

國立臺北科技大學一百零六學年第一學期

電機系博士班資格考試試題範本說明

- 一. 本系博士班資格考試試題為 A4 格式之版面。
- 二. 提供之試題範本自第 1 頁起提供 A4 格式之版面共 4 頁，若有不足請自行加頁。
- 三. 本範本以 Office 之 Word 文書應用軟體製作，命題委員至少須輸入之資料共四項，各項簡要說明如下：(前三項請依範本上之原字型與字型大小輸入，**前二項已代為執行合併列印套稿，請確認組別名稱與考試科目**。謝謝您！)

(一) **【考試科目名稱】** ⇒ [依所附檔案內**考試科目名稱**完整輸入取代]

(二) ⇒ [請依試題**題數**輸入取代並增加**必要之配分**與**各項特殊規定**]

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。

(三)

試題本文 ⇒ [請輸入**題號**與**試題內容**並完成排版與列印]

範本版面說明

試題本文之外方格線，係以單格表格並以隱藏格線方式設計，請在格線內命題，不要超出格線外；若有圖片，亦請於列印後黏貼於規劃版面內。謝謝！

- 四. 命題版面達 A4 共 2 頁(含)以上時，請修改範本第 1 頁之 **第一頁 共一頁** 為 **第一頁 共二頁**；若頁數更多，請類推修改增加之。
- 五. 本範本檔案及考試科目名稱檔案，將由本系以隨身碟提供命題委員，請命題委員在規劃版面內命題，**並以 A4 紙張列印出試題繳交，隨身碟亦請交給本系**。本系將直接列印後隨即製版，不再作其他處理，若有圖片請自行黏貼於妥當之版面位置。

國立臺北科技大學

一百零六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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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。
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4. 考試時間：二小時。

1. (15 points) (a) List six access technology. Classify each one as home access, enterprise access, or wide-area wireless access.

(b) Consider sending a packet from a source host to a destination host over a fixed route. List the delay components in the end-to-end delay. Which of this delays are constant and which are variable.

(c) Describe how a botnet can be created and how it can be used for a DDoS attack.

2. (15 points) Host A and Host B are communicating over a TCP connection, and Host B has already received from Host A all bytes up through byte 126. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 80 and 40 bytes of data, respectively. Host B sends an acknowledgment whenever it receives a segment from Host A. Suppose the two segments sent by Host A arrive in order at Host B. The first acknowledgment is lost and the second acknowledgment arrives after the first timeout interval. Draw a time diagram, showing these segments and all other segments and acknowledgment. For each segment in your figure, provide the sequence number and the number of bytes of data; for each acknowledgment that you add, provide the acknowledgment number.

3. (15 points) Assume a client and a server can connect through either network (a) or (b) in Figure 1. Assume that $R_i = (R_c + R_s)/i$, for $i = 1, 2, \dots, N$. In what case will network (a) have a higher throughput than network (b)?

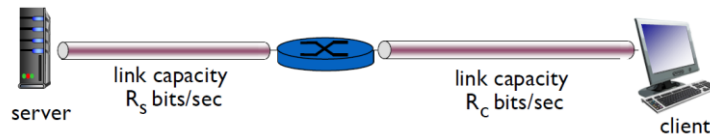


Figure 1 (a)

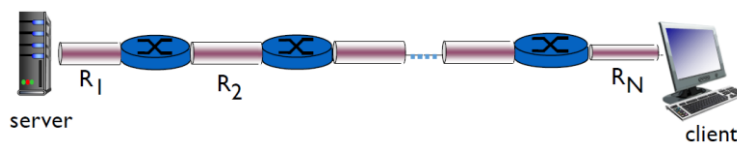


Figure 1 (b)

4. (15 points) Consider the SDN OpenFlow network shown in Figure 2. Suppose that the desired forwarding behavior for datagrams arriving at s2 is as follow:

- Any datagrams arriving on input port 1 from host h5 or h6 that are destined to host h1 or h2 should be forwarded over output port 2.
- Any datagrams arriving on input port 2 from host h1 or h2 that are destined to host h5 or h6 should be forwarded over output port 1.
- Any datagrams arriving on input ports 1 or 2 and destined to host h3 or h4 should be delivered to the host specified.
- Hosts h3 and h4 should be able to send datagrams to each other.

Specify the flow table entries in s2 that implement this forwarding behavior.

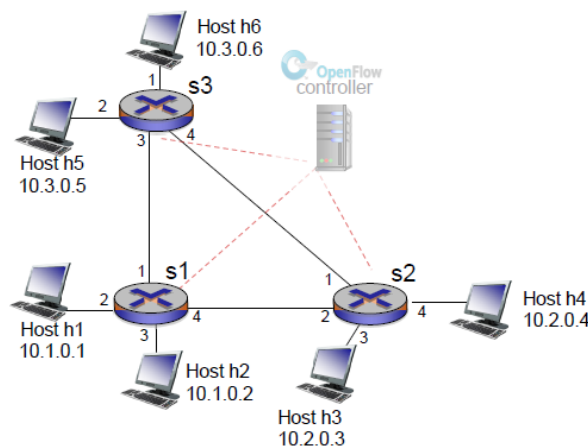


Figure 2

5. (15 points) Recall the simple model for HTTP streaming shown in Figure 3. Recall that B denotes the size of client's application buffer, and Q denotes the number of bits that must be buffered before the client application begins playback. Also r denotes the video consumption rate. Assume that the server sends bits at a constant rate x whenever the client buffer is not full. Suppose that $x < r$. As discussed in the text, in this case playback will alternate between periods of continuous playback and periods of freezing. Determine the length of each continuous playback and freezing period as a function of Q , r , and x .

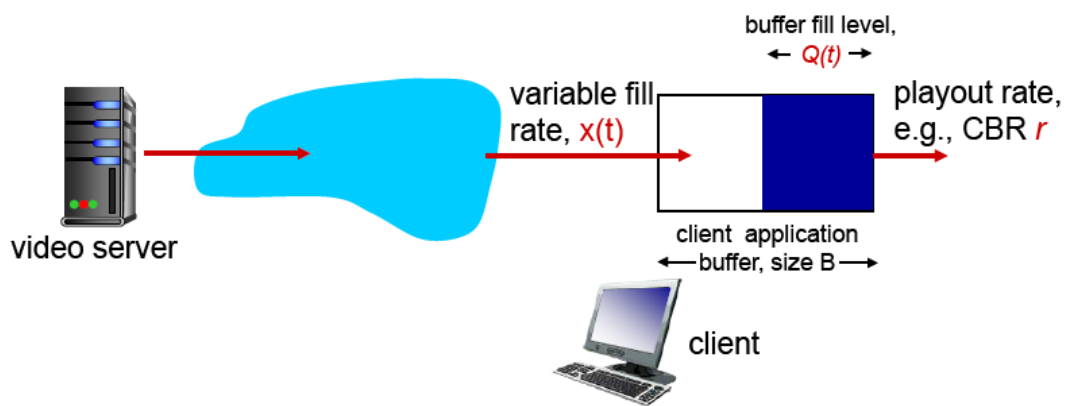


Figure 3

6. (15 points) In the VOIP example, let h be the total number of the header byte added to each chunk, including UDP and IP header. Assuming an IP datagram is emitted every 20 msec, find the transmission rate in bits per second for the datagrams generated by one side of this application.

7. (10 points) Under what circumstance is file downloading through P2P much faster than through a centralized client-server approach?