IIITS/S-2023/Term Exam-1/CCN

Date: 06 March 2023

Indian Institute of Information Technology, Sri City, Chittoor
Name of the Exam: Computer and Communication Networks (CCN)

Duration: 90 mins

Max. Marks: 25 Marks

Instructions:

1. Closed book exam
2. Assumptions made should be clearly stated
3. All sub-parts of the question should be written together
4. Calculators are allowed. sharing in exam hall is not allowed

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1 [5M]

Suppose that the five measured SampleRTT values are 110 ms, 115 ms, 125 ms, 95 ms, and 110 ms. Compute the EstimatedRTT after each of these SampleRTT values is obtained, using a value of $\alpha = 0.125$ and assuming that the value of EstimatedRTT was 95 ms just before the first of these five samples were obtained. Compute also the DevRTT after each sample is obtained, assuming a value of $\beta = 0.2$ and assuming the value of DevRTT was 10 ms just before the first of these five samples was obtained. Last, compute the TCP TimeoutInterval after each of these samples is obtained.

2

(a) Derive the minimum distribution time of a P2P architecture. [2M]

(b) Consider distributing a file of F= 10 Gbits to N peers. The server has an upload rate of u_s= 20 Mbps, and each peer has a download rate of d_i= 1.5 Mbps and an upload rate of u. For N= 20, 120, and 900 and u= 300 Kbps, 700 Kbps, and 1.5 Mbps, prepare a chart giving the minimum distribution time for each of the combinations of N and u for P2P distribution. [3M]

	N=20	N=90	N=900
U=300kbps			
U=700kbps			
U=1.5 Mbps			

3

(a) Station A needs to send a message consisting of six (P1, P2, P3, P4, P5 and P6) packets to Station B using a sliding window (window size 3) and go-back-n error control strategy. All packets are ready and immediately available for transmission. If the first packet (P1) that A transmits gets lost (but no acks from B ever get lost), then what is the number of packets that A will transmit for sending the message to B? **(No step marking)** [3M]

(b) Derive the sender utilization (efficiency) in stop and wait flow control protocol. [2M]

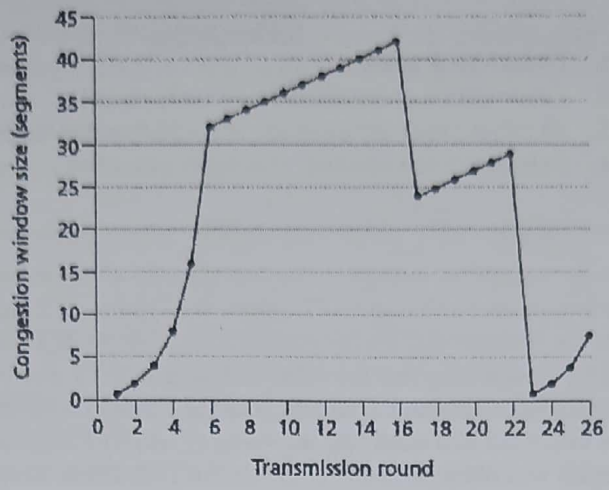
4 [5M]

Consider the below figure. Assuming TCP Reno is the protocol experiencing the behavior, answer the following questions. **In all cases, you should provide a short discussion justifying your answer (1. No step marking 2. If no justification is given, no marks will be awarded even for the correct answers):**

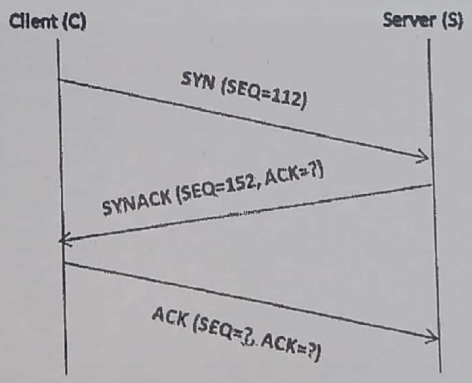
a) During what transmission round is the 141st segment sent? **[1M]**

b) Suppose there is a **triple duplicate acknowledgement event** at 22nd round. What will be the cwnd and ssthresh at 24th round? Justify. **[2M]**

c) In the scenario mentioned in the question (b), how many packets will be sent out in rounds 23, 24, 25, and 26, individually? **[2M]**



5 (a) Consider the three-way handshake mechanism followed during TCP connection establishment between Client (C) and Server (S) as shown in the below diagram. Let X and Y be two random 32-bit starting sequence numbers chosen by Client and Server respectively. The values of X and Y are 112 and 152 respectively. Fill in the fields highlighted with **question marks (?)** in the diagram below. **[3M]**



(b) Let the size of the congestion window of a TCP connection be 32 KB when a timeout occurs. The round trip time (RTT) of the connection is 100 msec and the maximum segment size (MSS) used is 2 KB. What is the time taken (in msec) by the TCP connection to get back the congestion window to 32 KB? **[2M]**