

Computer Network

Computer Network Model

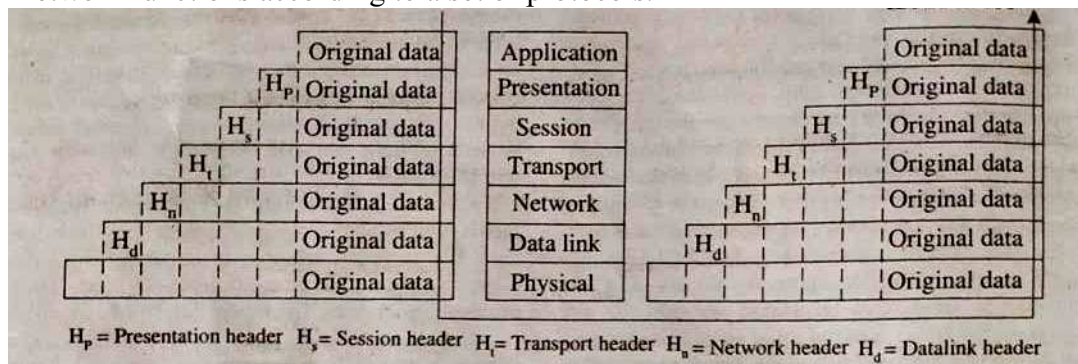
A communication subsystem is a complex piece of Hardware and software. The problem of getting a computer of one brand to accept data created by a machine of a different brand has confronted users of these devices since their early days. At one time the only practical way to get around this barrier was to retype the data from the computer into the second. This is a time-consuming procedure and has chances of errors. Employing software created with the model's requirements in mind, users of computers built to conform to the plan are able to send data to and from one another machines almost effortlessly.

In the early- and mid-1970s, networking was largely either government-sponsored. Towards this end, in 1977, the Geneva-based International Organization for Standardization set forth the Open Systems Inter-connection (OSI) model. The ISO Reference Model has developed a layered approach. In a layered approach, networking concept is divided into several layers, and each layer is assigned a particular task.

Layering Communication Process

Protocols set standards that permit a wide variety in the design of computer hardware and software. Most of today's popular protocols are designed in a layered fashion. Layered approach divides communication tasks into layers. One should think of each layer as being logically connected to the same layer on a different computer on the network. The connection established between these two layers is only logical; the physical communication occurs when packets of data are sent over a physical cable or wireless media.

The lower layers define the network's physical media and related tasks, such as putting data bits onto the network adapter cards and cable. The higher layers define how applications access communication services. The higher the layers, the more complex their task is. Each layer provides some service to action that prepares the data for delivery over the network to another computer. The layers are separated from each other by boundaries called interfaces. All requests are passed from one layer through the, interface to the next layer. Each layer builds upon the standards and activities of the layer below it. At each layer there is software that implements certain network functions according to a set of protocols.



At the sender's computer, before data is passed from one layer to another, it is broken into packets. *A packet is a unit of information transmitted as a whole from one device to another on a network.* Each layer adds some header information to the data packet. This information includes additional formatting or addressing to the packet, which it needs to be successfully transmitted across the network.

This data packet is then put on the physical wire of the transmitting computer. This data packet (along with the header information added by the layers) travels along the wire. When the packet reaches the receiving computer, it passes, through the layers there. Each layer, in the process, reads the header information sent by its peer layer in the sending computer. This header is stripped off before the packet is passed to the upper layer. Finally, the packet reaches the particular application software which can process the data.

Need for Layered Solutions

Layered approach has the following advantages;

- (a) Each layer needs to know and worry only about the functions in its domain. Functioning of other layers is hidden from it. For example, a layer called presentation layer need not worry about how the data will be fragmented and routed along the network. These are the functions of another layer, the network layer.
- (b) Each layer performs a function independent of the other layers. This enables software developers to develop a software component for a particular layer. The software component so developed should conform to the standard to be followed at that particular layer. By following the standards, the component will be able to , communicate and work with software components in other layers. This can be done no matter which vendor has manufactured which component. Thus, layered approach helps in standardizing the whole process in a simple manner.
- (c) A layer can be modified, if needed, without affecting other layers.
- (d) Software packages conforming to the standards of a particular layer are able to use the software at other layers to communicate with each other. Thus, programmers at application layer only need to concentrate on the main logic of the software and not on details such as how messages shall be broken down, to which router they should be sent to, what LAN technology the receiver is using, etc.

There are two common models for network communication.

1. **OSI Model (Reference Model)**
2. **TCP/IP Model (Industrial Model)**

Exercise:

- 1: **What is computer network model?**
- 2: **What is layered approach for network communication?**
- 3: **Write the advantages of layered solutions.**