Computer Hardware & Networking& Server Configurations (H7E3 04)

UNIT 03:
Computer Network Fundamentals

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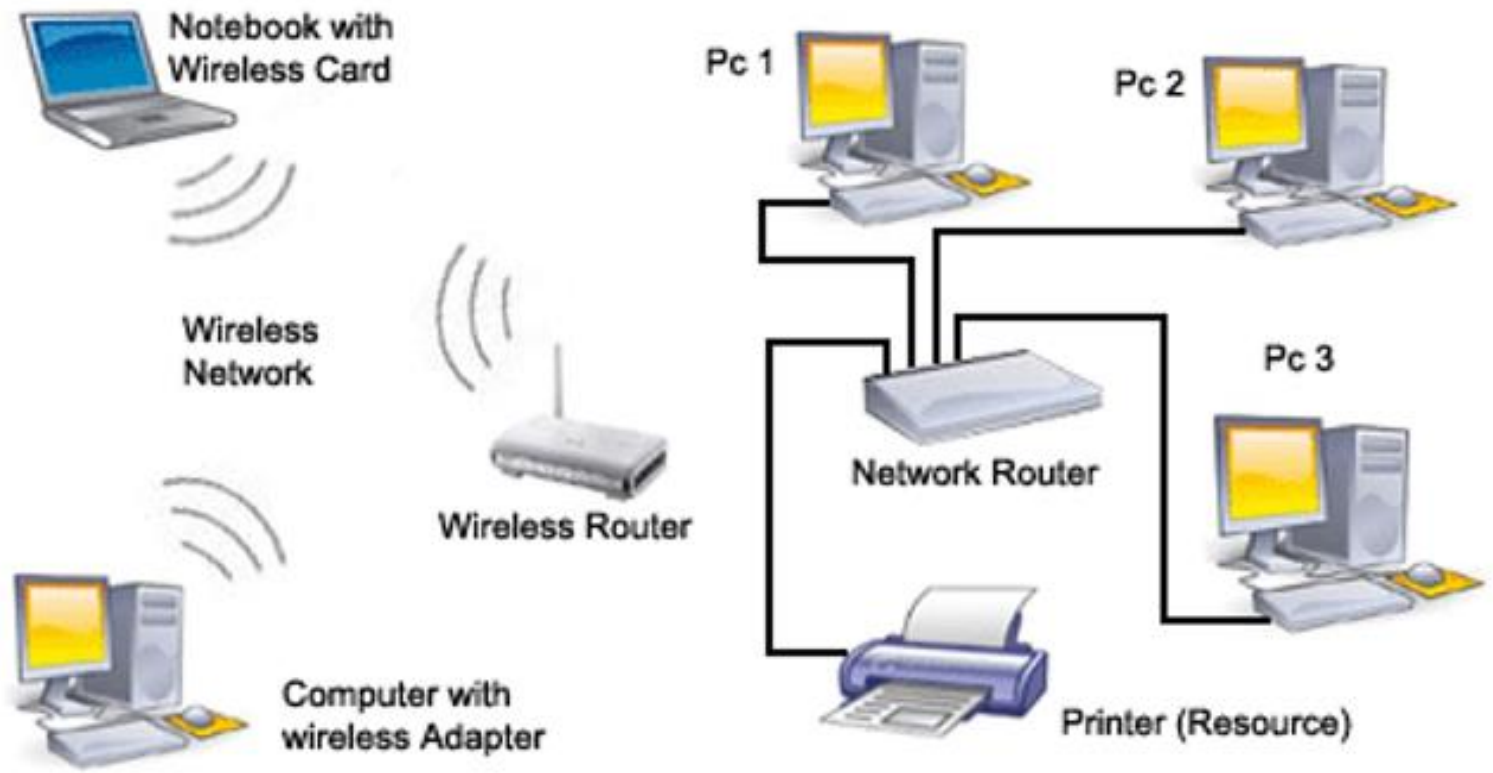
Network Introduction & Advantages

Computer Networks

A Simple Network Structure



- A network is two or more Nodes or Hosts connected by a cable or by a wireless connection so that they can communicate and exchange information or data.

- In other words " Network Means a collection of interconnected computer network of stand-alone computer. Commenting on the computer for the exchange of information. The connection can be over copper, fiber optic, microwave and satellite communications".

Computer Networks

- Computer Network Devices and Components
  - **Host Devices** – any device that sends and receives information on the network (computer, printer, etc.)
  - **Intermediary Devices** – exist in between host devices
  - **Media** – component over which the message travels from source to destination

The Importance of Computer Networks

- Cost reduction by sharing hard- and software resources
- High reliability by having multiple sources of supply
- Cost reduction by downsizing to microcomputer-based networks instead of using mainframes

- Greater flexibility because of possibility to connect devices from various vendors

- Sharing Internet, Communication and Video Games

Main Advantages and Disadvantages of Computer Networking

- Computer networking has become one of the most successful ways of sharing information, where all computers are wirelessly linked together by a common network. Now, businesses and organizations heavily rely on it to get messages and information across to essential channels. Not only has that it benefited establishments, but also individuals, as they also need to share important information every day.

But no matter how useful computer networking is, it does not come without drawbacks. Here are its advantages and disadvantages:

List of Advantages of Computer Networking

1. **It enhances communication and availability of information**

Networking, especially with full access to the web, allows ways of communication that would simply be impossible before it was developed. Instant messaging can now allow users to talk in real time and send files to other people wherever they are in the world, which is a huge boon for businesses. Also, it allows access to a fast amount of useful information, including traditional reference materials and timely facts, such as news and current events.

2. It allows for more convenient resource sharing

This benefit is very important, particularly for larger companies that really need to produce huge numbers of resources to be shared to all the people. Since the technology involves computer-based work, it is assured that the resources they wanted to get across would be completely shared by connecting to a computer network which their audience is also using.

3. It makes file sharing easier

Computer networking allows easier accessibility for people to share their files, which greatly helps them with saving more time and effort, since they could do file sharing more accordingly and effectively.

4. It is highly flexible

This technology is known to be very flexible, as it gives users the opportunity to explore everything about essential things, such as software without affecting their functionality. Plus, people will have the accessibility to all information they need to get and share.

5. It is an inexpensive system

Installing networking software on your device would not cost too much, as you are assured that it lasts and can effectively share information to your peers. Also, there is no need to change the software regularly, as mostly it is not required to do so.

6. It increases cost efficiency

With computer networking, you can use a lot of software products available on the market which can just be stored or installed in your system or server, and can then be used by various workstations.

7. It boosts storage capacity

Since you are going to share information, files and resources to other people, you have to ensure all data and content are properly stored in the system. With this networking technology, you can do all of this without any hassle, while having all the space you need for storage.

List of Disadvantages of Computer Networking

1. **It lacks independence.**

Computer networking involves a process that is operated using computers, so people will be relying more of computer work, instead of exerting an effort for their tasks at hand. Aside from this, they will be dependent on the main file server, which means that, if it breaks down, the system would become useless, making users idle.

2. It poses security difficulties.

Because there would be a huge number of people who would be using a computer network to get and share some of their files and resources, a certain user's security would be always at risk. There might even be illegal activities that would occur, which you need to be careful about and aware of.

3. It lacks robustness.

As previously stated, if a computer network's main server breaks down, the entire system would become useless. Also, if it has a bridging device or a central linking server that fails, the entire network would also come to a standstill. To deal with these problems, huge networks should have a powerful computer to serve as file server to make setting up and maintaining the network easier.

4. It allows for more presence of computer viruses and malware.

There would be instances that stored files are corrupt due to computer viruses. Thus, network administrators should conduct regular check-ups on the system, and the stored files at the same time.

5. Its Light Policing Usage Promotes Negative Acts.

It has been observed that providing users with internet connectivity has fostered undesirable behavior among them. Considering that the web is a minefield of distractions—online games, humor sites could be tempted during their work hours. The huge network of machines could also encourage them to engage in illicit practices, such as instant messaging and file sharing, instead of working on work-related matters.

While many organizations draw up certain policies on this, they have proven difficult to enforce and even engendered resentment from employees.

6. It requires an efficient handler.

For a computer network to work efficiently and optimally, it requires high technical skills and know-how of its operations and administration. A person just having basic skills cannot do this job. Take note that the responsibility to handle such a system is high, as allotting permissions and passwords can be daunting. Similarly, network configuration and connection is very tedious and cannot be done by an average technician who does not have advanced knowledge.

7. **It requires an expensive set-up.**

Though computer networks are said to be an inexpensive system when it is already running, its initial set up cost can still be high depending on the number of computers to be connected. Expensive devices, such as routers, switches, hubs, etc., can add up to the cost. Aside from these, it would also need network interface cards (NICs) for workstations in case they are not built in.

- **Conclusion**

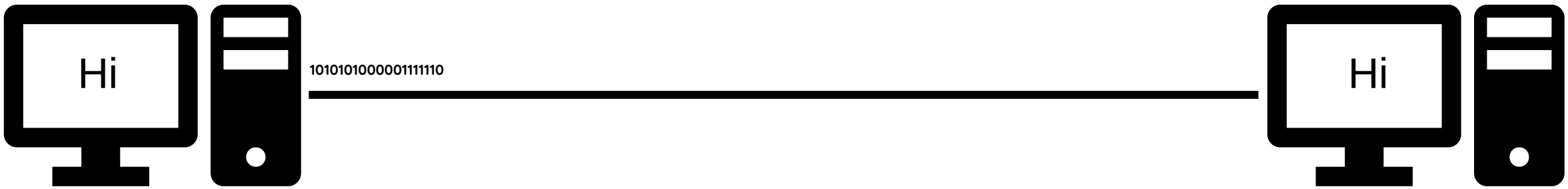
Computer networking will always be a fast and convenient means of transferring and sharing information, but people should be aware of its consequences as well. They should remember that often relying on this system can put them at certain risks that can be cause by its flaws and other malfunctions.

DATA COMMUNICATION AND TRANSMISSION

Data transmission - Introduction

Data representation

- The purpose of a network is to transmit information from one computer to another. To do this, you first have to decide how to encode the data to be sent, in other words its computer representation. This will differ according to the type of data, which could be:


Hi
1010101000001111110
Hi

- Audio data
- Text data
- Graphical data
- Video data

Data representation can be divided into two categories:

- **Digital representation**: which means that the information is encoded as a set of binary values, in other words a sequence of 0s and 1s

- **Analogue representation**: which means that the data will be represented by the variation in a continuous physical quantity

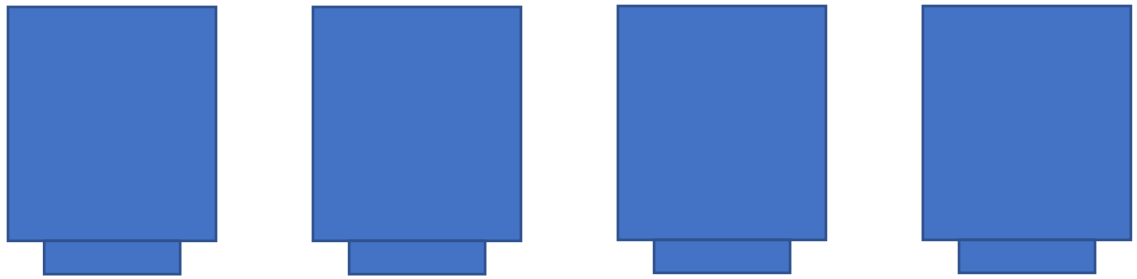
Data transmission medium

- In order for data transmission to occur, there must be a transmission line, also called *transmission channel* or *channel*, between the two machines.

- These transmission channels are made up of several segments that allow the data to circulate in the form of electromagnetic, electrical, light or even acoustic waves. So, in fact, it is a vibratory phenomenon that is propagated over the physical medium.

Encoding of transmission signals

- In order for data to be exchanged, an encoding must be chosen for the transmission signals. This depends basically on the physical medium used to transfer the data, the guaranteed data integrity and transmission speed.



Simultaneous data transmission

- Data transmission is called "simple" if there are only two machines communicating, or if only a single piece of data is sent. Otherwise, it is necessary to install several transmission lines or to share the line among several different communication actors. This sharing is called multiplexing.

Communication protocols

A protocol is a common language used by all actors in the communication to exchange data. However, its role does not stop there. A protocol also allows:

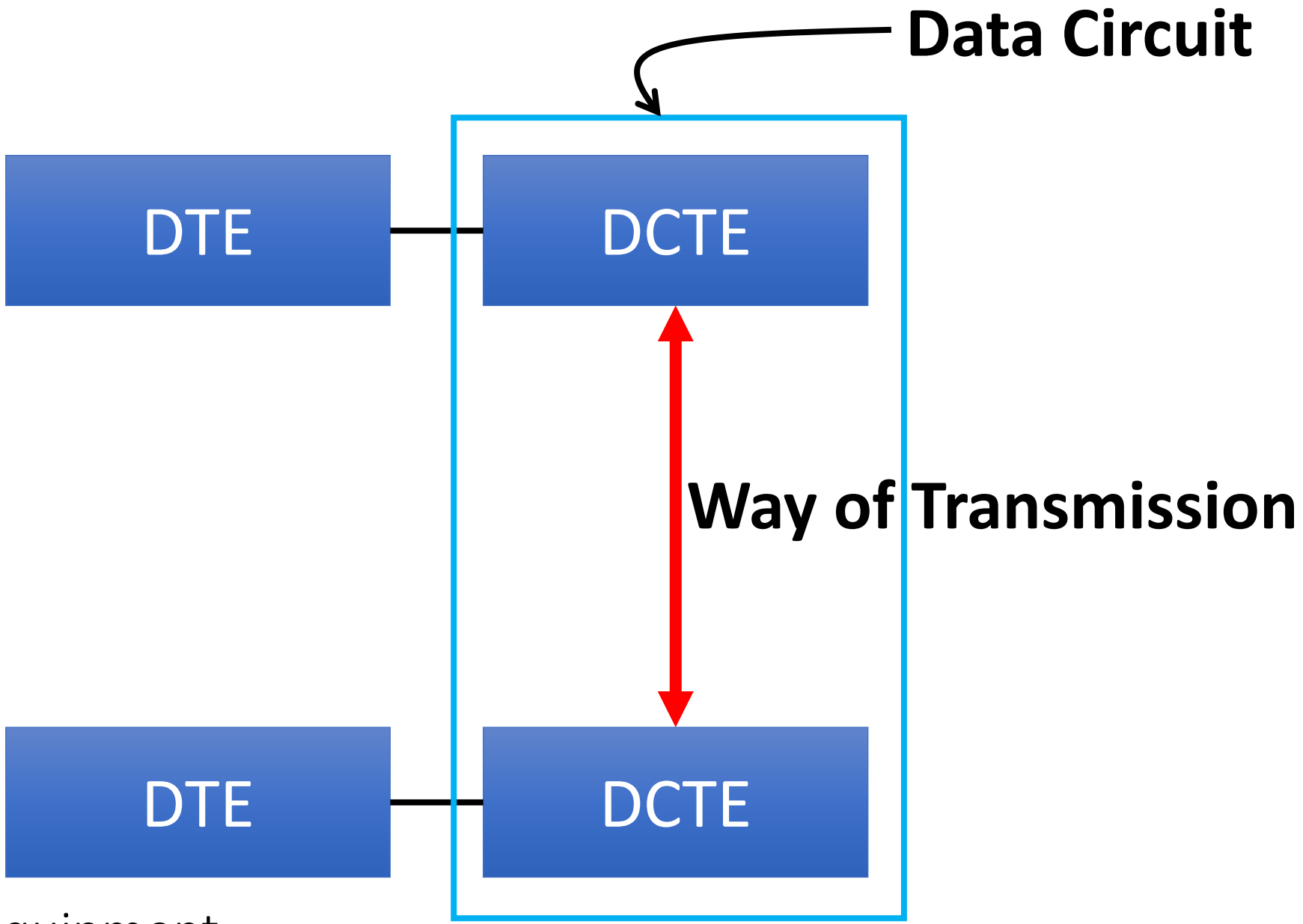
- Initiation of communications
- Data exchange
- Error detection
- A "courteous" end of communications

Data Transmission - The Physical Connection

What is a Transmission Channel?

- A transmission line is a connection between two machines. The term **transmitter** generally refers to the machine that sends the data while **receiver** refers to the one receiving the data. The machines can sometimes be both receivers and transmitters (this is generally the case with computers connected to a network).

- A transmission line, also sometimes called a *transmission channel*, does not necessarily consist of a single physical medium, which is why the end machines (as opposed to the intermediary machines), called **DTE**, (*Data Terminal Equipment*) each have equipment for the physical medium to which they are connected called **DCTE** (*Data Circuit Terminating Equipment*) or **DCE** (*Data Communication Equipment*). The term **data circuit** refers to the assembly consisting of the **DTCE** of each machine and the data line.



DTE - Data Terminal Equipment

DCTE - Data Circuit Terminating Equipment

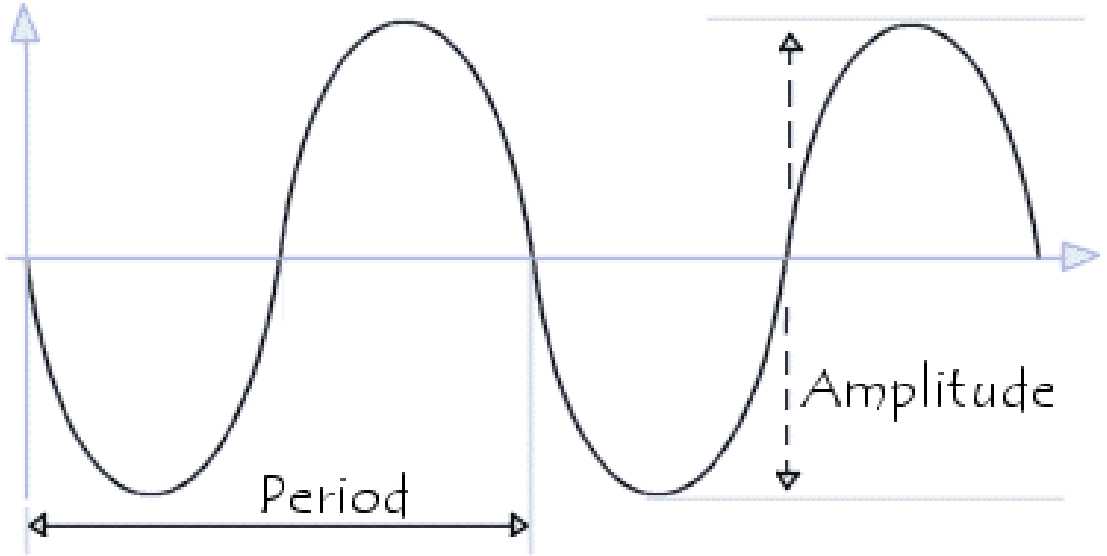
The basics of electromagnetic waves

Data is transmitted on a physical medium by propagation of a vibratory phenomenon. An undulating signal results from this depending on the physical quantity that is being varied:

- in the case of light, it is a light wave
- in the case of sound, it is a sound wave

- in the case of voltage or amperage of an electric current, it is an electrical wave

- Electromagnetic waves are characterized by their frequency, their amplitude and their phase.



Types of physical media

The physical transmission media are the elements that allow information to flow between transmission devices. These media are generally divided into three categories, according to the type of physical quantity that they allow to circulate, and therefore according to their physical composition:

- **Wire media** allow an electrical quantity to circulate on a cable that is generally metallic

- **Aerial media** refers to the air or a vacuum which allow the circulation of electromagnetic waves and various types of radio-electric waves

- **Optical media** allow information to be sent in the form of light

The speed of the physical quantity will vary depending on the physical medium (for example, sound propagates through the air at a speed of on the order of 300 m/s whereas the speed of light is close to 300,000 km/s).

Upload and download

- Download refers to data transfer from the server to your computer and upload refers to data transfer from your computer to the server. It is of interest to know that upload and download occur on separate transmission channels (whether this be on a modem or on a special-purpose line). So, when you are sending (uploading) a document you are not losing any download bandwidth.

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THANK YOU