

EE 450 Homework 2
Spring 2013 Nazarian

Score: ___/100

Student ID: _____

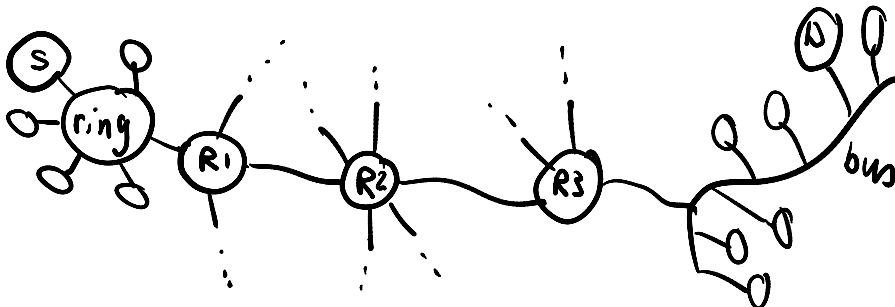
Name: _____

Assigned : Friday 2/1/2013

Due: 2/14/2013, Thursday morning at 11am (EE450 HW locker, on the 3rd floor of EE Building.) Late submissions are accepted for two days with a maximum penalty of 15% per day. For each day, submissions between 11am- 12pm: 2%, 12-1pm: 4%, 1-2pm: 8%. After 2pm: 15%.

Notes:

- The goal of this homework is to help you review the basics of network addressing as well as network utilization measure in terms of bandwidth-delay product.
 - This assignment is based on individual work. No collaboration is allowed. Please watch the first lecture of this course regarding the academic integrity policies and also refer to the syllabus for a summary of AI policies (including the penalties for any violation.) If you have any doubts about what is allowed or prohibited in this course, please contact the instructor.
- 1) **BW-Delay Product** (15 pts) There is a 20 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 $2.4 * 10^8$ m/sec.
- a) What is the propagation delay of the link?
 - b) What is the BW-delay product?
 - c) Let x denote the size of the photo. What is the minimum value of x for the microwave link to be continuously transmitting?
- 2) **Local Delivery** (25 pts + 10 extra) Consider a shared network that directly connects 10 end systems. With the help of flow chart explain how network addressing steps, as well as ARP and DNS protocols would be used for a message to be sent from a source to a destination system. Right next to the flow chart, note the addresses in the corresponding packets and frames in both source and destination. The notations and format of flow chart are optional. **NOTE: 10 extra credit points for the best flow chart in class.**
- 3) **Remote Delivery** (30 pts + 20 extra) Repeat problem 2 for internetwork communication, where source S and destination D are located remotely from each other (as shown in the following.) In addition, note the addresses of the packets and frames in router $R1$ and $R2$.
NOTE: 10 extra credit points for the best flow chart in class.



- 4) **DHCP (15 pts)** Suppose host A and the DHCP server are separated by 2 kilometers and are connected by a direct link of $R = 2$ Mbps. Suppose the propagation speed over the link is 2.5×10^8 meters/sec. Neglecting the processing and queuing delays and assuming each packet (which is transmitted between the host A and DHCP server) is 10 bytes, how long will it take for host A to obtain a valid IP address from the DHCP server?
- 5) **DNS (15 pts)** Refer to pages 82 and 83. For simplicity assume the transmission delay of each node and propagation delay of its outgoing link are denoted by d_{trans} and d_{prop} , respectively. Ignore the processing and queuing delays. Compare the time it takes for the original node to complete its DNS query using recursive and iterative modes.