Data Communication Protocols and Functions of Communication Protocols by Imran Zafar

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All machine based communications must follow certain set of rules for exchange of data between nodes connected to a network. The rules to send and receive data are called protocols. These rules are defined in the network software. A protocol defines;

Which is communicated?

How it is communicated?

When it is communicated?

Elements of Protocol:

1. Syntax:

Syntax refers to the format or structure of data. The protocol accepts the data according to the predefined format. For example, a protocol may expect the format of data as;

First 8-bits of the stream to be the address of header.

Second 8-bits of the stream to be the address of receiver.

Rest of the stream to be the actual data.

2. Semantics:

Semantic means meaning. Semantics refers to the meaning of each section of the bits stream. It includes: how is a particular pattern of bits to be interpreted, and what action is to be taken based on that interpretation.

3. Timing:

Timing refers to:

When data should be sent?

How fast it can be sent?

Functions of Communication Protocol:

The data transmission software or protocols perform the following functions for the efficient and error free transmission of data.

Data Sequencing: The function of a protocol to divide the long message into smaller packets of fixed size that are to be transmitted for error free data transmission, is called Data Sequencing.

Data Routing: The function of a protocol to find the most efficient path or route between the sender and the receiver before sending the data is called Data Routing.

Flow Control: The function of a protocol to control the rate of data transmission from the sender to the receiver is called Flow Control. It regulates the process of sending data between fast sender and slow receiver.

Error Control: The function of a protocol to detect and recover errors for successful data communication between the sender and the receiver is called Error Control. Successful data communication means that data is transmitted without any error.

Important Communication Protocols:

The most common and popular communication protocols are:

1. Ethernet:

Ethernet is the most popular and commonly used LAN protocol. Ethernet is based upon bus topology but can also be used in star topology. It uses cables to transmit data. This protocol is very simple than other, protocols. It is easy to install and maintain.

All nodes (or computers) in Ethernet use the same cable for sending and receiving data. Therefore, this type of network must follow a set of rules to communicate the computers with each other. Otherwise it may cause loss of data or messages. Before transmitting the data, a node must find out if the cable is in use. If so, the node must wait. When the cable is free, the node must begin transmitting immediately. Another version of Ethernet called Fast Ethernet is 10 times faster than original Ethernet. Gigabit Ethernet is even 10 times faster than Fast Ethernet.

2. Token Ring:

Token ring is another widely used LAN protocol. It is used in local area network using ring topology. A computer in the network (using ring topology) must get a token to transfer data to other computer on the network. A token is a special electronic signal. It consists of a series of bits. It is like a ticket. Only one token is available on the network.

When a node on the network wants to transmit data, it first gets the token, and then it can transmit data. When the node has sent its message, it releases the token back to the network. This method of controlling access to the shared network cable is called token passing.

In token passing scheme, only one device is able to access the network at a time. Thus no collision can occur. The main disadvantage of this scheme of data exchange is that, it has very slow data transfer rate.

3. Transmission Control Protocol:

Transmission Control Protocol / Internet Protocol is a real communication protocol that drives the Internet. Every computer to access the Internet must be installed TCP/IP. This protocol provides connectivity between browsers and servers on the Internet for data communication.

TCP/IP ensures a reliable connection between the computers communicating over the Internet. It also defines a mechanism through which every computer on the Internet is identified separately.

In this protocol, data transmission is managed by dividing the data into different pieces called packets. Each packet of data contains a part of actual data, source computer's address, destination computer's address, and information for reassembling data at destination computer. These packets of data travel along the fastest available path in the network.

4. Wireless Application Protocol (WAP):

Wireless application protocol is used by mobile users to access the Internet and e-mail services. In WAP, client-server network architecture is used. Mobile device uses client software to connect to the server computer of Internet Service Provider (ISP). Mobile devices that support WAP are called WAP-enabled devices. The demand of WAP-enabled devices is increasing day by day.

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Imran Zafar writes articles about computer basics and database management such as a elements of computer, a Relational Database and a client server.

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