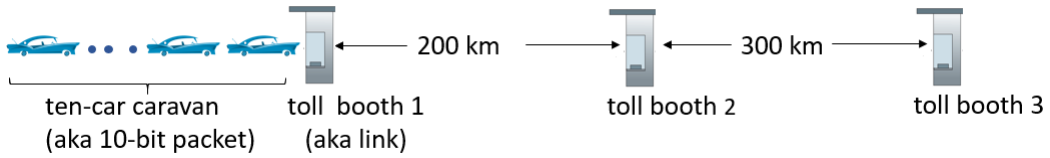
COM3032 Midterm
11.04.2021 16:30
120 min.

1. **(15 p) (Show each step in your solution.)**



Car ~ bit; caravan ~ packet; toll service ~ link transmission
Toll booth-1 takes 15 sec to service car (bit transmission time)
Toll booth-2 takes 10 sec to service car (bit transmission time)
Cars “propagate” at 100 km/hr.
Use store and forward.

How long until caravan is lined up before 3rd toll booth?

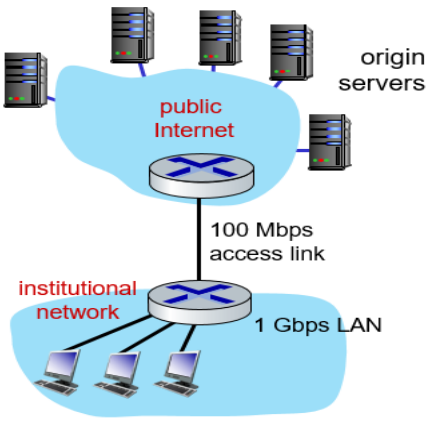
2. **(15 p) (Show each step in your solution.)**

Let’s assume we have 3 16-bit integers. Compute the checksum value of those 3 integers.

0 1 1 0 1 1 1 0 0 1 1 0 0 1 1 0
0 0 1 0 1 1 0 1 1 0 0 0 0 1 0 1
0 1 0 0 1 0 1 1 1 1 1 0 0 0 1 0

3. **(15 p) (Show each step in your solution.)**

- Access Link Rate: 50 Mbps
- Internet Delay : 1.5 sec
- Web Object Size: 600K bits
- Average Request Rate from Browsers to Origin Servers: 40/sec

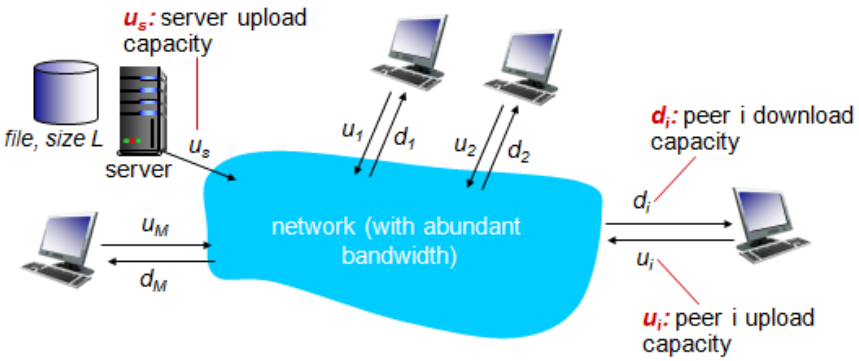


Compute the followings:

- Average Data Rate to Browsers
- Access Link Utilization
- LAN Utilization

4. **(15 p) (Show each step in your solution.)**

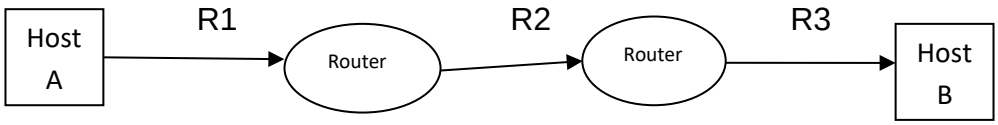
Consider a simple quantitative model for distributing a file to a fixed set of peers in client-server architectures and peer-to-peer architectures.



Denote the size of the file to be distributed (in bits) by L and the number of peers that want to obtain a copy of the file by M. The distribution time is the time it takes to get a copy of the file to all M peers. Determine the distribution time for the client-server architecture and peer-to-peer architecture. Explain each component of the distribution time estimation in detail.

5. **(15 p) (Show each step in your solution.)**

Suppose host A wants to send a large file (the file size is 6 million bytes) to host B. The path from host A to host B has three links, of rates R1=600 kbps, R2=200 kbps, and R3=4 Mbps. Both routers use store-and-forward transmission. Assume no other traffic in the network. Ignore propagation delay. How long will it take transfer the file to host B?



6. **(15 p)** What are the types of delays a packet suffer from on its travel from one node to the subsequent node? **Explain each delay in detail.**

7. **(10 p)** Define the concept of cookies? What is the purpose of using cookies?