

System Engineering And System Analysis And Design

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1 Introduction

If we want to transfer data or information between the computers there are two ways.

1. Without using network
2. With the help of networks

Just imagine that there are two computers which do not have any connection, still we want to transfer data then we have to use extra resources like Pen Drive, CD or DVD and copy it to other computer. This process is time consuming and requires more resources and money. With the help of network. We can transfer data or information all over the world from one system to another system. This process is easy, fast, secure and reliable.

1.1 Definition of Network:

1.1.1 Computer Networks

Computer network is defined as two or more computers are connected in such a way that they can share their data, information as well as their resources. Computer Network is the interconnected collection of autonomous computer and peripheral devices. The links connecting the devices are called *communication channels*. The concept of connecting computers for sharing resources or data are called *Networking*. Two computer are said to be interconnected if they are able to exchange *data* and *information*.

1.1.2 Characteristics of Network

1. Resource Sharing: It means all the computers within the network are able to share their resources which include all the programs, data, and devices available to anyone on the network without considering the physical location of the resource and user.
2. High reliability: Network provides high reliability by having alternative sources of supply.
3. Saving money: Mostly in networking, one computer work as server and other as client means only server computer require connection with resource and all other client can easily access it. So, it requires less hardware, hence saving a ton of money.
4. Powerful communication medium: One a network, when one person make any change to a document. The other person can see the change immediatly instead of waiting several days.
5. Scalability: Network is able to increase system performace as the work grows, just by upgrading the hardware.

6. Low cost: Using networks, we are able to talk with any person at any part of the world with a low cost compare to telephone system.
7. Time saving: E-mail services require less time compare to postal services.
8. Flexibility of equipment location: We can change location anytime.
9. Improved performace: We can improve performace by adding new efficient network hardware.

1.1.3 Networks are used by people because:

1. Access to remote information
2. Person to person communication
3. Interactive Entertainment

1.1.4 Advantages/Needs of Computer Network:

1. Efficient management of resources
2. Faster Data sharing
3. Keeping information reliable and up to date
4. High reliability
5. Efficient communication

1.2 Network Criteria:

Effective and efficient network must be able to meet following criteria.

1.2.1 Performace

Performace of a network is measured by two times.

1. Transit time Time requied for a message to travel from one device to anoter.
2. Response time Elapsed time between inquiry and response.

1.2.2 Reliability

Network reliability is measured by

1. Frequency of failure All networks fail occasionally. A network that fails often however is a little value.
2. Recovery time of a network after a failure A network that recovers quickly is more useful than one that does not.
3. Catastrophe events Network must be protected from the catastrophe events like fire, earthquake, tsunami, etc.
4. Security Network security include protecting data from unauthorized access and viruses
 - (a) Unauthorized access Sensitive data must be protected from unauthorized access.
 - (b) Viruses Network is accessible from many access points and can be susceptible to computer viruses. A virus is introduced to code that damages the system. A good network is protected to computer viruses.

1.3 Network Applications:

1.3.1 Financial Services

Credit history searches, foreign exchange, investment services and electronic money transfer, etc.

1.3.2 Marketing and sales

Marketing people use them for collecting, exchange and analyze data relating to customer. Sales applications include telemarketing, online reservation services, railway, airline, etc.

1.3.3 Electronic messaging

E-mail services are possible using networks.

1.3.4 Manufacturing

Computer networks are used in manufacturing processes.

1.3.5 Directory service

It allows list of files to be stored in particular location and search operation for the file.

1.3.6 Information Services

World wide web site offers the information services.

1.3.7 Cable television

This also uses computer networking concept

1.3.8 Teleconferencing

It allows conference to occur without the participants being in same place. It includes text, audio and video conferencing.

1.3.9 Electronic data exchange

It allows business information to be transferred without using paper.

1.4 Network Hardware