# CIS 410 Computer Networks - Midterm 1

Name:

Directions: This is a closed book, closed notes midterm. Place your
answers in the answer sheet provided. The point value for each question is
indicated (there are a total of 50 points.) You have 50 min for this
midterm. Be sure to put your name on this test copy and on the answer
sheet, and turn both of them in.

1. [4 points] What advantage does a circuit-switched network have over a packet-switched network?

2. [4 points] List at-least two key reasons for a host to have both a domain name and an IP address.

3. [4 points] What is a Proxy Server? Describe how Web caching can reduce the delay in receiving a requested object. Will Web caching reduce the delay for all objects requested by a user or for only some of the objects? Why?

5. [4 points] What are the two types of application layer architectures. What architecture is best fit for transferring file to N clients. Why?

6. [4 points] List the four broad classes of services that a transport protocol can provide to the applications. For each of the service classes, indicate if either UDP or TCP (or both) provides such a service.

7. [4 points] A local DNS server typically discards cached name-to-address mappings when the time-to-live expires. Alternatively, the local DNS server could optimistically issue a new query for the cached domain name. Given one advantage and one disadvantage of that approach.

8. [2 Points] In a DNS server, a _____ is a four- tuple that contains the following fields: (Name, Value, Type, TTL)
   The meaning of Name and Value depend on Type:

   1. If Type= A, then Name is a _____ and Value is the _____for the host-name. Thus, a Type A record provides the standard hostname-to-IP address mapping. As an example, (relay1.bar.foo. com, 145.37.93.126, A) is a Type A record.

   2. If Type= NS, then Name is a _____ and Value is the _____ of _____

9. [2 points] Why isn't SMTP used by a user agent to retrieve e-mail from the local e-mail server? What is typically used instead?

10. [2 points] What is the difference between persistent and non-persistent HTTP connection?

Problem 1. Consider the scenario shown in Figure 1 in which a server is connected to a router by a 150Mbps link with a 70ms propagation delay. Initially this router is also connected to two routers, each over a 100Mbps link with a 200ms propagation delay. A 2Gbps link connects a host and a cache (if present) to each of these routers and we assume that this link has 0 propagation delay. All packets in the network are 10,000 bits long.

a. [8 Points] What is the end-to-end delay from when a packet is transmitted by the server to when it is received by the client? In this case, we assume there are no caches, queuing delay at the nodes is 5ms, and the packet processing delay at nodes is 4ms.

b. [4 Points] Here we assume that client hosts send requests for files directly to the server (caches are not used or off in this case). What is the maximum rate at which the server can deliver data to a single client if we assume no other clients are making requests?
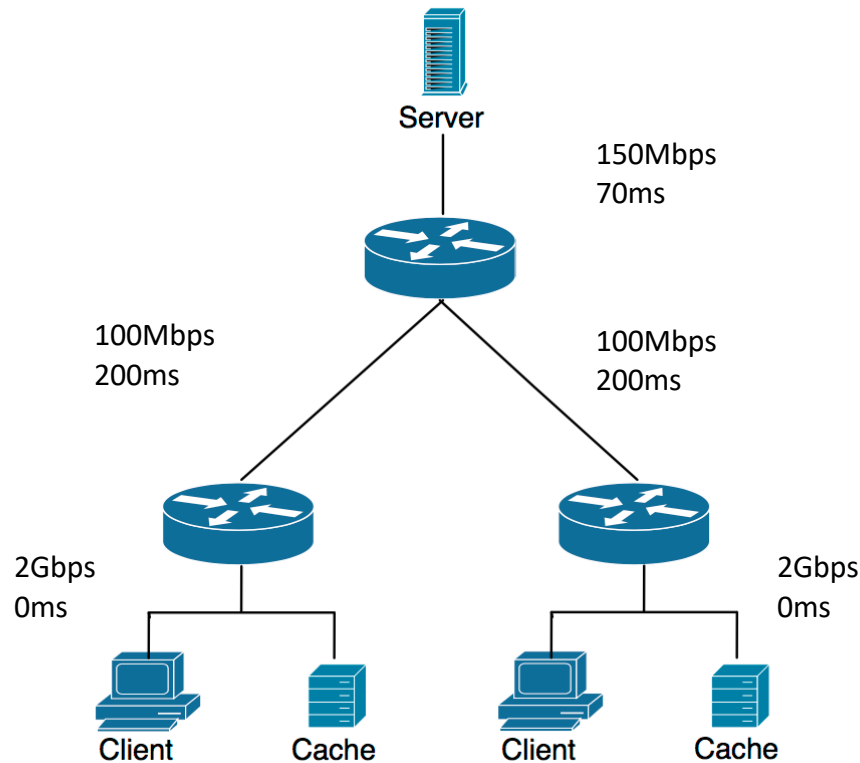
Figure 1

c. [4 Points] Again we assume only one active client but in this case the caches are on and behave like HTTP caches. A client's HTTP GET is always first directed to its local cache. 65% of the requests can be satisfied by the local cache. What is the average rate at which the client can receive data in this case?

d. [4 Points] Now clients in both LANs are active and the both caches are on (similar to c). 65% of the requests can be satisfied by the local caches. What is the average rate at which each client can receive data?