Introduction to Computer Networks

by Sophia

WHAT'S COVERED

In the early days of computing, computers were seen as devices for making calculations, storing data, and automating business processes. However, as the devices evolved, it became apparent that many of the functions of telecommunications could be integrated into the computer. During the 1980s, many organizations began combining their once-separate telecommunications and information-systems departments into an information technology, or IT, department. This ability of computers to communicate with one another and, maybe more importantly, to facilitate communication between individuals and groups, has been an important factor in the growth of computing over the past several decades. In this tutorial, we will take a closer look at computer networks, and why businesses rely so heavily on them.

Our discussion will break down as follows:

1. Networks

A **network** is a group of people, or devices, connected for the sole purpose of collaborating and sharing resources. Not all networks involve computers or the Internet. Telephone networks provide people with the ability to engage in conversations with one another over large distances. A satellite network provides GPS devices with directions to locations.

TERM TO KNOW

Network

Group of people or devices connected for the sole purpose of sharing data or resources.

2. Computer Networks

A **computer network** is a group of computers, servers, peripheral devices, and network hardware all connected for the purpose of sharing data. Computer networks can be categorized based on the proximity of the network's devices to one another. A **local area network (LAN)** is a computer network where all of the equipment is in close proximity to one another, usually in an office building or on the same campus. LANs are typically confined to a small local area and can be wired or wireless.

Conversely, a **wide area network (WAN)** is a computer network with all of the equipment spread over a large

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geographic area. It is typically inclusive of many small networks or LANs. WANs can be wired or wireless. The most common example of a WAN is the Internet. In fact, computer networking really began in the 1960s with the birth of the Internet. However, while the Internet was evolving and creating a way for organizations to connect to each other and the world, another revolution was taking place inside organizations. The proliferation of personal computers inside organizations led to the need to share resources such as printers, scanners, and data. Organizations solved this problem through the creation of local area networks (LANs), which allowed computers to connect to each other and to peripherals. These same networks also allowed personal computers to hook up to legacy mainframe computers. When an organization needed to provide a network over a wider area (with locations in different cities or states, for example), they would build a wide area network (WAN).

TERMS TO KNOW

Computer Network

A group of computers connected for the purpose of communication-sharing of data and resources.

Local Area Network (LAN)

Computer network that links computers within a building.

Wide Area Network (WAN)

Computer network with all of the equipment spread over a large geographic area, and is typically inclusive of many small networks or LANs.

3. Benefits of Computer Networks

The personal computer originally was used as a stand-alone computing device. However, with the advent of networking and local area networks, computers could work together to solve problems. Higher-end computers were installed as servers, and users on the local network could run applications and share information among departments and organizations. This is called client-server computing. The ability for networked computers to quickly share information is by far one of the most popular reasons for networking computers. To illustrate this idea, consider email applications. The Internet was originally designed as a way for scientists and researchers to share information and computing power among themselves. However, as soon as electronic mail was invented, it began driving demand for the Internet. This wasn't what the developers had in mind, but it turned out that people connecting to people was the killer app for the Internet. Lots of businesses and organizations have also adopted computer networks just to be able to utilize email. The table below lists some more benefits of networked computers.

Networked Computers Allow For:	Translates Into The Following Benefits:
Quick sharing of information (audio, video, text)	--Electronic mail (Email) --Multiple computers can be assigned to solve one problem --Fosters collaboration between users --Decreased need for paper-based communication
Sharing of hardware and software	--One printer can be used to print documents from more than one computer --One computer can be used to serve others (deliver application software)

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4. Protocols

Computers and devices on a network use various protocols to facilitate communication between them. A **protocol** is a format or rule for transmitting data between devices. The protocol determines things such as how the sending device notifies the receiving device that there is data to be sent, what data compression method will be used, and how to check for errors in the data. It is critical that the protocol be executed in the same way on each device; otherwise, no communication can take place.

The most common protocol utilized today is the **TCP/IP** used on the Internet. TCP/IP stands for Transmission Control Protocol/Internet Protocol and is a group of protocols that function together for web-based communication.

TERMS TO KNOW

Protocol
Format or rule for transmitting data between devices.

TCP/IP
Transmission Control Protocol/Internet Protocol; a group of protocols that functions together for web-based communication.

SUMMARY

The networking revolution has completely changed how the computer is used. Today, no one would imagine using a computer that was not connected to one or more **networks**. The development of the Internet, combined with wireless access, has made information available at our fingertips. For businesses and organizations, **computer networks help** to increase productivity and efficiency. Because resources can be shared over a **computer network**, businesses are also able to reduce costs by **sharing data** and other resources such as software and hardware.

Source: Derived from Chapter 5 of “Information Systems for Business and Beyond” by David T. Bourgeois. Some sections removed for brevity.
https://www.saylor.org/site/textbooks/Information%20Systems%20for%20Business%20and%20Beyond/Textbook.html

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