浙江大学《计算机网络》课程课后作业一

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1. Imagine that you have trained your St. Bernard, Bernie, to carry a box of three 8-mm tapes instead of a flask of brandy. (When your disk fills up, you consider that an emergency.) These tapes each contain 7 gigabytes. The dog can travel to your side, wherever you may be, at 18 km/hour. For what range of distances does Bernie have a higher data rate than a transmission line whose data rate (excluding overhead) is 150 Mbps? How does your answer change if (i) Bernie's speed is doubled; (ii) each tape capacity is doubled; (iii) the data rate of the transmission line is doubled

   Answer：
   (0) Assume the time consume between the dog and myself is t. we have

   $$3 * 7\text{GB} = 150\,000\,000\ \text{b} * t \quad (1)$$

   $$\frac{18}{3600} * \text{t} = \text{s} \quad (2)$$

   We can get $\text{s} = (21 * 10^9 * 8) / (15 * 10^7) * 0.005 = 5.6\ KM$
   (1) from qustion (0) we can get s is also doubled so that s = 11.2KM
   (2) from qustion (0) we can get s is also doubled so that s = 11.2KM
   (3) from qustion (0) we can get s is also halved so that s = 2.8KM

2. What are two reasons for using layered protocols? What is one possible disadvantage of using layered protocols?

   Answer:
   (1) Reasons: ① It can devide the datas into many small packets, which can be easy to transmit. ② When the protocol changed, it will not affect other layers.
   (2) Disadvantage: It difficult to implement and need the all programmers obey the protocol.

3. In some networks, the data link layer handles transmission errors by requesting that damaged frames be retransmitted. If the probability of a frame's being damaged is p, what is the mean number of transmissions required to send a frame? Assume that acknowledgements are never lost.

   Answer:
   Assume that after k-1 times, we success at the k-th time and we denote it as P_k . For each time, the probability of success is 1-p and p for failed.

   $$\text{P}_\text{k} = p^{k-1}(1-p)$$

   $$\text{P} = \sum_1^k kP_k = (1-p)\sum_1^k kp^{k-1} = \frac{1}{(1-p)}$$

4. What is the main difference between TCP and UDP?

   Answer: TCP is connection-oriented service while UDP is connectionless service

5. How long was a bit in the original 802.3 standard in meters? Use a transmission speed of 10 Mbps and assume the propagation speed in coax is 2/3 the speed of light in vacuum.

   Answer:

   $\mathrm{v} = 3 * 10^8 * \frac{2}{3} = 2 * 10^8\ m/s$

   $\mathrm{t} = \frac{1\ b}{10\ 000\ 000\ b/s} = 10^{-7}\ s$

   Thus 1 bit takes length of v * t = 20 meters

6. List one advantage and one disadvantage of having international standards for network protocols.

   Answer:
   (1) Advantage: Every one can talk to others easily no matter where the person come from as long as the protocol supports.
   (2) Disadvantage: The standard is not easy to change and update.

7. Which layers are common in the OSI model and TCP/IP model?

   Answer: internet layer、transport layer、application layer