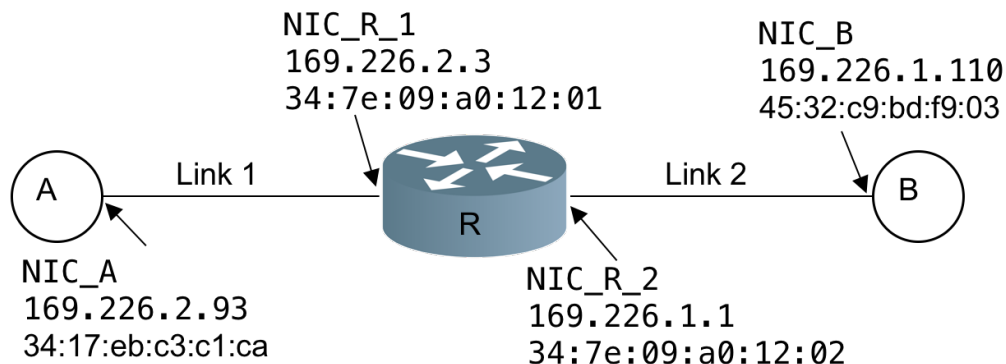


# ICSI 416/516 Homework 5 – Data Link Layer

## 20 points

Due date: Wednesday 4/27 at 11:59PM as a single PDF file via Blackboard

- Assume a protocol that uses CRC for error detection. Assume that the generator for that protocol is  $G=1101$ .
  - Calculate the redundancy bits  $R$  to be sent with the following bit sequence  $D=1010100000$ . Show your work.
  - Was there an error in the transmission of the following bit sequence  $D'+R'=111001101001011$ ? Show your work.
- Compare and contrast channel partitioning and random multiple access schemes. In your answer consider whether these schemes are distributed or centralized, what fraction of the channel capacity is used by any user, what are some challenges that each of the mechanisms need to overcome and whether these schemes are predisposed to waste resources.
- What kinds of problems can arise when two hosts on the same LAN share the same hardware address? Using a specific example, describe what happens and why that behavior is a problem.
- Suppose two nodes  $A$  and  $B$  start to transmit at the same time a packet of length  $L$  over a broadcast channel of rate  $R$ . Denote the propagation delay between the two nodes as  $d_{prop}$ . Will there be a collision if  $d_{prop} < L/R$ ? Why or why not?
- Consider the following network. IP and Ethernet addresses are marked for all interfaces. Assume a client on host  $A$  sends a TCP connection request message to a web server on host  $B$ .



- Suppose all of the ARP tables are up to date. Enumerate all the steps, as done for the single-router example in Section 5.4.1.
  - Repeat (a), now assuming that the ARP table in the sending host is empty (and the other tables are up to date).
- Recall that with the CSMA/CD protocol, the adapter waits  $K*512$  bit-times after a collision, where  $K$  is drawn randomly. For  $K = 50$ , how long does the adapter wait until returning to Step 2 (carrier sense to re-attempt transmission) for a 10 Mbps broadcast channel? For a 100 Mbps broadcast channel?