Solved Question Paper

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2.d)Explain the following in the context of packet switching in data communication : (i) Datagram Approach (ii) Virtual Circuit Approach [10 marks]

Data communication takes place between two devices that are directly connected through some form of transmission medium. Instead, a network of switching nodes provides a transfer path between two devices.

Packet switching involves the breaking up of message into smaller components called packets. Packets often range in size from about 128 bytes to over 4096 bytes depending on the system involved.

Each packet contains source and destination information, and is treated as an individual message. These mini-messages are received and routed through optimal routes by various nodes on a wide area network.

There are two types of packets to be switched. Or there are two approaches of packet switching. They are :

1. Datagram

2. Virtual circuit

1. Datagram approach : In datagram approach, each packet is treated independently and may follow a different path through a network. Each packet contains all necessary addressing information such as source address, destination address and port numbers etc. Packets may be re-ordered, dropped or delivered in wrong sequence. The communication protocols will have to provide error recovery and sequencing of packets at the destination.

2. Virtual circuit : Before starting the transmission, it establishes a logical path or virtual connection between sender and receiver and all packets belongs to this flow will follow this predefined route. This path remains unchanged for the session. Although no resources are reserved along the path, packets are buffered at intermediate nodes awaiting transmission. A virtual circuit only defines a path for packets to follow without actually reserving dedicated channels along the route as is the case with circuit switching. Virtual circuit may provide a number of services including sequencing, error control and flow control.

5.a) Write short notes on the following : Trivial File Transfer Protocol [5 marks]

Trivial File Transfer Protocol (TFTP)

TFTP stands for Trivial File Transfer Protocol.

The TFTP is a minimal protocol for transferring files without authentication. In TFTP, there is no separation of control information and data as in FTP. Therefore TFTP must not be used on computer where sensitive/confidential information is stored. TFTP is frequently used by devices without permanent storage for copying an initial memory image from a remote server when the devices are powered on. Due to the lack of security features, the use of TFTP is generally restricted.

TFTP uses the unreliable transport protocol UDP(User Datagram Protocol) for data transport, whereas FTP uses TCP(Transmission Control Protocol). Each TFTP message is carried in a separate UDP datagram. The first two bytes of a TFTP message specify the type of a message, which can be a request to download a file, request to upload a file, a data message, or an acknowledgement or error message. A TFTP session is initiated when a TFTP client sends a request to upload or download a file from an ephemeral UDP port to the (well-known) UDP port 69 of a TFTP server. When the request is received the TFTP server picks an ephemeral UDP port of its own and uses this port to communicate with the TFTP client. Thus, both client and server communicate using ephemeral ports.

Since UDP does not recover lost or corrupted data, TFTP is responsible for maintaining the integrity of the data exchange. TFTP transfers data in blocks of 512 bytes. Each block is assigned a 2-byte long sequence number and is transmitted in a separate UDP datagram. A block must be acknowledged before the next block can be sent. When an acknowledgment is not received before a timer expires, the block is retransmitted.

5.d) Write short notes on the following : Hybrid Network Topologies [5 marks]

A network may have two-or more topologies. Any two topologies or all the topologies can be used in a network.

For example, a hub may be connected to other hubs using a bus and the workstations may be connected by a star.

Two main hybrid topologies are:

1) The Star Bus Topology

▪ The star bus topology is a combination of bus and star topologies. In this topology the hubs of many star topology networks are linked together with a linear bus or trunk.

▪ For example, we want to link three star topology networks together. In each network, the nodes are connected to its own hub. Thus we have three hubs. These three hubs are connected by a bus topology.

2. The Star Ring Topology

▪ In this topology the hubs of many star topology networks are connected to another main hub in a star pattern. Thus if we have three star topology networks, then the three hubs of the networks are connected to a fourth hub (main hub) in star pattern.