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CSCI Midterm 2

NOTE: This looks better in notepad, because that’s what I wrote it in. I put a txt copy on the server as well, it is named Ex2.txt

1. At first, z knows only the distance to its neighbors.

u v x y z

u: inf inf inf inf inf

v: inf inf inf inf inf

x: inf inf inf inf inf

y: inf inf inf inf inf

z: inf 5 2 10 0

Then z receives updated distances from neighbors.

u v x y z

u: inf inf inf inf inf

v: 4 0 inf 7 5

x: 12 inf 0 1 2

y: inf 7 1 0 10

z: inf 5 2 10 0

Then z updates it's own distances based on the new information.

Using this data all values are minimized except for u's distances.

u v x y z

u: inf inf inf inf inf

v: 4 0 7 7 5

x: 11 7 0 1 2

y: 11 7 1 0 3

z: 9 5 2 3 0

Because v and x received the info [u: 0 4 12 inf inf] in the last round, z has enough

information in the next round to complete its table.

u v x y z

u: 0 4 12 11 9

v: 4 0 7 7 5

x: 11 7 0 1 2

y: 11 7 1 0 3

z: 9 5 2 3 0

2. Throughput is bits transferred divided by time.

Each node transmits Q bits at rate R, taking Q/R seconds plus a polling delay of d\_poll.

This is done for N nodes so each round is N(Q/R+d\_poll) seconds.

Q bits are transferred for N nodes so QN bits are transferred.

Therefore throughput is QN/N(Q/R+d\_poll)

3. NOTE: I used frame size for t\_trans instead of packet size, I can't remember how much a

frame adds to the packet, I took a guess on problem 4, but left the size for this one.

1. We know that efficiency = 1/(1+5\*(t\_prop/t\_trans))

So we need to solve 0.75 = 1/(1+5\*(t\_prop/t\_trans))

Then, 1+5\*(t\_prop/t\_trans) = 1.333

5\*(t\_prop/t\_trans) = 0.333

(t\_prop/t\_trans) = 0.066

t\_prop = distance/2\*10^8 m/sec

50 byte frame = 400 bits

t\_trans = 400bits/100,000,000bits/sec = 0.004‬ms

Now we have (t\_prop/0.000004 seconds) = 0.066

t\_prop = 0.000000264 seconds

distance/2\*10^8 m/sec = 0.000000264 seconds

distance = 52.8 meters

Therefore, the maximum distance between a node and the hub should be 52.8 meters to

have an efficiency of 0.75.

2. To determine there was a collision, t\_trans would have to be double t\_prop.

We now know that t\_prop is 52.8m/2\*10^8 m/sec = 0.000264‬ms\*2 = 0.000528ms

Since 0.000528 is less than 0.004ms A would detect the other node transmitting before

it finished transmitting.

4. We know that d\_nodal = d\_proc + d\_queue + d\_trans + d\_prop

Assuming queueing and processing delays of 5ms at each switch we find that,

d\_proc = 5ms \* 5 switches = 25ms

d\_queue = 5ms \* 5 switches = 25ms

and we know that the propagation delay is the distance between two switches divided by the

propagation speed so,

d\_prop = 100m / (2\*10^8 m/sec) = 0.0000005 sec \* 6 links = 0.000003 seconds = 0.003ms

We know d\_trans = Packet length divided by link bandwidth, and frame adds 46 bytes(I think)

to packet. 100 Megabits = 12.5 megabytes = 12,500,000 bytes, so

(1500 bytes-46 bytes)/12,500,000bps=0.00011632‬ seconds=0.11632ms, so

d\_trans=0.11632ms\*6 links=0.69792ms

Therefore, d\_nodal = 25ms + 25ms + 0.69792ms + 0.003ms = 50.69822ms

5. Yes it is possible for two mobile nodes in a foreign network with a foreign agent to have

the same Care-of-address in mobile IP. The care-of-address is wrapped around the permanent

address of each mobile node. When the packet reaches the foreign agent, the foreign agent

removes the care-of-address from the packet, and then forwards the packet to the correct

mobile node using the permanent address in the packet.

6. There are 48 bits in a mac address. 48 bits plus 8 bits for the port number is 56 bits.

56 bits plus 2 bits for the aging information is 58 bits. Therefore each entry in the

address table of the switch in question is 58 bits. Thus 4096 entries would be 4096\*58 bits,

which is 237,568 bits which is 29,696 bytes which is 29 kilobytes.

7. Half duplex doesn't allow transmitting and receiving data at the same time, but in a

network with a bus topology each system is connected to a single cable, usually coax. This

means that the whole network is one collision domain. If two systems try and transmit at the

same time in a single collision domain a collision occurs. This means that with half or full

duplex, only one system would be able to transmit data to the bus at a time. In wired

networks, hardware is implemented in the NIC to detect collisions so the network shouldn't

have to listen while it transmits, meaning a network with half duplex systems should run

similarly to a network with full duplex systems if it is a bus topology.