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12SCS11

First Semester M.Tech. Degree Examination, February 2013

Computer Networks

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Explain the use of encapsulation, multiplexing and demultiplexing in network architecture. **(06 Marks)**

b. Suppose a 128 Kbps point-to-point link is setup between earth and rover on mars. The distance from earth to mars is approximately 55 Gm, and data travels over the link at the speed of light 3×10^8 m/sec.
   i) Calculate the minimum RTT for the link.
   ii) Calculate the delay × bandwidth product for the link.
   iii) A camera on the rover takes pictures of its surroundings and sends these to earth. How quickly after a picture is taken, can reach mission control on earth? Assume the each image is 5 MB in size. **(06 Marks)**

c. With a neat protocol graph, explain internet architecture. **(08 Marks)**

2 a. Suppose we want to transmit the message 11001001 and protect it from errors using the CRC polynomial $x^3 + 1$.
   i) Use polynomial long division to determine the message that should be transmitted.
   ii) Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receiver's CRC calculation? How does the receiver know that an error has occurred? **(06 Marks)**

b. Explain token ring maintenance in IEEE802.5 LAN standard. **(06 Marks)**

c. Explain how broadcast and multicast is implemented in bridges. Also list the limitations of bridges. **(08 Marks)**

3 a. Explain segmentation and reassembly in ATM networks. **(06 Marks)**

b. Suppose a workstation has an I/O bus speed of 1 Gbps and memory bandwidth of 2 Gbps. Assuming DMA in and out of main memory, how many interfaces to 45 Mbps T3 links could a switch based on this workstation handle? **(06 Marks)**

c. Differentiate between flow control and congestion control. Explain the use of sequence numbers in ordered reliable delivery. **(08 Marks)**

4 a. Suppose a TCP message that contains 2048 bytes of data and 20 bytes of TCP header is passed to IP for delivery across two networks of the internet. The first network uses 14-bytes headers and has an MTV of 1024 bytes, the second uses 8-byte headers with an MTU of 512 bytes. Give the sizes and offsets of the sequence of fragments delivered to the network layer at the destination host. Assume all IP headers are 20 bytes. **(08 Marks)**

b. With necessary algorithms, explain data forwarding in IP. **(06 Marks)**

c. List all the subnet masks and the number of hosts in each subnet for a class C address space. **(06 Marks)**

5 a. What is MPLS? Explain virtual networks and tunnels in MPLS networks. **(08 Marks)**

b. Explain the TCP variant of sliding window algorithm. Show how this algorithm ensures flow control between the sender and receiver. **(08 Marks)**

c. Write Nagle's algorithm for solving silly window syndrome in TCP. **(04 Marks)**

6 a. Two users, one using Telnet and one sending files with FTP, both send their traffic out via router R. The outbound link from R is slow enough that both users keep packets in R's queue at all times. Discuss the relative performance seen by the Telnet user if R's queuing policy for these two flows is:
   i) Round-Robin service
   ii) Fair queuing
   iii) Modified fair queuing, where we count the cost only of data bytes, and not IP or TCP headers.

   Consider out band traffic only. Assume Telnet packets have 1 byte of data, FTP packets have 512 bytes of data, and all packets have 40 bytes of headers. **(08 Marks)**

   b. Explain any one congestion control and congestion avoidance algorithm for TCP. **(12 Marks)**

7 a. Explain with illustrations, the various request and response messages of HTTP protocol and world wide web. **(09 Marks)**

   b. Explain a generic application protocol for web services. **(06 Marks)**

   c. Explain the WSDL and SOAP standards for protocols. **(05 Marks)**

8 a. With an illustrative example, describe the various steps of name resolution. **(10 Marks)**

   b. Write short notes on:
   i) Triggering transmission in TCP
   ii) Routing for mobile hosts. **(10 Marks)**

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