.

Routers are crucial devices that let messages flow between networks, rather than within networks.

Wireless Networks

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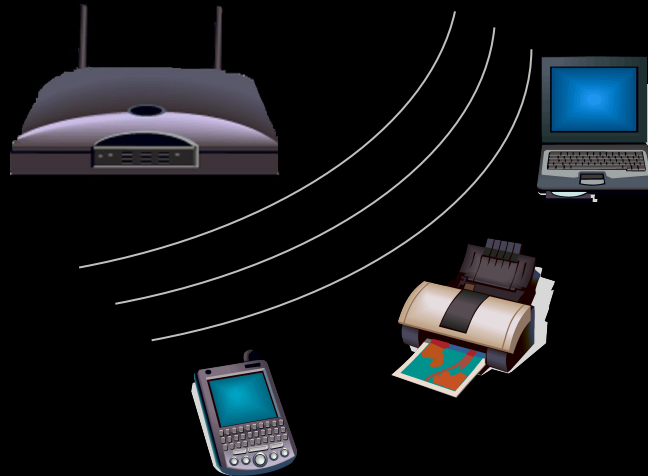
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The Internet



Allows for computers to be moved easily without having to worry about wires or cables

Walkie-Talkie Network

- You would equip each computer with basically, a walkie-talkie.
- You would give each computer a way to set whether it wants to transmit or receive.
- A wireless network converts binary signal (0's and 1's) into a radio signal (series of beeps).

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***The simplest definition of the Internet
is that it's a network of computer
networks***

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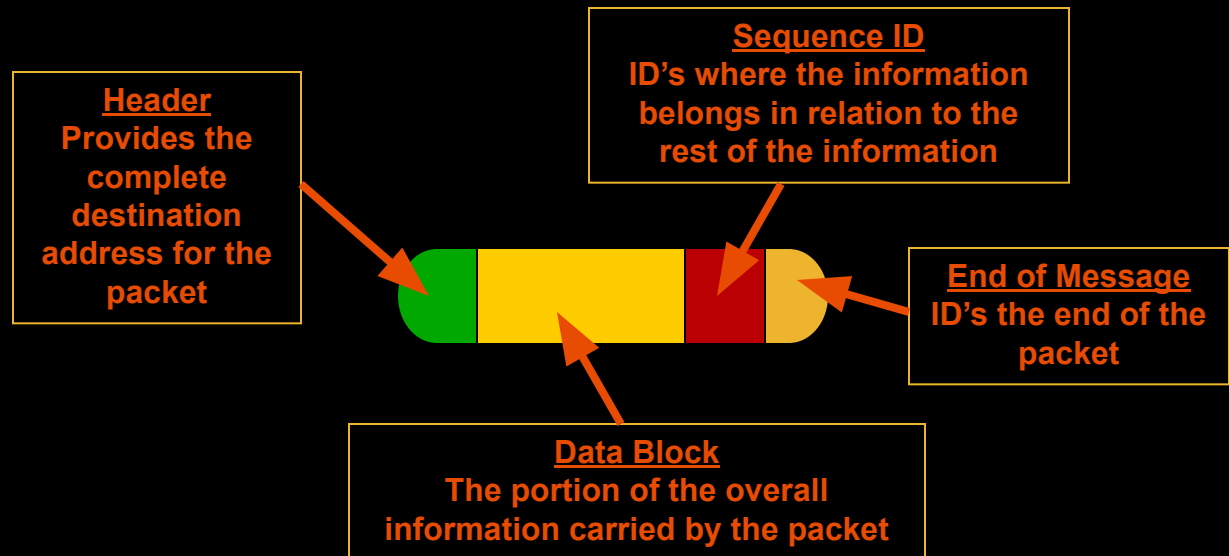
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How Information Travel Through the Internet

A page on the Internet—whether it's full of words, images or both—doesn't come to you in one shipment. It's translated into digital information, chopped into 1500 byte pieces called **PACKETS**, and sent to you like a puzzle that needs to be reassembled. Each part of the packet has a specific function:



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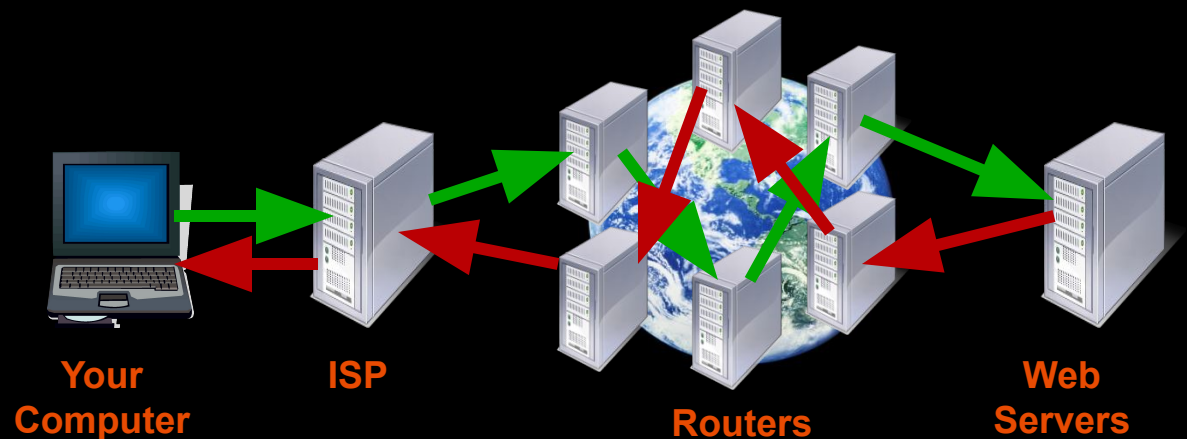
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How Information Travel Through the Internet

When you connect to a Web site through an ISP and start exchanging information, there isn't a fixed connection between your computer and the Web server computer hosting the Web site. Instead, information is exchanged using the best possible path at that particular time. Special computers called routers determine these paths, avoiding slow links and favoring fast ones.



References

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