**UBI507 Bilgisayar Ağ İletişimi I**

**ARASINAV**

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**Bir A4 yardım kağıdı. 2 saat süre.**

**Zorunlu Soru**

**1. (35 p)** Consider a scenario in which Host A wants to simultaneously send packets to Hosts B and C. A is connected to B and C via a broadcast channel – a packet sent by A is carried by the channel to both B and C. Suppose that the broadcast channel connecting A, B, and C can independently corrupt (but not lose) packets (and so, for example, a packet sent from A might be correctly received by B, but not by C). Design a stop-and-wait like error-control protocol for reliably transferring packets from A to B and C, such that A will not get new data from the upper layer until it knows that both B and C have correctly received the current packet. Give FSM descriptions of A and B. (Hint: The FSM for C should be essentially the same as for B.) Also give a description of the packet format(s) used.

Use only those mechanisms that are absolutely necessary.

**Seçmeli sorular. Dilediğiniz 4 soruyu yanıtlayınız.**

**2.(15 p**) Suppose N packets arrive simultaneously to a link at which no packets are currently being transmitted or queued. Each packet is of length L and the link has a transmission rate R. what is the average queuing delay for the N packets?

**3. (15 p)** Suppose there is a 10 Mbps microwave link between a geostationary satellite and its base station on earth. Every minute the satellite takes a digital photo and sends it to the base station. Assume a propagation speed of 2,4.108 meters/sec.

**a)** What is the propagation delay of the link?

**b)** What is the bandwidth-delay product R . dprop?

**c)** Let x denote the size of the photo. What is the minimum value of x for the microwave link to be continuously transmitting?

Hint: The distance between base station and satellite is about 40 km.

**4. (15 p)** Suppose within a Web browser you click on a link to obtain a Web page. The IP address for the associated URL is not cached in your local host, so a DNS lookup is necessary to obtain the IP address. Suppose than n DNS servers are visited before your host receives the IP address from DNS; the successive visits incur an RTT of RTT1, . . . , RTTn. Further, suppose that the Web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Let RTT0 denote the RTT between the local host and the server containing the object. Assuming zero transmission time of the object, how much time elapses from when the client clicks on the link until the client receives the object?

**5. (20 p)** Consider distributing a file of F = 15 Gbits to N peers. The server has an upload rate of us = 30 Mbps, and each peer has a download rate of di = 2 Mbps and an upload rate of *u.* For N = 10, 1000 and *u* =300 Kbps, prepare a chart giving the minimum distribution time for each of the combinations of N and *u* for both client-server distribution and P2P distribution.

**6. (20 p)** Consider the following plot of TCP window size as a function of time. (reproduced below for you) Assuming TCP Reno is the protocol experiencing the behavior shown, answer the following questions.

**a.** Identify the intervals of time when TCP slow start is operating.  
**b.** Identify the intervals of time when TCP congestion avoidance is operating.

**c.** After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?  
**d.** After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?  
**e.** What is the initial value of Threshold at the first transmission round?  
**f.** What is the value of Threshold at the 18th transmission round?  
**g.** What is the value of Threshold at the 24th transmission round?  
**h.** During what transmission round is the 70th segment sent?  
**i.** Assuming a packet loss is detected after the 26th round by the receipt of a triple duplicate ACK, what will be the values of the congestion-window size and of Threshold?

