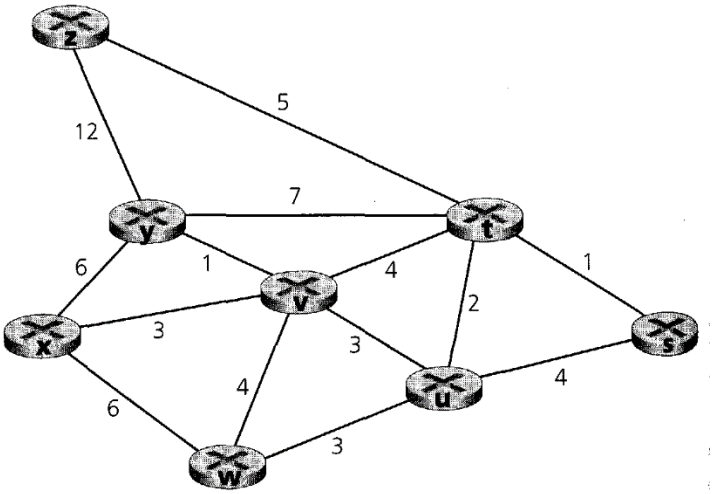
Assignment 4

CSC467/567 Fall 2014

Submission deadline: ***April 4, 2017***

Question 1 [15 points] (QoS Routing)

Consider the following network. Assume that all the edges have unit link cost and the numbers shown next to each edge is the current available bandwidth on that link. Also assume that the delay on each link is 1ms.



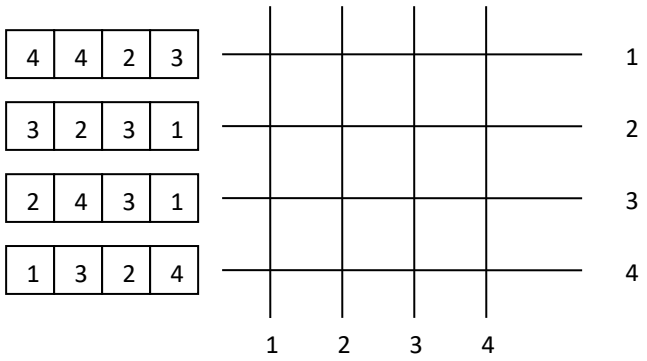
a) Use Dijkstra's shortest-path algorithm to compute shortest paths from node "x" to all other nodes (destinations) in the above network considering only the link costs. Please follow the algorithm shown in slides 40 and 41 of the QoS Routing class notes. Please indicate the next hop router to be taken from node "x" in order to reach these destinations.

b) Now let us assume that we need to find paths from node 'x' to all other nodes with a minimum bandwidth of 4 units. Use modified Dijkstra algorithm by pruning the links that do not have the needed bandwidth and then computing the shortest paths on the resultant graph. Note that it is possible some nodes may get disconnected in this scenario.

c) Repeat the above with the added constraint that the end-to-end delay should be less than 3ms.

Question 2 [10 points] (Switch Schedule)

Consider a 4×4 crossbar switch as shown in the following figure along with the packets waiting to be transmitted at the inputs. The numbers shown are output ports the packets are destined to.



1) Assuming only the input buffering, determine a switch schedule for a couple of transmission opportunities. What will be the packet loss for this input buffered switch with B=100 and p=0.2? What will it be if p increases to 0.6?
2) Assuming a virtual input-queued (per-output port queuing) buffer at the input. Draw a bi-partite graph for this traffic pattern and determine the switch schedule using i-slip algorithm for a couple of transmission opportunities.