

Ben Walker

CPSC 5042: Comp Systems Principles II

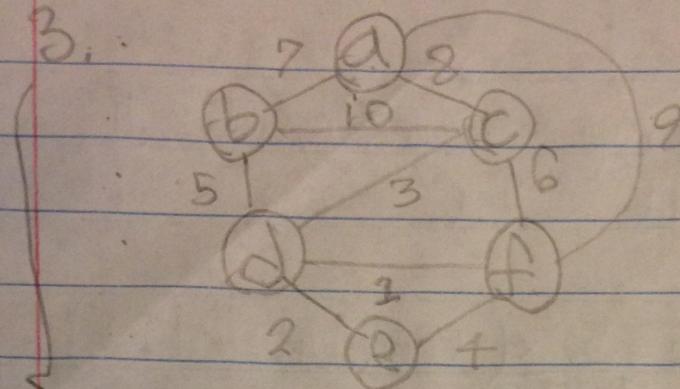
Home work #5

1.  $50 \text{ packets/s} = 50 \times (1500B + 20B + 20B)$   
 $= 77000B = \frac{77000}{8 \times 1024} \text{ KB} = \sim 9.4 \text{ KB of data}$   
100mb connection =  $100 \times 1024 \text{ KB} = 102400 \text{ KB}$   
→ no bottleneck w/ connection  
 $9.4 \text{ KB / 1 second} = \text{effective data throughput}$   
effective data throughput =  $\sim 9.4 \text{ KB ps}$

2. Message length = M bytes; Header length = h bytes  
protocol layers = n; header bytes per packet;  
total bytes per packet =  $(M + nh)$   
Fraction of bandwidth filled with  
messages =  $M / (M + nh)$

• undirected, weighted graph abstraction

3.



Sample

Shortest paths e to a:

e → d → c → a

. e → f → a

With routers as nodes + connections as edges  
on an undirected, weighted graph,  
apply a maximum flow algorithm.

f. Yes, a packet could be misrouted even if all software and routers are hosts are perfect due to network threats like impersonation or hijacking, user errors, or undetectable errors caused by burst noise. Each of these could render a valid packet for one destination into a valid packet for another.

5. Two reasons we can't use process  
are one, because processes can  
listen on multiple ports and  
two, because you can't control  
the process id but you can  
control the port number.

6. execution rate: 1000 MIPS (without/s) →  
copy rate: 64 b / 10 instructions  
necessary throughput: 1 GB/s → 800,000,000 b/s

$$\frac{64}{10} = 6.4 \text{ b per instruction} * 1000,000,000 = 6,400,000,000 \text{ b/s}$$

No, it cannot since a gigabyte is  
800,000,000 bits and its execution  
rate would be 6,400,000,000 b/s,  
thus not meeting the requirements  
of a 1 GB/s line.