Computer Networks Midterm
Date: April 23 2014

1. Give the full name of the following acronyms. (21%)

    (a) ICP

    (b) TDM

    (c) P2P

    (d) SMTP

    (e) HTTP

    (f) DNS

    (g) ADSL

2. What are the five layers in the Internet protocol stack? (10%)

3. Please give a description of how iterated queries work on DNS. (10%)

4. Consider sending a packet from a sending host to a receiving host over a fixed route. List the delay components in the end-to-end delay. (8%)

5. List the underlying transport protocol name (TCP or UDP) for each of the following network-application services and briefly explained the reasons. (10%)

    (a) Video conferencing.

    (b) DNS service.

    (c) E-Mail.

    (d) Web service.

    (e) File transfer.

6. Suppose Host A wants to send a large file to Host B. This path from Host A to Host B has four links, of rates $R_1 = 2Mbps$, $R_2 = 2Mbps$, $R_3 = 2Mbps$, and $R_4 = 2Mbps$. Suppose the file is 10 Mbits.

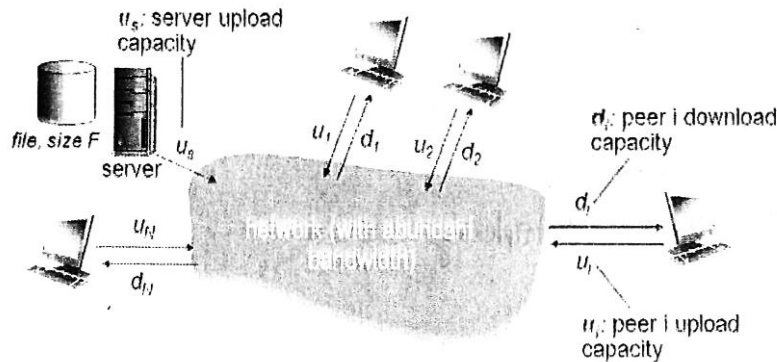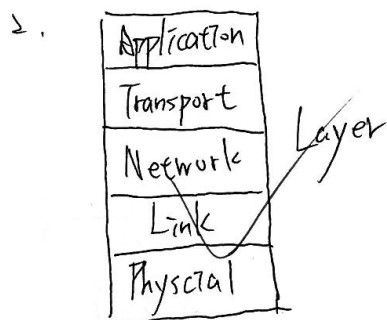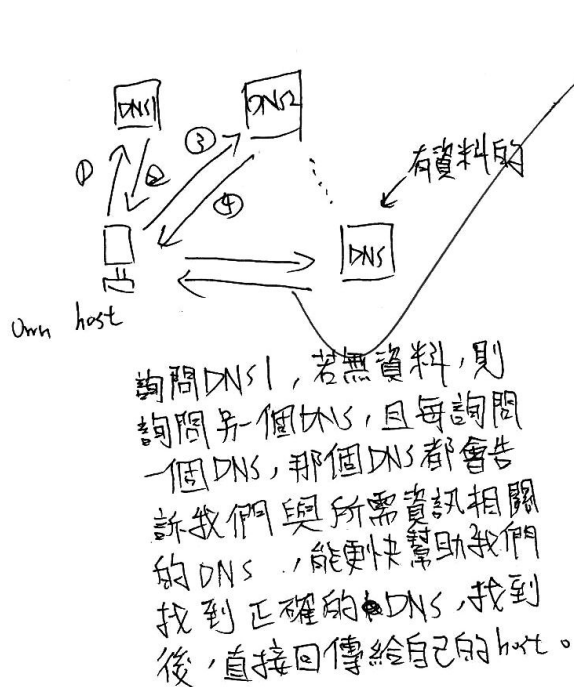   (a) How long will it take to transfer the file to Host B (use message switching)? (5%)

Figure 1:

. (b) Redo the above problem by breaking the files equally into 500 packets (use packet switching)? (5%)

(c) Redo the above problem by breaking the files equally into 1000 packets (use packet switching)? (5%)

7. (10%)

(a) What is the Proxy cache?

(b) What advantages does a proxy cache have?

8. Please briefly described the steps to detect a network failure. (10%) (Hint: use DOS command : ping)

9. Consider the environment shown in Figure 1, the server and the peers are connected to the Internet with access links. The upload rate of the server's access link is denoted by u_s ($u_s = 1Mbps$). And the upload (and download) rate of ith peer's access link is denoted by u_i (and d_i), where $u_i = 0.5Mbps$ (and $d_i = 2Mbps$), $1 \leq i \leq N$. Now, the server wants to distribute a file with size F ($F = 5Mbits$) to N peers ($N = 10$).

(a) What is the minimum distribution time for the client-server architecture? (6%)

(b) What is the minimum distribution time for the P2P architecture? (6%)

1.
(a) Internet Content Protocol
(b) Time Division Multiplexing
(c) Peer - to-Peer
(d) Simple Mail Transfer Protocol
(e) Hyper Text Transfer Protocol
(f) Domain Name System
(g) Asymmetric Digital Subscriber Line

2.

| Application |
| Transport |
| Network | Layer
| Link |
| Physical |

3.

詢問 DNS1，若無資料，則
詢問另一個 DNS，且每詢問
一個 DNS，那個 DNS 都會告
訴我們與所需資訊相關
的 DNS，能更快幫助我們
找到正確的 DNS，找到
後，直接回傳給自己的 host。

4.
Processing delay
Queueing delay
Transmission delay
Propagation delay

dend-end (有 router)：
Processing + Queueing + Transmission + Propagation (delay)

dend-end (無 router)：
Processing + Transmission + Propagation (delay)

5.
(a) UDP
reason：影片視訊可以有容錯的情況，
故使用 UDP。

(b) UDP
reason：為了使效率加快，故使用較快
的 UDP。
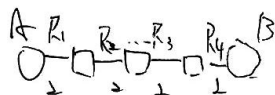
(c) TCP
reason：信件不容許有錯誤情況，所以
使用 TCP。

(d) TCP
reason：網站為了提供正確的訊息，所
以使用不容許出錯的 TCP。

(e) TCP
reason：若檔案有損毀就無法執行，所
以不容出錯，故使用 TCP。

6.

(a)

$$A \overset{R_1}{\bigcirc} \square \overset{R_2}{\underset{1}{\square}} \overset{\cdots R_3}{\square} \overset{R_4}{\underset{1}{\square}} \bigcirc B$$

$$\frac{10}{2} = 5 \ (sec)$$

$$5 \times 4 = 20 \ (sec)$$

(b)

$$\frac{10}{500} = 0.02 \ (Mb)$$

$$\frac{0.02}{2} = 0.01 \ (sec)$$

$$0.01 \times (500 + 3)$$

$$= 5.03 \ (sec)$$

(c)

$$\frac{10}{1000} = 0.01 \ (Mb)$$

$$\frac{0.01}{2} = 0.005 \ (sec)$$

$$0.005 \times (1000 + 3)$$

$$= 5.015 \ (sec)$$

7.

(a)
代理伺服器能將使用者
所要求的資源儲存在
伺服器裡，等下一次使用
者再要求同個資源時，
就能直接從代理伺服
器裡取出。

(b) 能減少對外頻寬、減少回
應時間、還能省錢。

8. ① 先 ping 自己的網卡IP ?
② 再 ping 自己的 IP
③ 再 ping gateway
④ 再 ping DNS server

9.

(a) client - server

$$D_{cs} \geq max\left\{ \frac{NF}{U_s} , \frac{F}{d_{min}} \right\}$$

$$\Rightarrow D_{cs} \geq max\left\{ \frac{50}{1} , \frac{5}{2} \right\}$$

$$\Rightarrow D_{cs} \geq 2.5$$

min distribution time = 2.5

(b) P2P

$$D_{p2p} \geq max\left\{ \frac{F}{U_s} , \frac{F}{d_{min}} , \frac{NF}{U_s + \sum_{i=1}^{N} U_i} \right\}$$

$$\Rightarrow D_{p2p} \geq max\left\{ \frac{5}{1} , \frac{5}{2} , \frac{50}{1 + 2 \times 10} \right\}$$

$$\Rightarrow D_{p2p} \geq max\left\{ 5 , 2.5 , 2.38 \right\}$$

$$\Rightarrow D_{p2p} \geq 2.38$$

min distribution time = 2.38