السابع اتصالات

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College of Electronic Technology

Final EXAM Group A **Course: Switching and Networks**

Student Name: **Exam duration: 2 Hours**

Part I (20 points):

True (T) or False (F)

1- In the subscriber loop design, the optimum loop length is taken as minimum value between resistance limit and attenuation limit ( )

2- For long length subscriber loop, wire gauge 26 is better than wire gauge 22 ( )

3- ADM block in SONET does traffic extraction at some points in the network without de-multiplexing the entire traffic ( )

4- Hybrid circuit is usually exist between subscriber and exchange ( )

5- Busy hour is the hour at which traffic in telephone network reaches its average value ( )

6- ATM switching is a best packet switching for voice and video communication ( )

7- In time switching, information between two different time slots is done using TSI ( )

8- Memory is required in the space stage of the multistage time switching( )

9- SONET uses the concept of byte multiplexing in all levels ( )

10- Singing phenomena in telephone network happens when the returned signal reflected two times between sending and receiving sides( )

Answer the following questions briefly :

1-What are some differences between ATM switching network and internet (IP) network ?

2- Why do we need space stages in Time Switches?

3- Explain the difference between the basic rate and the primary rate in ISDN, and what is the best application for each one of them?

4- How ATM technology supports real time communication?

5- Sketch a block diagram of the local telephone network distribution?

Part II

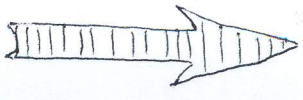
Problem 1) (15 points) It is required to build a time switch using multi-stage configuration(**S T S**). The first **S** stage is **8x8** and the second **S** stage is **8x8** with 128 channel on each link.

a)- Sketch the switch configuration, and calculate the switch complexity and its blocking probability if the channel utilization is 0.3.

b)- If the complexity of the STS is increased to 1029.12 due to increasing time stage sub-blocks, find the new blocking probability (everything else stay the same)

c)- Given the **MTBF**= 2000 hours and **MTTR**= 15 hours for this switch, find the hours of unavailability of the switch in 20 years.

Hint: complexity in STS= $2KN + \frac{KC}{100}(2log_2N + 8 + log_2C)$, $P_B = (1-(1-\frac{pN}{K})^2)^K$



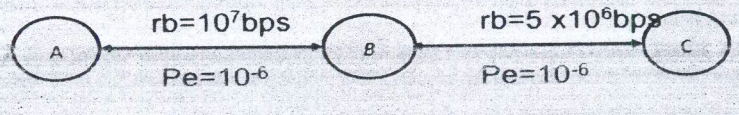
Problem 2) (10 points) A file of size 2 M bits is to be transmitted over two links in packet switching network as shown in figure below. If the link speed between A and B is 10Mbps and between B and C is 5Mbps, and the probability of bit errors in both links is 10^{-6}.

(a)- How many bits need to be transmitted to deliver file correctly if the file is sent as packets of size 1000 k bits.

(b)- How many bits need to be transmitted to deliver file correctly if the file is sent as packets of size 50 k bits.

(c)- Comment on the results of (a) and (b).

(d)- Compare the transmission delay of the above two cases in (a) and (b) ?



Problem 3) (15 points) A single stage space switch consists of 2048 inputs and 2048 output links, If it is required to build it in a three stages as **non-blocking** and with a **minimum** cost:

a) Design the three stage space switch and identify all its information, with a diagram sketch of all stages

b) Compare the cost of the single stage case with the three stages case in terms of number of cross points

c) If the number of cross points of the previous **three stages** is reduced to 81096, Find number of 2^{nd} stage blocks (k), Is the switch now blocking or non-blocking? If it is blocking find its blocking probability when p=0.1.