EECS 122 : Introduction to Communication Networks
Spring 2004
Assignment 3

Due: February 27, 2004

Problem 1 [15 Pts]
Peterson and Davie, Chapter 3, Exercise 3.
For each node, list out the Next Hop for each of the destinations. For instance, Node B's table would look like:

Destination	Next Hop
A	E
C	E
D	E
E	E
F	E

Problem 2 [15 Pts]
Peterson and Davie, Chapter 3, Exercise 17

Problem 3 [15 Pts]
Peterson and Davie, Chapter 3, Exercise 21

Problem 4 [10 Pts]
Peterson and Davie, Chapter 3, Exercise 23

Problem 5 [10 Pts]
Over the past 5-6 years, several networking companies have advocated the use of Ethernet (and VLANs) for networks far beyond a "local" area. Their view is that Ethernet as a technology could be used for much wider areas like a city (Metro), or even across several cities. Think of this for a little bit and suggest *two* nice features of Ethernet that would still be applicable in a wider area. Also suggest *two* other characteristics which would not scale well, and would cause problems in such architectures.

Problem 6 [15 Pts]
Consider a wireless network shaped like a pentagon. The wireless nodes are shown at the vertices A, B, C, D, and E, and the nodes are placed such that each node can talk only to its two neighbors – as shown. Thus there 10

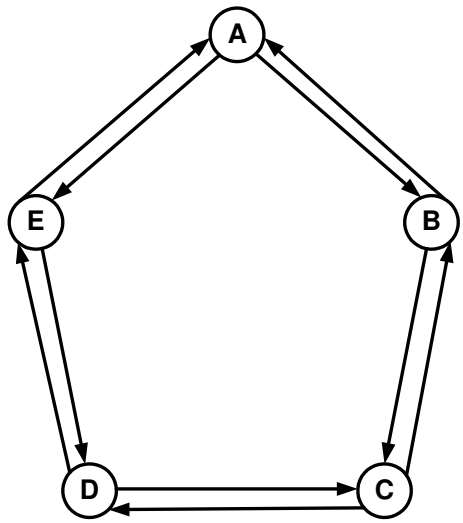

Figure 1: Diagram for Problem 7

unidirectional wireless links in this network. Assume that the nodes employ RTS/CTS, and also require acks for successful transmission.

Consider a situation when A is transmitting a packet to B. Obviously link $A \rightarrow B$ is active, and all links that are affected by this transmission must keep quiet. Considering RTS/CTS, and acks, indicate which of the other links could also be active at the same time. In other words, indicate which of the other links could be *simultaneously* transmitting.

Problem 7 [20 Pts]

Draw a timing diagram for a single wireless packet transfer (*from Node A to Node B*)– consisting of RTS, CTS, Packet and Ack. There are 3 nodes A, B and C. The distance from A to B is 600m and the distance from B to C is another 600m in the same direction (i.e. A — — 600m — — B — — 600m — — C).

Make the following simplifying assumptions to draw the timing diagram:

- The transmission ranges of the nodes is about 1 km
- RTS takes up 10 μs and CTS takes up 5 μs
- Packet size is 1 kB and Ack size is 64 B
- Channel bandwidth is 10 Mbps
- Propagation speed of the signal is $3 \times 10^8 m/s$
- Assume no processing delays

Be sure to show the traffic seen at *all three* nodes.