Government of Rajasthan

GOVERNMENT POLYTECHNIC COLLEGE, PALI

Year: 3rd yr **Branch: Electronics** **Session: 2017-18**

EL-309: Computer Communication

III MID TERM TEST

Duration: 1 Hr. **Max. Marks: 15**

Note: *Attempt any THREE questions. All question carry equal marks.*

Q.1 Explain the leaky bucket technique of congestion control.

Congestion कण्ट्रोल का लीकी बकेट तकनीक को समझाइये !

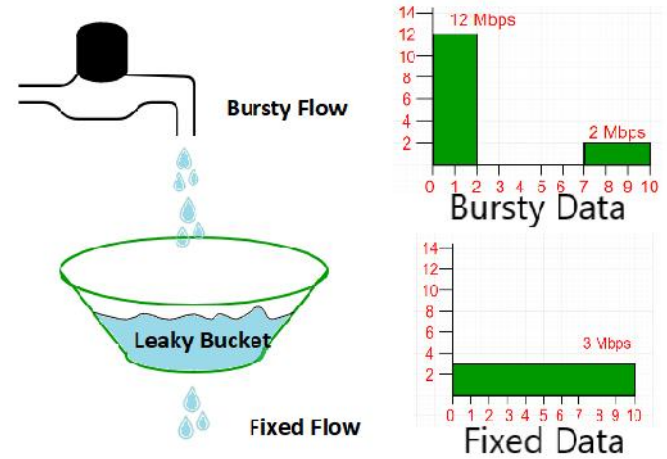
Ans.) To understand this concept first we have to know little about traffic shaping.

Traffic Shaping : This is a mechanism to control the amount and the rate of the traffic sent to thenetwork.

Leaky Bucket technique can be used to shape the traffic.

Suppose we have a bucket in which we are pouring water in a random order but we have to get water in a fixed rate , for this we will make a hole at the bottom of the bucket. It will ensure that water coming out is in a some fixed rate . And also if bucket will full we will stop pouring in it.

The input rate can vary, but the output rate remains constant. Similarly, in networking, a technique called leaky bucket can smooth out bursty traffic. Bursty chunks are stored in the bucket and sent out at an average rate.



In the figure, we assume that the network has committed a bandwidth of 3 Mbps for a host. The use of the leaky bucket shapes the input traffic to make it conform to this commitment. In Figure the host sends a burst of data at a rate of 12 Mbps for 2 s, for a total of 24 Mbits of data. The host is silent for 5 s and then sends data at a rate of 2 Mbps for 3 s, for a total of 6 Mbits of data. In all, the host has sent 30 Mbits of data in 10 s. The leaky bucket smooths the traffic by sending out data at a rate of 3 Mbps during the same 10 s. Without the leaky bucket, the beginning burst may have hurt the network by consuming more bandwidth than is set aside for

this host. We can also see that the leaky bucket may prevent congestion.

A simple leaky bucket algorithm can be implemented using FIFO queue. A FIFO queue holds the packets. If the traffic consists of fixed-size packets (e.g., cells in ATM networks), the process removes a fixed number of packets from the queue at each tick of the clock. If the traffic consists of variable-length packets, the fixed output rate must be based on the number of bytes or bits.

The following is an algorithm for variable-length packets:

1. Initialize a counter to n at the tick of the clock.
2. If n is greater than the size of the packet, send the packet and decrement the counter by the packet size. Repeat this step until n is smaller than the packet size.
3. Reset the counter and go to step 1.

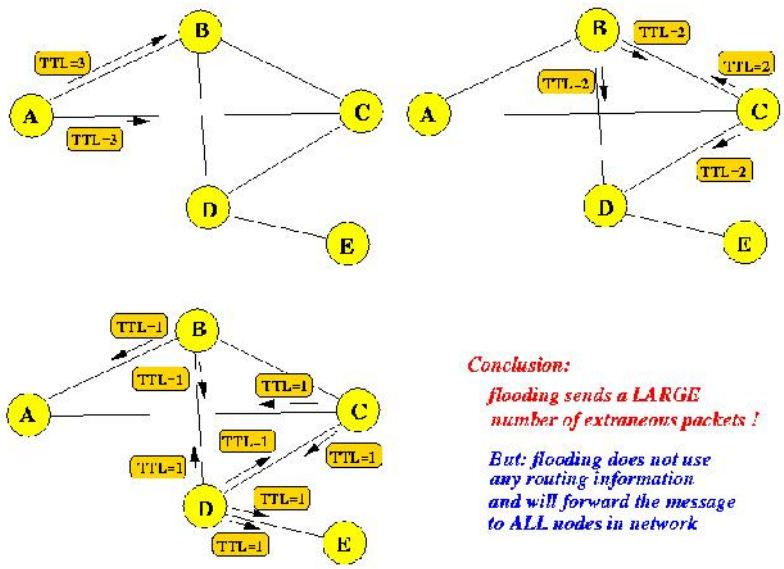
Q.2 Explain the flooding technique use for the routing.

रूटिंग के लिए प्रयोग में लाये जाने वाली flooding तकनीक को समझाइये !

Ans.) Flooding is a simple routing technique in computer networks where a source or node sends packets through every outgoing link.

Flooding, which is similar to broadcasting, occurs when source packets (without routing data) are transmitted to all attached network nodes. Because flooding uses every path in the network, the shortest path is also used. The flooding algorithm is easy to implement.

One major problem of this algorithm is that it generates a large number of duplicate packets on the network.



Several measures are takes to stop the duplication of packets. These are:

1. One solution is to include a hop counter in the header of each packet. This counter is decremented at each hop along the path. When this counter reaches zero the packet is discarded. Ideally, the hop counter should become zero at the destination hop, indicating that there are no more intermediate hops and destination is reached. This requires the knowledge of exact number of hops from a source to destination.

Another technique is to keep the track of the packed that have been flooded, to avoid sending them a second time. For this, the source router put a sequence number in each packet it receives from its hosts. Each router then needs a list per source router telling which sequence numbers originating at that source have already been seen. If an incoming packet is on the list, it is not flooded.

3. Another solution is to use **selective flooding.** In selective flooding the routers do not send every incoming packet out on every output line. Instead packet is sent only on those lines which are approximately going in the right direction.

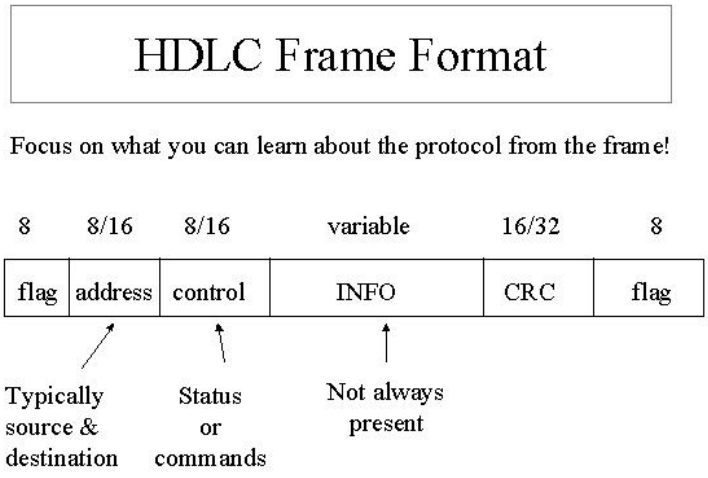
Q.3 Explain the frame structure of HDLC protocol.

HDLC प्रोटोकॉल के प्रेम स्ट्रक्चर को समझाइये !

Ans.) High-Level Data Control, also known as HDLC, is a bit oriented, switched and non-switched protocol. It is a data link control protocol, and falls within layer 2, the Data Link Layer of the Open Systems Interface (OSI) model.

It has been so widely implemented because it supports both half duplex and full duplex communication lines, point to point(peer to peer) and multi-point networks, and switched or non-switched channels. The procedures outlined in HDLC are designed to permit synchronous, code-transparent data transmission. Other benefits of HDLC are that the control information is always in the same position, and specific bit patterns used for control differ dramatically from those in representing data, which reduces the chance of errors.

HDLC Frame Structure: HDLC uses the term "frame" to indicate an entity of data (or a protocol data unit) transmitted from one station to another. Figure below is a graphical representation of a HDLC frame with an information field.



Field Name	Size(in bits)
Flag Field(F)	8 bits
Address Field(A)	8 bits
Control Field(C)	8 or 16 bits
Information Field(I)	Variable; Not used in some frames
Frame Check Sequence(FCS)	16 or 32 bits
Closing Flag Field(F)	8 bits

THE FLAG FIELD

Every frame on the link must begin and end with a flag sequence field (F). Stations attached to the data link must continually listen for a flag sequence. The flag sequence is an octet looking like 01111110. Flags are continuously transmitted on the link between frames to keep the link active.

B. THE ADDRESS FIELD

The address field (A) identifies the primary or secondary stations involvement in the frame transmission or reception. Each station on the link has a unique address. In an unbalanced configuration, the A field in both commands and a response refers to the secondary station. In a balanced configuration, the command frame contains the destination station address and the response frame has the sending station's address.

C. CONTROL FIELD

HDLC uses the control field(C) to determine how to control the communications process. This field contains the commands, responses and sequences numbers used to maintain the data flow accountability of the link, defines the functions of the frame and initiates the logic to control the movement of traffic between sending and receiving stations. There three control field formats:

D. THE INFORMATION FIELD:

This field is not always in a HDLC frame. It is only present when the Information Transfer Format is being used in the control field. The information field contains the actually data the sender is transmitting to the receiver.

E. THE FRAME CHECK SEQUENCE FIELD:

This field contains a 16 bit, or 32 bit cyclic redundancy check. It is used for error detection.

Q.4 Write short note on TCP/IP model.

TCP/IP मॉडल पर लघु टिपण्णी लिखिए !

Ans.) TCP/IP, or the Transmission Control Protocol/Internet Protocol, is a suite of communication protocols used to interconnect network devices on the internet. The TCP/IP model was created in the 1970s by the Defense Advance Research Project Agency (DARPA). Like the OSI model, it describes general guidelines for designing and implementing computer protocols.
It consists of four layers: Network Access, Internet, Transport, and Application.

he functions of these four layers are comparable to the functions of the seven layers of the OSI model. Figure 1-9 shows the comparison between the layers of the two models.

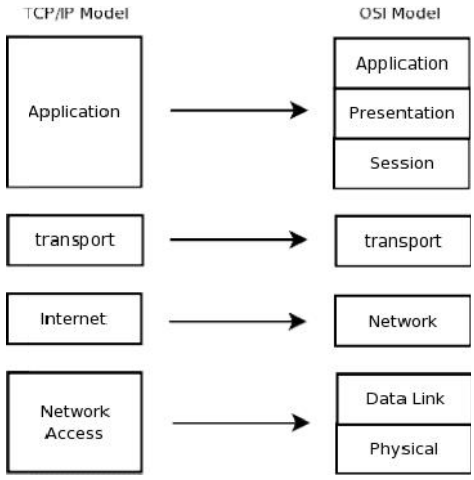


Fig. TCP/IP model

Application Layer

The application layer is concerned with providing network services to applications. There are many application network processes and protocols that work at this layer, including HyperText Transfer Protocol (HTTP), Simple Mail Transport Protocol (SMTP) and File Transfer Protocol (FTP).

At this layer sockets and port numbers are used to differentiate the path and sessions which applications operate. Most application layer protocols, especially on the server side, have specially allocated port numbers, e.g. HTTP = 80 and SMTP = 25, and FTP = 20 (Control), 21 (Data).

Transport Layer

This layer is concerned with the transmission of the data. The two main protocols that operate at this layer are Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). TCP is regarded as being the reliable transmission protocol and it guarantees that the proper data transfer will take place. UDP is not as complex as TCP and as such is not designed to be reliable or guarantee data delivery. UDP is generally thought of as being a best effort data delivery, i.e. once the data is sent, UDP will not carry out any checks to see that it has safely arrived.

The Internet Layer

This is the layer that contains the packet construct that will be transmitted. This takes the form of the Internet Protocol (IP) which describes a packet that contains a source IP Address, destination IP Address and the actual data to be delivered.

Network Access Layer

This is the lowest level of the TCP/IP protocol stack and functions carried out here include encapsulation of IP packets into frames for transmission, mapping IP addresses to physical hardware addresses (MAC Addresses) and the use of protocols for the physical transmission of data.

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