

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination: Semester II
Date: Feb 19, 2010
Subject: 210-555 Modern Communication Networks

Academic Year: 2009
Time: 9.00-12.00
Room: R300

Instructions:

- a. Allow a student to open all of his/her own notes/books during the exam
- b. Allow the student to use his/her own calculator and dictionary

Answer all four problems

1. Consider the network shown in **Figure 1**, with the indicated link costs. Use Dijkstra's shortest path algorithm to compute the shortest path from **S** to all network nodes. Show how the algorithm works by computing a table similar to Table 4.3 given in class as illustrated here also.

(25 points)

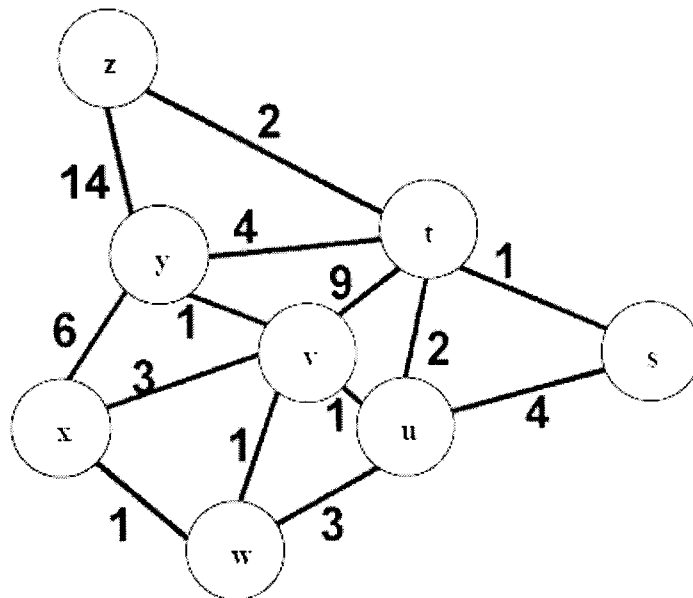


Figure 1 Network topology with link costs for Problem 1

step	N'	$D(v),p(v)$	$D(w),p(w)$	$D(x),p(x)$	$D(y),p(y)$	$D(z),p(z)$
0	u	2,u	5,u	1,u	∞	∞
1	ux	2,u	4,x		2,x	∞
2	uxy	2,u	3,y			4,y
3	uxyv		3,y			4,y
4	uxyvw					4,y
5	uxyvwz					

Table 4.3 * Running the link-state algorithm on the network in Figure 4.25

2. Consider the network shown in Figure 2, and assume that each node initially knows the costs to each of its neighbors. Consider the distance vector algorithm and show the distance entries at node z.

(25 points)

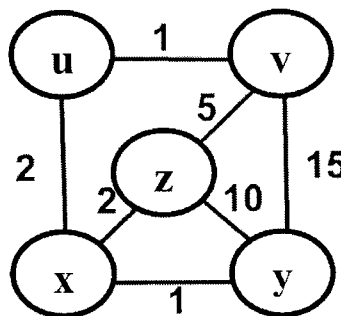


Figure 2 Network topology with link costs for Problem 2

3. Consider the plot of TCP window size as a function of time in Figure 3. Answer the following questions. In all cases, you should provide a discussion justifying your answer.
- Identify the intervals of time when TCP slow start is operating
 - Identify the intervals of time when TCP congestion avoidance is operating
 - After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?
 - After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?
 - What is the initial value of Threshold at the first transmission round?
 - What is the value of Threshold at the 18th transmission round?
 - What is the value of Threshold at the 24th transmission round?
 - During what transmission round is the 70th segment sent?
 - 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?

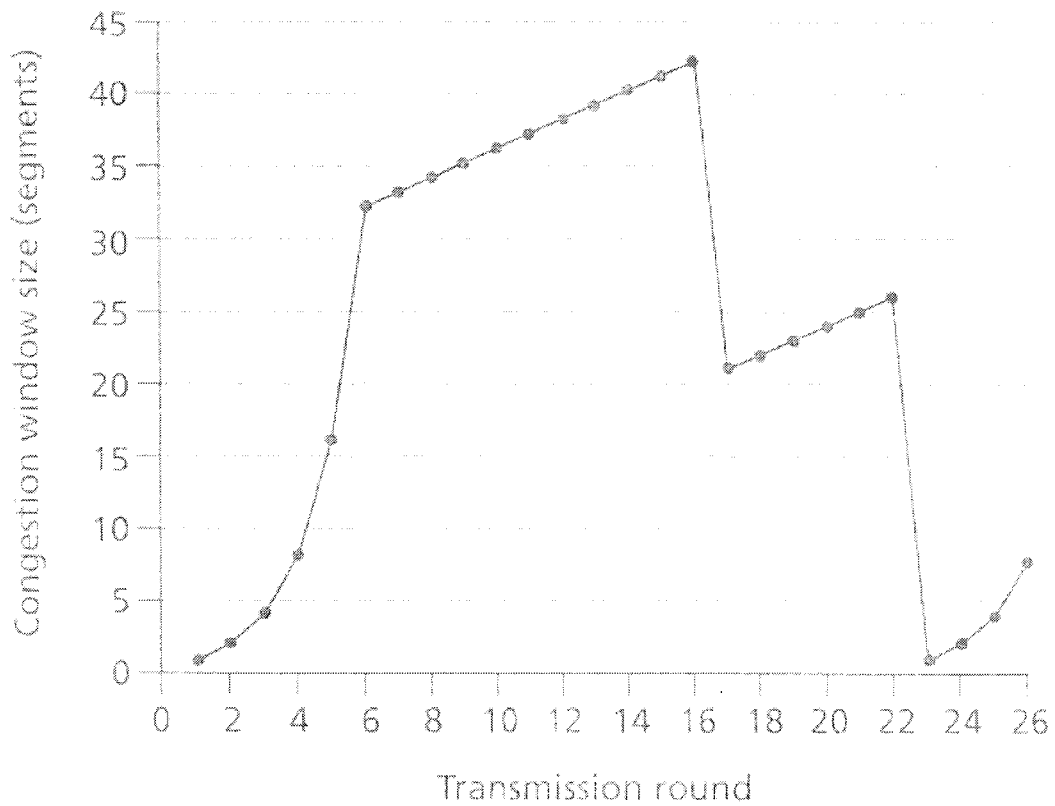


Figure 3 TCP window size

4. TCP congestion control can sometimes have very different performance in wired and wireless networks.
 - a. Discuss why.
 - b. Propose your idea to deal with the problem that you discuss in a.

(25 points)