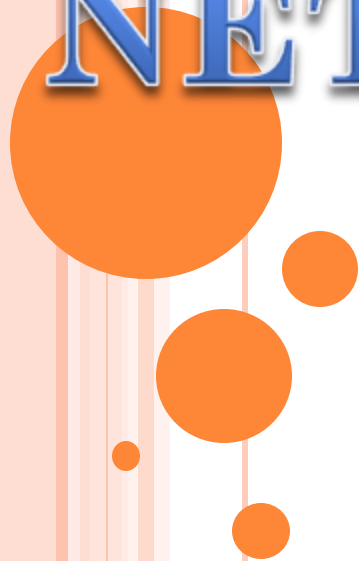# UNIT – 1

COMPUTER NETWORK

DATA COMMUNICATION

Data communication refers to the transmission of this digital data between two or more computers and **a computer network** is a telecommunications network that allows computers to exchange data. The devices that transmit or receive the data, such as a phone or a computer, are referred to as nodes.

COMPONENTS OF DATA COMMUNICATION

Data Communication
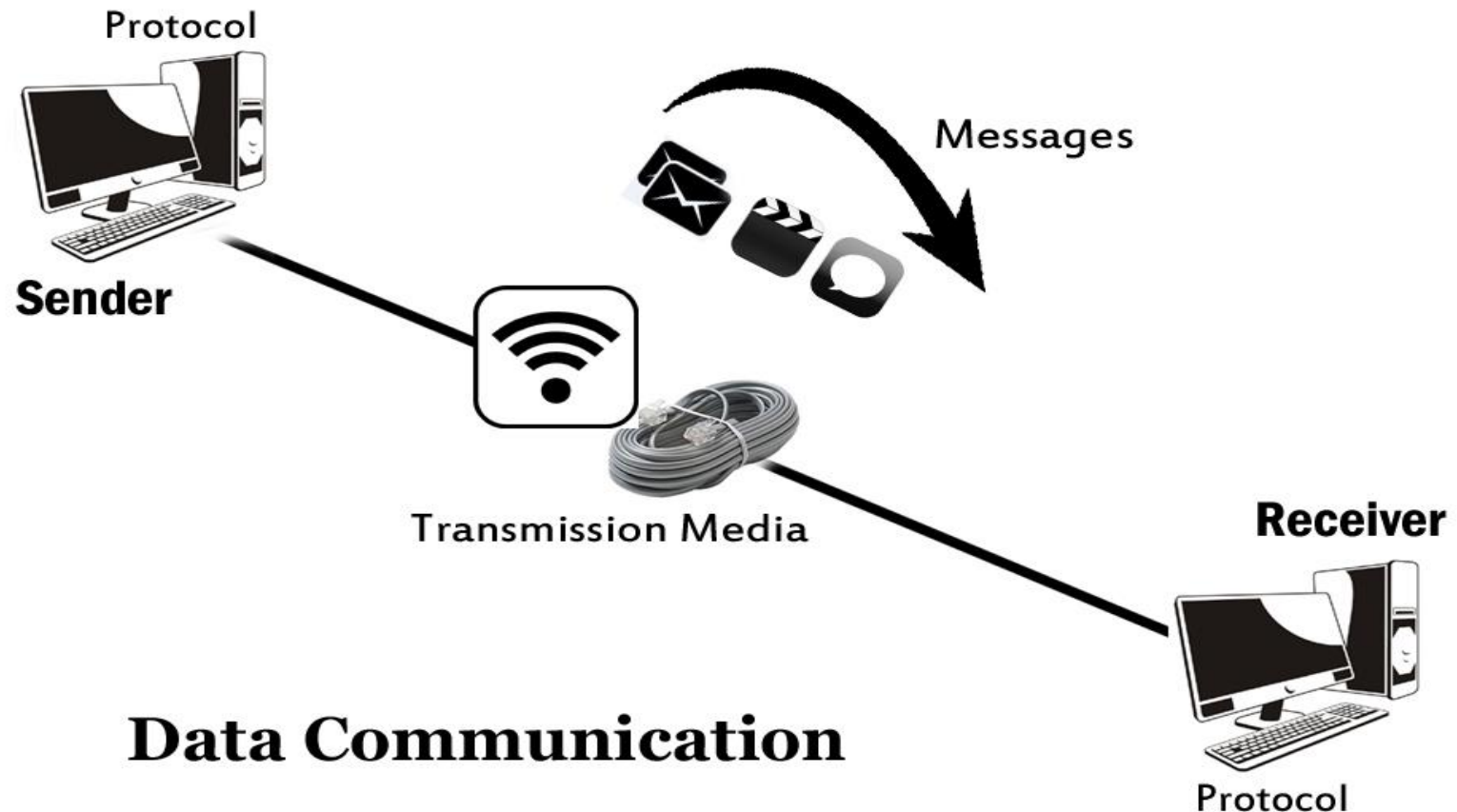
There are mainly five components of a data communication system:

1. Message
2. Sender
3. Receiver
4. Transmission Medium
5. Set of rules (Protocol)

1. *Message:* The message is the information (data) to be communicated. A message could be in any form, it may be in form of a text file, an audio file, a video file, etc.

2. *Sender* :
   To transfer message from source to destination, someone must be there who will play role of a source. Sender plays part of a source in data communication system. It is simple a device that sends data message. The device could be in form of a computer, mobile, telephone, laptop, video camera, or a workstation, etc.

3. **Receiver**

It is destination where finally message sent by source has arrived. It is a device that receives message. Same as sender, receiver can also be in form of a computer, telephone mobile, workstation, etc.

4. **Transmission medium**

In entire process of data communication, there must be something which could act as a bridge between sender and receiver, Transmission medium plays that part. It is physical path by which data or message travels from sender to receiver.

Transmission medium could be like twisted-pair cable, coaxial cable, fiber-optic cable etc.

5. Protocol

A protocol is nothing but a set of rules that applies on the full data communication procedure. This is like an agreement between the two devices to successfully communicate with each other. For example, how to send the data, how the data will be travelling, how to ensure that full data has received, how to handle errors in transmission etc. Both devices follow the same set of rules or protocol so that they understand each other.

COMPUTER NETWORK

A **computer network** is a set of **computers** connected together for the purpose of sharing resources. The most common resource shared today is connection to the Internet.

Computers on a network are called **nodes**.

TYPES OF NETWORK

There are three main types of networks:
1. **LAN**
2. **WAN**
3. **MAN**

They are explained below:

- **Local Area Network (LAN):** It is usually a small network that is restricted to a small geographic area. A computer network available only to the residents of a building can be called a LAN.

- **Wide Area Network (WAN):** As the name implies, these networks cover a broad range of geographic area. WANs are used to connect LANs and other types of networks together so that users and computers can communicate with computers in other regions. An example of a WAN is Internet.

- **Metropolitan Area Network (MAN):** MAN is a network that connects the users with computer resources in a geographic area that is larger than LAN but not quite as large as WAN.

DISTRIBUTED PROCESSING

Distributed processing is the use of more than one processor to perform the processing for an individual task.

Distributed processing also can be used as a synonym for parallel processing, in which programs are made to run more quickly with multiple processors.

Distributed data processing is a computer-networking method in which multiple computers across different locations share computer-processing capability.

ADVANTAGES

- **Improved Performance and Reduced Processing Time:** Single computers are limited in their performance and efficiency. An easy way to increase performance is by adding another computer to a network.

- **Flexible:** Individual computers that comprise a distributed network are present at different geographical locations. The three machines are interconnected via the Internet and are able to process data in parallel, even while at different locations. This makes distributed data-processing networks more flexible.

- **Reliable:** Distributed data processing is more reliable, since multiple control centres are spread across different machines. A glitch in any one machine does not impact the network, since another machine takes over its processing capability. Faulty machines are quickly isolated and repaired. This makes distributed data processing more reliable than single-server processing systems.

OSI MODEL

OSI stands for **Open Systems Interconnection**. It has been developed by ISO – '**International Organization of Standardization**', in the year 1984. It is a 7 layer architecture with each layer having specific functionality to perform. All these 7 layers work collaboratively to transmit the data from one person to another across the globe.
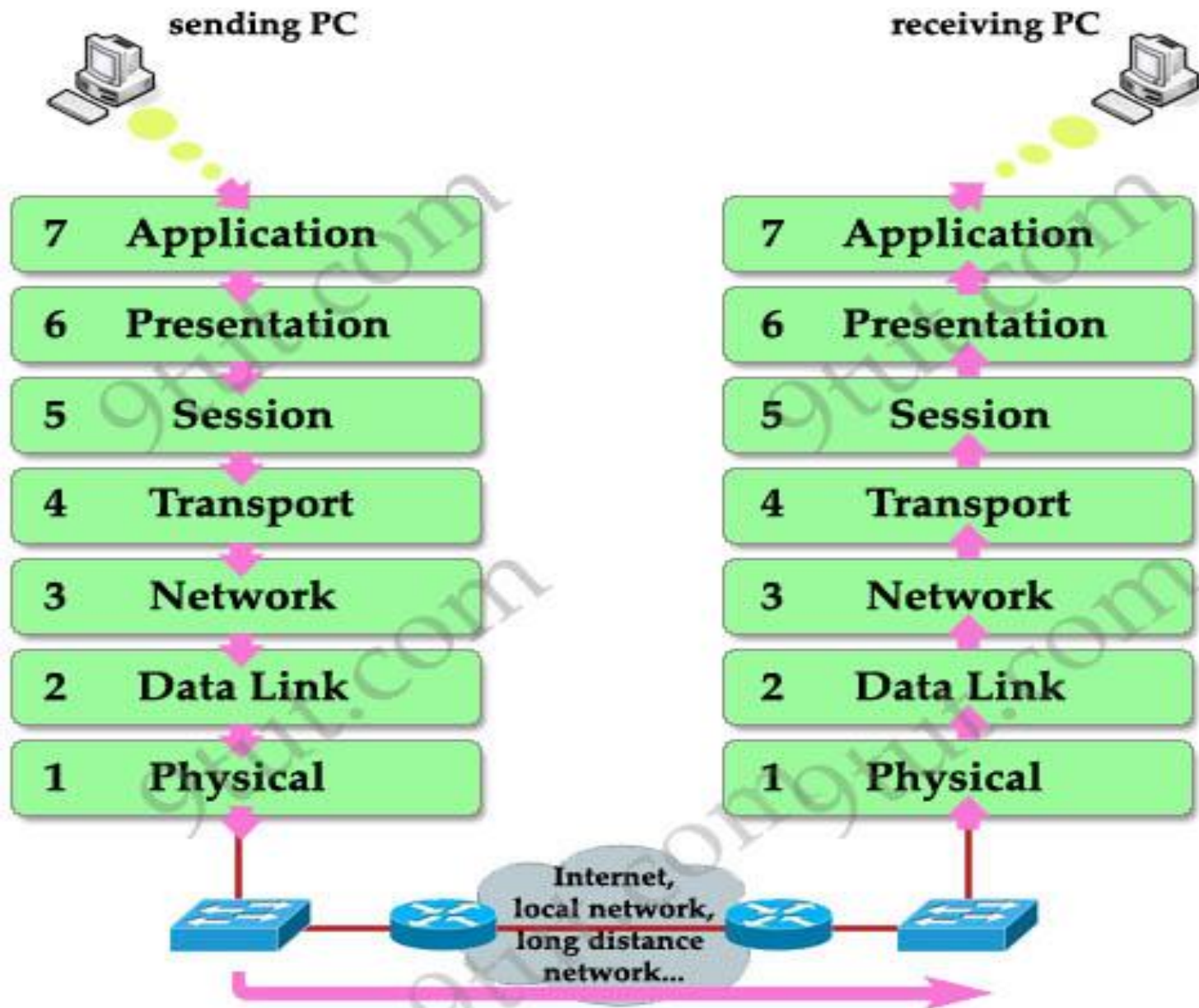
7 LAYERS OF OSI MODEL

1. Physical Layer (Layer 1) :

The lowest layer of the OSI reference model is the physical layer. It is responsible for the actual physical connection between the devices. The physical layer contains information in the form of **bits.** It is responsible for transmitting individual bits from one node to the next.

The main functions of the physical layer are as follows −

- It defines the physical characteristics and functions of the physical devices and interfaces so that transmission can occur.

- It lays out the transmission medium and type of signal for transmitting the bits.

- It defines the procedure of encoding of the bits, for example, how many volts should represent a 0 bit and 1 bit in case of electrical signals.

- It states the data transmission rate, i.e., number of bits transmitted per second; and the duration of a bit, i.e., how long a bit stays.

- It defines the topology, i.e., physical layout, of the network devices.

- It also states the direction of transmission, i.e., whether the transmission is in simplex mode, half-duplex mode or full-duplex mode.