

HW2

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CS 455

1.
 - a. False
 - b. True
 - c. False
 - d. False
 - e. False
2.
 - a. Application layer: DNS and HTTP
 - b. Transport layer: TCP and UDP
3.
 - a. gaia.cs.umass.edu/cs453/index.html
 - b. 1.1
 - c. Persistent
 - d. No IP can be found
 - e. Mozilla. Different browsers require different files for same content. HTTP record this to get correct files for users' browser.
4. Amount of time to get the IP address is: $RTT_1 + RTT_2 + RTT_3 + \dots + RTT_n$
Total Time: RTT_0 (create connection) + $RTT_1 + RTT_3 + \dots + RTT_n + RTT_0$ (request and receive object) = $2RTT_0 + RTT_1 + RTT_2 + RTT_3 + \dots + RTT_n$
5.
 - a. $2RTT_0 + RTT_1 + RTT_3 + \dots RTT_n + 8*2*RTT_0 = 18RTT_0 + RTT_1 + RTT_3 + \dots RTT_n$
 - b. $2RTT_0 + RTT_1 + RTT_3 + \dots RTT_n + 2*2RTT_0$ (Needs two requests and receive process) = $6RTT_0 + RTT_1 + RTT_3 + \dots RTT_n$
 - c. $2RTT_0 + RTT_1 + RTT_3 + \dots RTT_n + RTT_0 = 3RTT_0 + RTT_1 + RTT_3 + \dots RTT_n$
- 6.

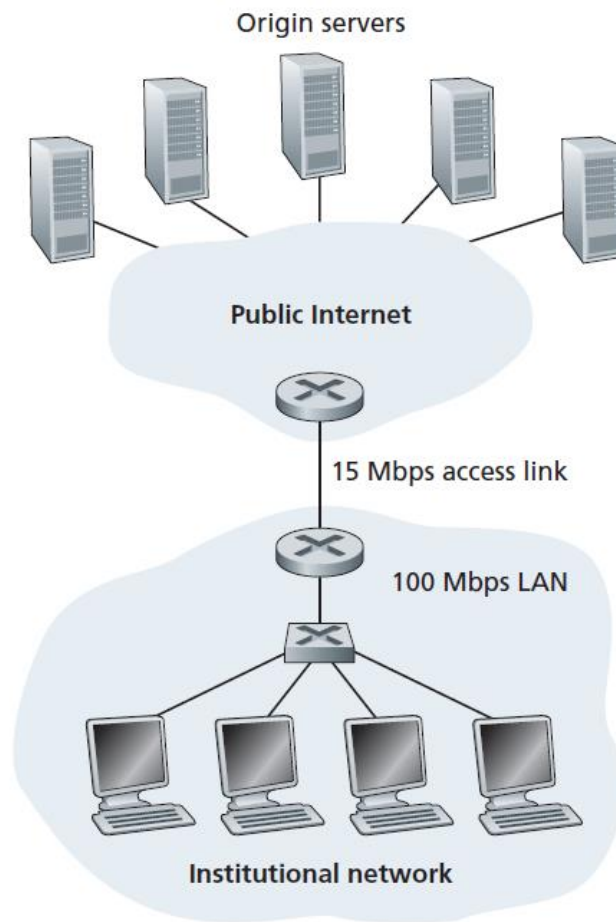


Figure 2.12 ♦ Bottleneck between an institutional network and the Internet

- a.
- b. Time to transmit: L/R

$$\Delta = \frac{850000 \text{ bits}}{15000000 \text{ bits/sec}} = 0.056 \text{ s}$$

$$\beta\Delta = 16 \text{ request/sec} * 0.056 \text{ sec/request} = 0.896 \text{ sec}$$

$$\Delta/(1 - \Delta\beta) = 0.056/(1 - 0.896) = 0.53 \text{ sec}$$

$$\text{Average response time} = 0.53 \text{ sec} + 3 \text{ sec} = 3.53 \text{ sec}$$
- c. 60% of requests goes to cache, which has 0 response time
 Also reduce the access delay: $(0.056)/(1 - 0.4 * 0.896) = 0.087$
 Total response time: $.4 * (3 + 0.087) = 1.2348 \text{ s}$

7.

Parallel downloads via parallel instances of non-persistent HTTP:

10 parallel connections, each has 15bits/sec transmit rate.

Total Delay = D_p (propagation delay) + D_t (Transmission delay)

$(200/150 + D_p + 200/150 + D_p + 200/150 + D_p + 100000$

$/150 + D_p) + (200/15 + D_p + 200/15 + D_p + 200/15 + D_p + 100000/15 + D_p) = 7377 + 8 * D_p$

For persistent HTTP:

Total Delay = D_p (propagation delay) + D_t (Transmission delay)

$(200/150 + D_p + 200/150 + D_p + 200/150 + D_p + 100000$

$$/150 + D_p) + 10*(200/150 + D_p + 100000/150+D_p) = 7351 + 24*D_p$$

There are no significant difference between two. Therefore, no gains.

8.

- a. $N(\text{videos}) * N(\text{audios}) = N^2$
- b. $N(\text{videos}) + N(\text{audios}) = 2N$