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CSC138- Networks and Internets

***Homework Chapter #1(Intro to Computer Networks)***

1>Q1 (R4) List six access technologies. Classify each one as home access, enterprise

Access, or wide-area wireless access

Answer 1:

|  |  |
| --- | --- |
| Dial-up modem over telephone line | Home Access |
| Hybrid fiber-coaxial cable | Home Access |
| 100 Mbps switched Ethernet | Home Access |
| Wireless LAN | Home and Enterprise Access |
| Digital subscriber Line | Home Access |
| DSL over telephone line | Home Access |
| 3G , 4G services | wide-area wireless access |

Q2 (R12) what advantage does a circuit-switched network have over a packet-switched network?

Answer 2:

* A circuit-switched network can guarantee a certain amount of end-to-end bandwidth for the duration of a call. Most packet-switched networks today (including the Internet) cannot make any end-to-end guarantees for bandwidth.
* Circuit switched networks are used for voice/video calls, but packet-switched networks are not possible to do this.
* Circuit switched network's bandwidth is limited, but packet-switched network's bandwidth is not limited. So, packets transfer is time taken in packet-switched network.

Q3 (R23). List the 5 layers in the Internet protocol stack? What are the principal responsibilities of each of these layers?

Answer 3:

* Application layer: HTTP, SMTP, and FTP protocols are used in application layer. It is used to send data over multiple end systems.
* Transport layer:Transfer the content between two endpoints mainly. TCP and UDP protocols are used in transport layers.
* Network layer: Move the packets between any two hosts in the network. IP protocol is used in network layer.
* Data link layer: Move the packets from one node to the next another node. Point-to-point protocol (ppp) used in data link layer.
* Physical layer:Transfer the individual bits from one node to the next node within the frame.

Q4 (p8)

Answer 4:

1. a. (5%) When circuit switching is used, how many users can be supported?

The number of users:

= (Transmission Rate of the link used by the user / transmission Rate required for each user)

= (3000Kbps /150 Kbps)

=20 users can be supported.

1. b. (5%) For the remainder of this problem, suppose packet switching is used. Find the probability that a given user is transmitting.

Since transmission rate is 10% → p = 0.1

1. c. (5%) Suppose there are 120 users. Find the probability that at any given time, exactly n users are transmitting simultaneously. (Hint: Use the binomial distribution.)

( 120 C 𝑛 ) ((0.1)^𝑛)(0.9) ^(120−𝑛) where n is the number of users

1. d. (5%) Find the probability that there are 21 or more users transmitting simultaneously.

1- ∑(from n=0 to 20) ( 120 C 𝑛 ) ((0.1)^𝑛)(0.9) ^(120−𝑛)

We use the central limit theorem to approximate this probability. Let 𝑋𝑗 be independent random variables such that 𝑃(𝑋𝑗 = 1) = 𝑝.

𝑃(21 or more users) = 1 − 𝑃 (∑(from 𝑗=1 to120) Xj ≤ 20)

≈ 𝑃 (𝑍 ≤ 8 /3.286) = 𝑃(𝑍 ≤ 2.43) = 0.992

⇒ P ≈ 0.008

Q5.

Answer 5:

Given data

Number of client and server paths = M

Transmissions rate of path M consists of N links = Rk1, Rk2, …., RkN.

Generally two types of throughputs are Instantaneous and Average throughput

* If the server uses a single path to send data to the client, the maximum throughput is Rk1.
* If the server uses all the M path to send data to the client, the maximum throughput is

Min{ Rk1, Rk2, … , RkN).