國 立 臺 北 科 技 大 學

九十六學年第一學期電機系博士班資格考試

電腦網路理論試題(公告用)

注意事項：

1. 本試題共【8】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. (10 points) Consider the use of 1000-bit frames on a 1 Mbps satellite channel with a 270 ms delay,. What is the maximum link utilization for
   (a) Stop-and-wait flow control?
   (b) Continuous flow control with a window size of 127?

2. (10 points) Please describe the RSA algorithm. You must describe the encryption, decryption operation and key generation.

3. (20 points) Consider three LANs interconnected by two routers, as shown in the diagram below.

(a) Assign IP address to all of the interfaces, and assign MAC address to all of the adapters

(b) Consider sending an IP datagram from Host A to Host E. Suppose all of the ARP tables are empty. Enumerate all steps.
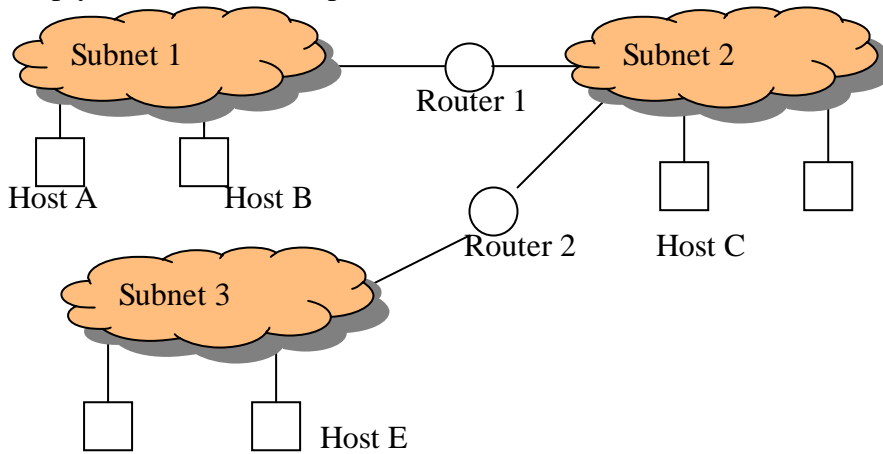
4　(10 points) (a) Consider the following figure that bridges connect in a cycle. Please describe the problem occurs in this figure.

(c) Please propose a method to prevent loops in the bridged networks.
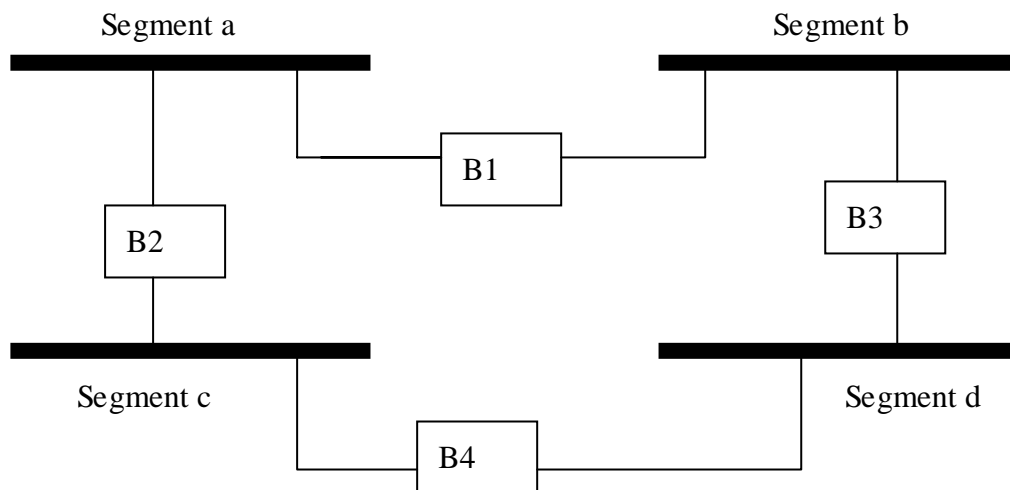
5. (15 points) (a) As shown in the following figure, if the maximum transmission distance is d. Please describe the reason why wireless LAN cannot use the CSMA/CD protocol.
(b) Please propose a protocol for this wireless networks.
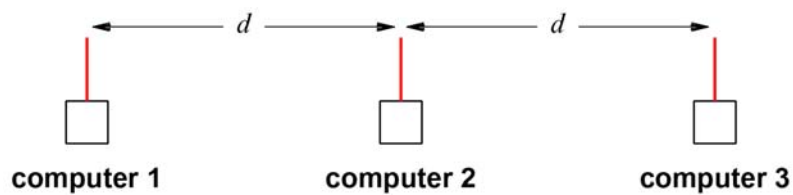
6. (10 points) A TCP entity opens a connection and uses slow start. Approximately how many round-trip times are required before TCP can send N segments.

7. (15 points) Suppose there are two ISPs providing Wi-Fi access in a particular café, with each ISP operating its own AP and having its own IP address block.

(a) Further suppose that by accident, each ISP has configured it AP to operate over channel 11. Will the 802.11 protocol completely break down in this situation? Discuss what happens when two stations, each associated with a different ISP, attempt to transmit at the same time.

(b) Now suppose that one AP operates over channel 1 and the other over channel 11. Discuss what happens when two stations, each associated with a different ISP, attempt to transmit at the same time.

8. (10 points) Use Nyquist's theorem to determine the maximum rate in bits per second at which data can be sent across a transmission system that has a bandwidth of 4kHz and uses four values of voltage to encode information.