

Exercise 1

1. Between 6 and 8 seconds, Flow 3 affects the bandwidth of Flow 1 but not flow 2. After flow 3 goes through slow start, at 6 seconds it takes some bandwidth away from flow 1 (as it shares lines n0-n1 and n1-n6 with flow 1) without affecting flow 2. This means flow 2 can use greater bandwidth meaning it has a higher throughput than flow 1. Flow 4 affects both flow 1 and flow 2

2. Flow 1 is going through TCP slow start and slowly finding how much bandwidth it can use.

3. At any one time, there are multiple flows going through a link and that means that the flows are bottlenecked at the links with low bandwidth (2.5mb/s). Multiple flows take the 2.5mb/s bandwidth limiting the throughput to around 1.5mb/s

Exercise 2

1. When a packet is over 1500 bytes, it causes fragmentation of the packet

192.168.1.103 has fragmented the packet.

2 fragments are created was 2000 byte message

2. Yes, because it was over 1500 bytes so it was fragmented

3. First fragment: ID: 31355, length: 1500, Flags: 0x01, More fragments: set, offset 0

Second fragment: ID: 31355, length: 1500, Flags: 0x01, More fragments: set, offset 1480

Third fragment: ID: 31355, length: 568, Flags: 0x00, More fragments: Not set, offset 2960

4. We can't know if fragmented packets of the 3500 byte datagram have been further broken down so cannot answer this question.

5. If one fragment is lost, the whole packet will have to be retransmitted and fragmented again.

Exercise 3

1. Node 0 communicates with node 5 - Route: 0 - 1 - 4 - 5

Node 2 communicates with node 5 - Route: 2 - 3 - 5

No it doesn't change over time

2. Between time 1-1.2, the link between nodes 1-4 goes down. The link between 0 - 1 - 4 - 5 is broken and packets are dropped at node 1

3. Yes there is a small amount of bytes being transmitted in the network before time 1.

Now, when the changes take place at time 1, the traffic from 0 - 1 is redirected to node 2 instead of being dropped at node 1. Now the packets Travel the path from node 2 to node 5

4. Now packets from node 0 do not go to node 5 via node 1. These packets now go via node 2 to node 5.

5. Now packets from node 0 to node 5 travel via node 1 and node 4. Packets from node 2 to 5 travel 2 different routes to node 5. Some packets travel via node 1, some packets travel via node 3.

The effect the multipath line has was that before it was restricting how many paths the packets could take, now the packets can travel more than 1 path