Data Communication – Definition, Components, Types, Channels

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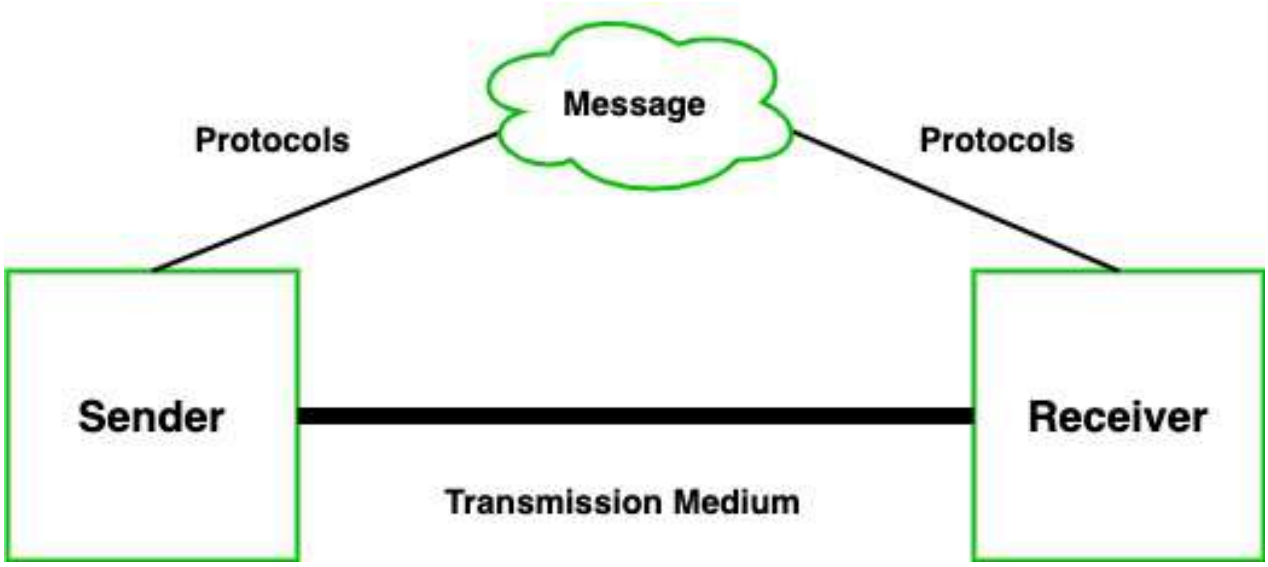
Communication is defined as a process in which more than one computer transfers information, instructions to each other and for sharing resources. Or in other words, communication is a process or act in which we can send or receive data. A network of computers is defined as an interconnected collection of autonomous computers. Autonomous means no computer can start, stop or control another computer.

Components of Data Communication

A communication system is made up of the following components:

1. **Message:** A message is a piece of information that is to be transmitted from one person to another. It could be a text file, an audio file, a video file, etc.
2. **Sender:** It is simply a device that sends data messages. It can be a computer, mobile, telephone, laptop, video camera, or workstation, etc.
3. **Receiver:** It is a device that receives messages. It can be a computer, telephone mobile, workstation, etc.
4. **Transmission Medium / Communication Channels:** Communication channels are the medium that connect two or more workstations. Workstations can be connected by either wired media or wireless media.
5. **Set of rules (Protocol):** When someone sends the data (The sender), it should be understandable to the receiver also otherwise it is meaningless. For example, Sonali sends a message to Chetan. If Sonali writes in Hindi and Chetan cannot understand Hindi, it is a meaningless conversation.



Therefore, there are some set of rules (protocols) that is followed by every computer connected to the internet and they are:

- **TCP(Transmission Control Protocol)**: It is responsible for dividing messages into packets on the source computer and reassembling the received packet at the destination or recipient computer. It also makes sure that the packets have the information about the source of the message data, the destination of the message data, the sequence in which the message data should be re-assembled, and checks if the message has been sent correctly to the specific destination.
- **IP(Internet Protocol)**: Do You ever wonder how computer determines which packet belongs to which device. What happens if the message you sent to your friend is received by your father? Scary Right. Well! IP is responsible for

handling the address of the destination computer so that each packet is sent to its proper destination.

Type of data communication

As we know that data communication is communication in which we can send or receive data from one device to another. The data communication is divided into three types:

1. **Simplex Communication:** It is one-way communication or we can say that unidirectional communication in which one device only receives and another device only sends data and devices uses their entire capacity in transmission. For example, IoT, entering data using a keyboard, listing music using a speaker, etc.
2. **Half Duplex communication:** It is a two-way communication, or we can say that it is a bidirectional communication in which both the devices can send and receive data but not at the same time. When one device is sending data then another device is only receiving and vice-versa. For example, walkie-talkie.
3. **Full-duplex communication:** It is a two-way communication or we can say that it is a bidirectional communication in which both the devices can send and receive data at the same time. For example, mobile phones, landlines, etc.

Communication Channels

Communication channels are the medium that connects two or more workstations. Workstations can be connected by either wired media or wireless media. It is also known as a transmission medium. The transmission medium or channel is a link that carries messages between two or more devices. We can group the communication media into two categories:

- Guided media transmission
- Unguided media transmission

data is transmitted using these cables in terms of signals. Guided media transmission of the following types:

1. Twisted pair cable: It is the most common form of wire used in communication. In a twisted-pair cable, two identical wires are wrapped together in a double helix. The twisting of the wire reduces the crosstalk. It is known as the leaking of a signal from one wire to another due to which signal can corrupt and can cause network errors. The twisting protects the wire from internal crosstalk as well as external forms of signal interference. Types of Twisted Pair Cable :

- **Unshielded Twisted Pair (UTP):** It is used in computers and telephones widely. As the name suggests, there is no external shielding so it does not protects from external interference. It is cheaper than STP.
- **Shielded Twisted Pair (STP):** It offers greater protection from crosstalk due to shield. Due to shielding, it protects from external interference. It is heavier and costlier as compare to UTP.

2. Coaxial Cable: It consists of a solid wire core that is surrounded by one or more foil or wire shields. The inner core of the coaxial cable carries the signal and the outer shield provides the ground. It is widely used for television signals and also used by large corporations in building security systems. Data transmission of this cable is better but expensive as compared to twisted pair.

3. Optical fibers: Optical fiber is an important technology. It transmits large amounts of data at very high speeds due to which it is widely used in internet cables. It carries data as a light that travels inside a thin glass fiber. The fiber optic cable is made up of three pieces:

1. **Core:** Core is the piece through which light travels. It is generally created using glass or plastic.
2. **Cladding:** It is the covering of the core and reflects the light back to the core.
3. **Sheath:** It is the protective covering that protects fiber cable from the environment.

2. Unguided Media: The unguided transmission media is a transmission mode

used to transmit signals in all directions. Unguided Media is further divided into various parts :

1. Microwave: Microwave offers communication without the use of cables. Microwave signals are just like radio and television signals. It is used in long-distance communication. Microwave transmission consists of a transmitter, receiver, and atmosphere. In microwave communication, there are parabolic antennas that are mounted on the towers to send a beam to another antenna. The higher the tower, the greater the range.

2. Radio wave: When communication is carried out by radio frequencies, then it is termed radio waves transmission. It offers mobility. It is consists of the transmitter and the receiver. Both use antennas to radiate and capture the radio signal.

3. Infrared: It is short-distance communication and can pass through any object. It is generally used in TV remotes, wireless mouse, etc.

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