

Module

3

Communication Process And Layered Architecture

Lesson

6

Communication Between Two Computers And The Layering Concept

LESSON OBJECTIVE

General

This lesson will focus on the layering concept in communication process (computer communication).

Specific

The learner shall be able to

1. Describe communication between two computers in light of the layering concept.
2. Describe the working of a network interface card.

The process of human communication has been explained in the previous lesson. It is now necessary to develop a technique whereby two machines viz. computers can communicate with each other. A computer was originally a stand-alone device, but subsequently it was realized that the computers could also be used for non-numerical applications such as information storage and processing. Immediately with this application came the need for two computers to exchange information, in a manner similar to human beings as shown in figure 3.2.1 . It is known that the computers are inanimate devices and do not have intelligence like human beings have. Therefore the communication process, which has been discussed above, has to be modified before applying to the computers for enabling them to communicate with each other. A computer has to be equipped with what can be called as a communication processor, which will handle the variety of communication tasks necessary for any communication.

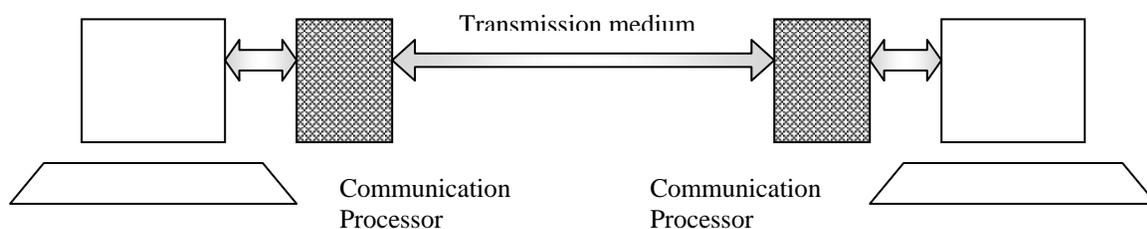


Fig. 3.2.1 Communication between two computers

Out of the three communication processes discussed the application and the physical process are the most important. The implementation of these

three processes is very important in any machine communication. The communication process has the application process as its topmost layer; the communication processor will accordingly have an application processor, which will define the application both at the transmitter and the receiver in a manner similar to that in human beings. Some of the popular examples of application are e-mail, file transfer, remote login, directory services, and World Wide Web. This will basically be a software implementation. Different software packages will be required for the different applications

The communication processor will also require a physical processor, which will convert the information signal into the appropriate electrical or optical signal suitable for transmission over the medium, e.g. if the medium is wireless then a radio MODEM is required at both the transmitter and receiver. Since the computer signals are digital in nature all functions necessary for a digital communication system need to be taken care at the physical layer. The various digital communication tasks are line coding, spectrum shaping, modulation, error control, multiplexing, multiple accessing, synchronization, and transmit and receive power amplification. The physical layer has to take care of these tasks.

 *Modulation is the process of mapping the source spectrum to the destination spectrum*

 **THE COMMUNICATION PROCESSOR WAS PREVIOUSLY CALLED COMMUNICATION ENGINE. NOW IT IS ALSO CALLED NETWORK INTERFACE CARD (NIC).**

There has to be an interface between the application and the physical process. The interface has to carry out the very important task of converting the application into the deliverable message. It may be noted that whatever is done at the sending computer has to be undone at the receiving computer. The above discussion brings out the process of communication between two computers. This process consists of many tasks and functions. For the sake of convenience and understanding as well as implementation, these tasks are grouped into what may be called layers. All application related tasks are grouped together in the application layer, whereas all tasks related to physical transmission and reception of information signal are clubbed into physical layer. The application layer is basically at the end users and works as a virtual communication link. The

physical layer is connected with the media and thus has a direct real link between the sender and the receiving machine. The application from the user A is passed to the application layer of user B, through the physical layer of A and B respectively, because there is no direct path between the application layers of A and B. The interface between the application and the physical process may be termed the Transport process. This layering concept is shown in the figure 3.2.2.

Thus we can see that the computer with the help of hardware and software implements the communication processor.

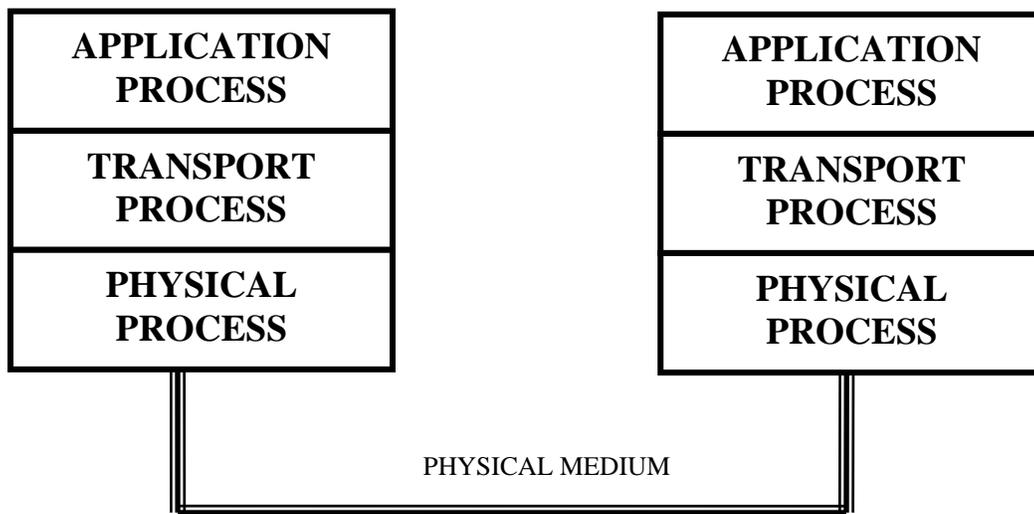


Figure 3.2.2 Layering Concept

Thus instead of a single module for performing communications, there is a structured set of modules that implements the communication function. The three processes mentioned above follow each other, i.e. the Application process precedes the Transport Process and the Physical Process follows it. So we can consider the Application process to be the topmost process of a three-layer structure, the transport process as the second layer and the bottommost layer is the physical process. The Physical process layer is concerned with the exchange of data between a computer and the network to which it is attached. The Application Layer has all the logic needed to support the various users' applications. All the other tasks that are required during communication but cannot fit into the Application or Physical layers are included in the Transport layer. It is a set of abstract mechanisms.

Objective Questions

- 6.01 _____ is the process of mapping source spectrum into the destination spectrum.
- 6.02 Network Interface card was previously known as _____.

Subjective Questions

- 6.11 Describe the communication process between two computers.
- 6.12 What do you mean by communication processor?
- 6.13 What is a network interface card? Where and why is it used?
- 6.14 What are the three basic layers in the communication process.

Level 2 Questions

- 6.21

Source: <http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Communication%20network/pdf/3.2%20Lesson%206.pdf>