

國立臺北科技大學

九十九學年第一學期電機系博士班資格考試

網際網路工程試題

填學生證號碼

第一頁 共三頁

--	--	--	--	--	--	--	--

注意事項：

1. 本試題共【7】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。

- 1 (15 points) Consider distributing a file of F bits to N peers using a P2P architecture shown in Figure 1. Denote the upload rate of server's access link by u_s , and the upload rate of the i th peer's access link by u_i , and the download rate of the i th peer's access link by d_i . Let d_{min} denote the download rate of the peer with the lowest download rate. Assume a fluid model. Assume that d_{min} is very large, so that peer download bandwidth is never a bottleneck. Suppose that $u_s \leq (u_s + u_1 + \dots + u_N)/N$. Specify a distribution scheme that has a distribution time of $NF/(u_s + u_1 + \dots + u_N)$.

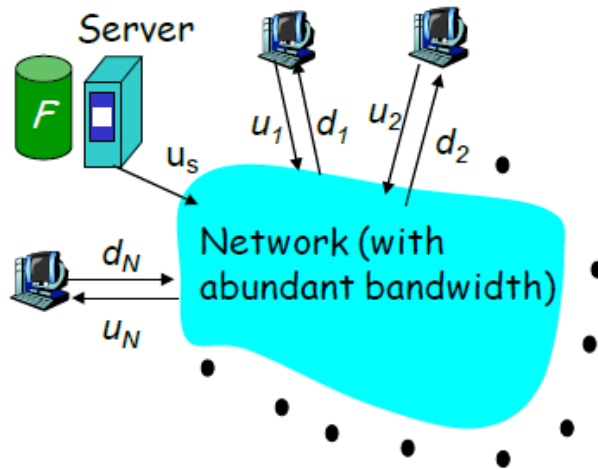


Figure 1

- 2 (15 points) Suppose a peer with username Alice discovers through querying that a peer with user Bob has a file it want to download. Also suppose that Alice and Bob are both behind a NAT. Try to devise a technique that will allow Alice to establish a TCP connection with Bob without application-specific NAT configuration. If you have difficulty devising such a technique, discuss why.
- 3 (15 points) Suppose an 802.11b station is configured to always reserve the channel with the RTS/CTS sequence. Suppose this station suddenly wants to transmit 1,000 bytes of data, and all other stations are idle at this time. As a function of SIFS and DIFS, and ignoring propagation delay and assuming no bit errors, calculate the time required to transmit the frame and receive the acknowledgment.
- 4 (15 points) Suppose Alice, Bob, and Claire want to have an audio conference call using SIP and RTP. For Alice to send and receive RTP packets to and from Bob and Claire, is only one UDP socket sufficient (in addition to the socket needed for the SIP message)? If yes, then how does Alice's SIP client distinguish between the RTP packets received from Bob and Claire?
- 5 (15 points) Consider Figure 2, provide MAC address and IP address for the interface at Host A, both routers, and Host F. Suppose Host A sends a datagram to Host F. Give the source and destination MAC addresses in the frame encapsulating this IP datagram as the frame is transmitted (1) from Host A to the left router, (2) from the left router to the right router, (3) from the right router to Host F. Also give source and destination IP addresses in the IP datagram encapsulated within the frame at each of these points in time.

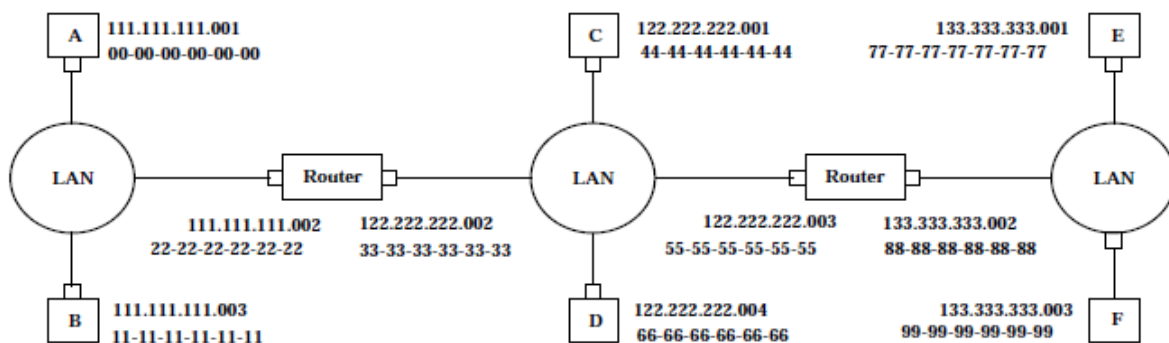


Figure 2

6 (15 points) In TCP congestion control protocol, we saw that TCP waits until it has received three duplicate ACKs before performing a fast retransmit. Why do you think the TCP designers chose not to perform a fast retransmit after the first duplicate ACK for a segment is received?

7 (10 points) What information is needed to dimension a network so that a given quality of service is achieved?