

國立臺北科技大學

一百零四學年第一學期電機系博士班資格考試

網際網路工程 試題

第一頁 共三頁

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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 the connected two LAN switches with two VLANs in Figure 1, and assume an external router is connected to switch port 1 in left switch. Assign IP addresses to the EE and CS hosts and router interface. Trace the steps taken at both the network layer and the link layer to transfer an IP datagram from host EE1 to host CS1.

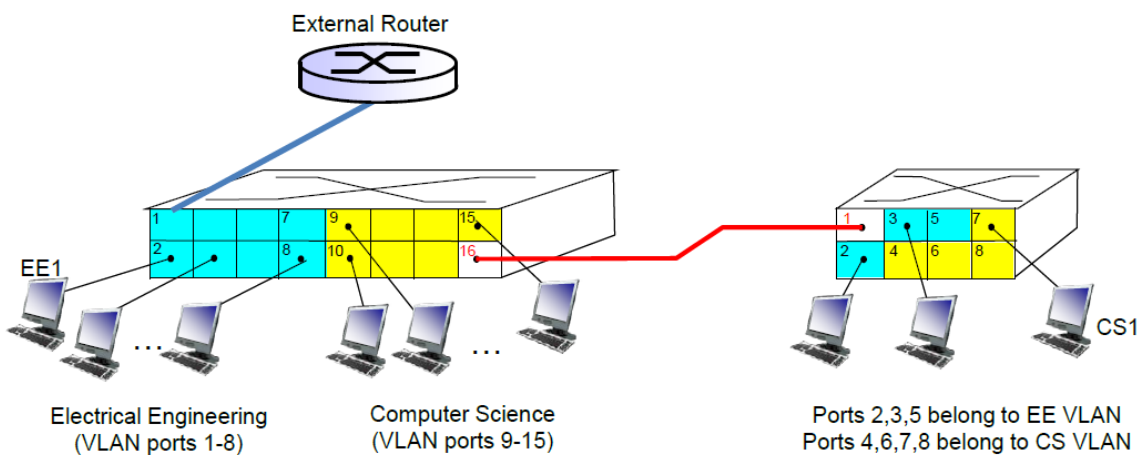


Figure 1

2. (15 points) Diagram the basic architecture of the Netflix video-streaming platform.

3. (15 points) Consider Figure 2. Suppose there is another router w , connected to router y and z . The costs of all links are given as follows: $c(x,y)=4$, $c(x,z)=50$, $c(y,w)=1$, $c(z,w)=1$, $c(y,z)=3$. Suppose that poisoned reverse is used in the distance-vector routing algorithm.

- (a) When the distance vector routing is stabilized, router w , y , and z inform their distance to x to each other. What distance values do they tell each other?
- (b) Now suppose that the link cost between x and y increase to 60. Will there be a count-to-infinity problem even if poisoned reverse is used? Why or why not? If there is a count-to-infinity problem, then how many iterations are needed for the distance-vector routing to reach a stable state again?
- (c) How do you modify $c(y,z)$ such that there is no count-to-infinity problem at all if $c(y,x)$ changes from 4 to 60?

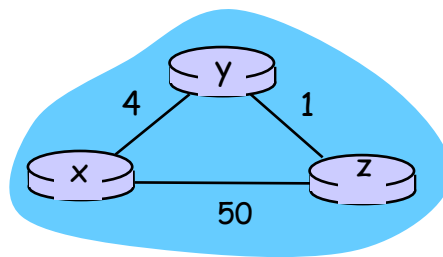


Figure 2

- 4. (15 points) (a) Given value of EstimatedRTT and DevRTT, what value should be used for TCP's timeout interval?
- (b) What is the utility of the TCP state variable SendBase?

5. (15 points) Suppose the host *ee.ntut.edu.tw* desires the IP address of the mail server of *networkutopia.com*. Also suppose that NTUT's local DNS server is called *dns.ntut.edu.tw* and that an authoritative DNS server for *networkutopia.com* is called *dns1.networkutopia.com*.

- (a) Please describe the interaction of the various DNS servers using recursive queries.
- (b) Please describe the interaction of the various DNS servers using iterative queries.

6. (15 points) A packet switch receives a packet and determines the outbound link to which the packet should be forwarded. When the packet arrives, one other packet is halfway done being transmitted on this outbound link and six other packets are waiting to be transmitted. Packets are transmitted in order of arrival. Suppose all packets are 1500 bytes and the link rate is 2 Mbps. What is the queueing delay for the packet? More generally, what is the queueing delay when all packets have length L , the transmission rate is R , x bit of the currently-being-transmitted packet have been transmitted, and n packets are already in the queue?
7. (10 points) If the UDP server were to support i simultaneous different client hosts, how many sockets would the UDP server need? Why? If the TCP server were to support i simultaneous connection, each from a different client host, how many sockets would the TCP server need? Why?