

1. What is the difference between a host and an end system? List three different types of end systems. Is a Web server an end system?

End systems are the devices provide information or services. A network of communication links and packet switches connected the end system. The speed of transmission can be measured by bits/second. Hosts are a subset of end system. Throughout some texts, the words “host” and “end system” are used interchangeably. PCs, web servers, and workstations are three different types of end systems. Yes, web server is an end system.

2. Suppose there is exactly one packet switch between a sending host and a receiving host. The transmission rates between the sending host and the switch and between the switch and the receiving host are R_1 and R_2 , respectively. Assuming that the switch uses store-and-forward packet switching, what is the total end-to-end delay to send a packet of length L ? (Ignoring queuing delay, propagation delay, and processing delay.)

Assuming that the switch uses store-and-forward packet switching, the total end-to-end delay to send a packet of length L is $L/R_1 + L/R_2$. Since it all begin by $t_0 = 0$, then at time $t_1 = L/R_1$, the sending host completed the transmission and switch received package packet. It then transmits packet to the host at t_1 . At $t_2 = L/R_1 + L/R_2$, the router completed transmission and the packet is received by host.

3. Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates $R_1 = 500$ kbps, $R_2 = 2$ Mbps, and $R_3 = 1$ Mbps. a. Assuming no other traffic in the network, what is the throughput for the file transfer? b. Suppose the file is 4 million bytes. Roughly, how long will it take to transfer the file to Host B? c. Repeat (a) and (b), but now with R_2 reduced to 100 kbps.

- a. 500 kpbs
- b. $(4 \times 1000000) \times 8 / (500000) = 64$ seconds
- c. Set $R_2 = 100$ kbps, then $4 \times 1000000 \times 8 / 100 \times 1000 = 320$ seconds

4. What is the difference between a virus and a worm?

The difference is worm operates independently of other files, whereas a virus depends on a host program to spread it. For more information, please check for more detail via the link below <http://www.cisco.com/c/en/us/about/security-center/virus-differences.html>

5. Suppose N packets arrive simultaneously to a link at which no packets are currently being transmitted or queued. Each packet is of length L and the link has transmission rate R . What is the average queuing delay for the N packets?

The average queuing delay for the N packets is $(N-1)L/(2R)$. Since $[L/R + 2L/R + 3L/R + \dots + (N-1)L/R] / N = (L/(RN)) N(N-1)/2 = (N-1)L/(2R)$

Filename: hw1.docx
Folder: /Users/Wen/Library/Containers/com.microsoft.Word/Data/Documents
Template: /Users/Wen/Library/Group Containers/UBF8T346G9.Office/User
Content.localized/Templates.localized/Normal.dotm
Title:
Subject:
Author: Wen Jiang
Keywords:
Comments:
Creation Date: 1/11/17 1:56:00 PM
Change Number: 2
Last Saved On: 1/11/17 1:56:00 PM
Last Saved By: Wen Jiang
Total Editing Time: 0 Minutes
Last Printed On: 1/11/17 1:56:00 PM
As of Last Complete Printing
Number of Pages: 1
Number of Words: 437
Number of Characters: 2,152 (approx.)