IQRA NATIONAL UNIVERSITY, PESHAWAR, PAKISTAN

NETWORKS MANAGEMENT

Program: MSCS/PhDCS **FINAL-TERM EXAM** **Semester: Spring 2020**

Maximum Marks: 50 **Time Allowed: 6 Hours**

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Note : ***Write down the complete statements of Q1 otherwise just answers will lead to zero marks.***

The paper should be submitted in pdf form and plagiarism will be checked; ***2 students with the same plagiarism report and answers will lead to zero marks to both.***

Cc: ***to Vice Chancellor***

Controller of Examination

Head of Department

Q1. Select the correct answer of the given ones. (10)

1) Interactive transmission of data independent of a time sharing system may be best suited to
   (a) simplex lines (b) half-duplex lines (c) full-duplex lines (d) biflex lines
2) The loss in the signal power as of an Electromagnetic signal is called
   (a) attenuation (b) propagation (c) scattering (d) interruption
3) Early detection of packet losses improves _____ acknowledgment performance.
   (a) odd (b) even (c) positive (d) negative
4) Additional signal introduced in the desired signal in producing hypes is called
   (a) fading (b) noise
   (c) scattering (d) dispersion
5) Token is a _____ that rotates around the ring.
6) Ring may have up to _____ (802.5) or _____ (IBM) nodes.
7) FDDI can support a maximum of ____5000_____ stations.
8) Error-correcting codes are _____intelligent_____ enough to handle all errors.
9) ACK is a small _____Control frame_____ confirming reception of an earlier frame
10) Electronics are _____organized_____ as compared to optics

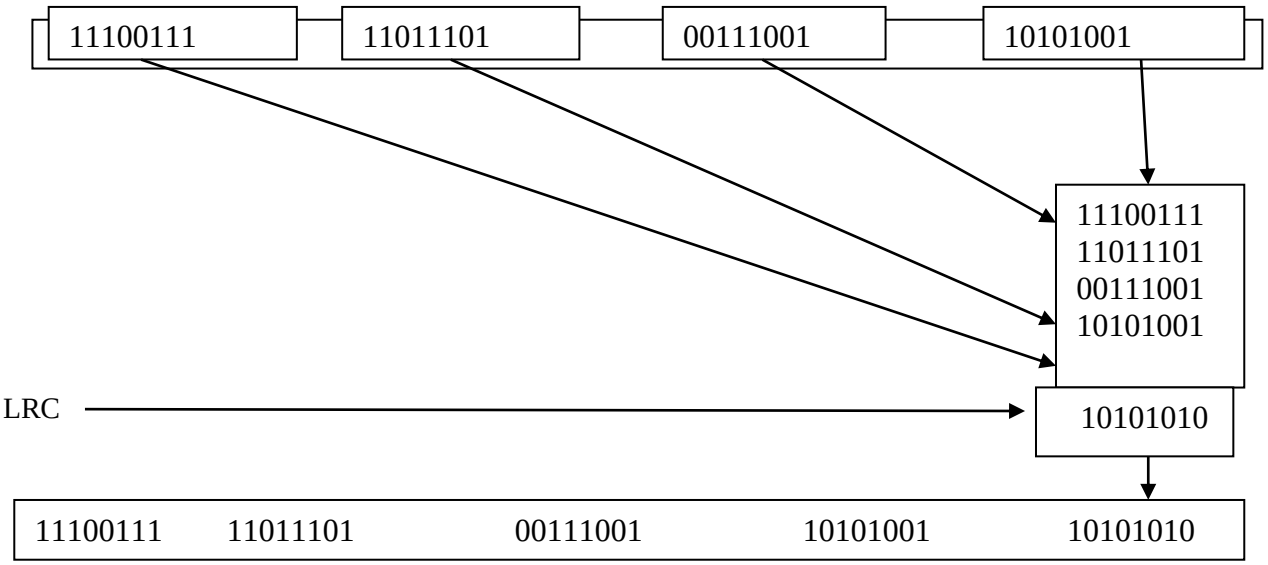
Q2: Distinguish between error correction and error detection. Explain any two error detection techniques with mathematical examples other than given in slides, search from internet. (10)

Ans: In Error detection it is checked whether any Error has occurred or not during communication. It means that to check whether the data sent is accurate or not while error correction means to know the exact number of corrupted bits and the location of corrupted bits. While performing error detection and error correction both sender and receiver needs some extra bits to be accompanied with the actual data, when receiver receives the message the data

is checked upon the extra redundant bits if it find the data free from errors, it remove the extra bits before forwarding data to upper layers.

Error Detection Techniques:-

1. ***Longitudinal Redundancy check(LRC):*** In this method a block of bits are arranged in rows and columns format and for each column parity bit will be calculated separately. These parity bits are sent along with the original data. In LRC each bit with each column is checked. This method can easily check burst errors and single bit error as explained in diagram with calculation:
   i.e:



2. ***Parity Checking:*** In parity checking an additional bit is added to the original data. Number of 0's and 1's are calculated before adding the parity bit. It also causes change in the size of string, means 8 bit string will become 9 bits.
   i.e - If the data has even number of 1's, the parity bit is 0. Ex: data is 10000001 then parity bit is 0.
   - Odd number of 1's, the parity bit is 1. Ex: data is 10010001 then parity bit is 1.
   - If the data has odd number of 1's, the parity bit is 0. Ex: data is 10011101 then parity bit is 0.
   - Even number of 1's, the parity bit is 1. Ex: data is 10010101 then parity bit is 1

Q3: What is encoding? Write down different types of encoding. Explain characteristics of AM, FM and PM with mathematical equations. (10)

Ans: The process of converting data from one form to another is called Encoding. The purpose of encoding is to transfer data into other format using publically available scheme so that it can easily be reversed. Its goal is not to keep information secret but to ensure that it is properly consumed. There are many types of encoding like:

- ***Acoustic Encoding:*** It is the process of hearing to implant memories. It uses the phonological loop which is the process to hear voice over and over in order to remember it.

- ***Visual Encoding:*** It is the process of encoding images and visual information. This information is firstly added to the temporary memory and then sent to permanent memory.
- ***Elaborative Encoding:*** The already known information is used in Elaborative Encoding and it relates this known information to the new information being experienced.
- ***Semantic Encoding:*** It uses the sensory input that has a specific meaning. Mnemonics are mostly used in semantic Encoding.

Characteristics:

- ***Amplitude Modulation***: Signal carry equation would be: $C(t) = C \sin(\omega c + \varphi)$ where

Frequency carrier in hertz = $\omega c/2$
πC is the carrier amplitude
φ is the signal phase at the start of the reference time
C can be = 1 and φ can be = 0
Multiplying the carrier and the modulating signal.

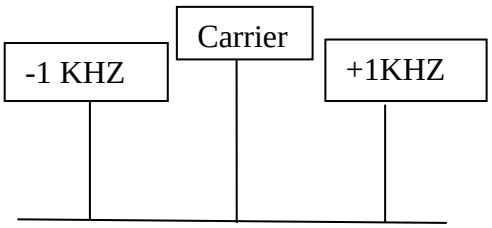
$$y(t) = [A + m(t)].c(t) y(t) = [A + m(t)].c(t)$$

Constant A is required as it represents amplitude of the wave form
The overall signal after individual relationships for carrier and modulating signal.

$$y(t) = [A + M\cos(\omega mt+\varphi].\sin(\omega ct) y(t) = [A + M\cos(\omega mt+\varphi].\sin(\omega ct)$$

The equation is further expanded to include the components of signal.

$$y(t) = A.\sin(\omega ct)+A\ M2[\sin((\omega c+\omega m)t+\varphi)]+A\ M2[\sin((\omega c-\omega m)t-\varphi)]$$



- ***Frequency Modulation:*** *V(t)* the voltage of the signal as a function of time. V_o the amplitude of the signal (represents the maximum value achieved each cycle). *f* the frequency of oscillation, the number of cycles per second (also known as Hertz = 1 cycle per second)
  f the phase of the signal, representing the starting point of the cycle.
- Information: $V_m(t)$
- Carrier: $V_c(t) = V_{co} \sin (2\ p\ f_c\ t + f)$
- FM: $V_{FM}(t) = V_{co} \sin (2\ p\ [f_c + (Df/V_{mo})\ V_m(t)]\ t + f)$
- $b = Df/f_m$, where f_m is the maximum modulating frequency used
- the L + R (left + right) signal in the range of 50 to 15,000 Hz.
- a 19 kHz pilot carrier.
- the L-R signal centered on a 38 kHz pilot carrier (which is suppressed) that ranges from 23 to 53 kHz .

- ***Phase Modulation:***

For a baseband signal, x(t):
– kp is the frequency deviation constant in rad/volt
– A constant envelope signal with varying frequency/phase
– The instantaneous phase is: $\theta i(t) = 2\pi f\ c\ t + kp\ x(t)$ $fi(t) = f\ c + kp\ 2\pi\ dx(t)$
– The instantaneous frequency is: $xPM(t) = Ac \cos 2\pi f\ c\ t + k\ p\ [\ x(t)]$

Q4: Compare Ethernet and Token Ring concept of data networking with diagrams. Which one is better in your opinion and why? (10)

Ans: Comparison of Ethernet and Token Ring is as follows:

- Ethernet supports direct cable connection between two networks while token ring doesn't support direct cable connection as it needs additional software or hardware.

- Collision is eliminated by token ring by using single token and early token release. Ethernet eliminates the collision through HUB or Switch.
- Network interface cards in token ring are capable of speed auto-detection and routing as these cards contains great intelligence, Whereas Ethernet interface cards theoretically operate on a hub but not as large LAN.
- The chances of collision in Ethernet are more than that of token ring.
- Token ring provides priority access in which certain nodes may have priority over the token, while Ethernet don't have the provision for access priority.
- Multiple MAC addresses are supported by Token Ring, while Ethernet don't have the ability to support same MAC addresses.
- Token ring is more complex then Ethernet, which requires a special processor and licensed firmware for each interface.
- Token Ring Uses more costly cables the Ethernet as after modification in Ethernet twisted pair cables can also be used in Ethernet.

Which One is better Ethernet or Token Ring?

In my opinion Token Ring is better than Ethernet because:

- Token ring supports direct cable which causes fewer complexities in LAN.
- Data collision stoppage is better in Token ring as compared to Ethernet.
- Network interface cards of token ring are more intelligent than the Hubs used by Ethernet.
- Token ring provides processes priorities more intelligently than Ethernet.
- Same MAC addresses are supported by Token Ring, which cannot be supported by Ethernet.
- Token Ring uses more costly cables then Ethernet but if we look at the cost of switches and hubs then both are the same.
- Token Ring is more complex but it is also ver good in large networks as compared to Ethernet,

Q5. Explain the concept and review of Reliable Transmission with diagram (from a research paper of 2019 or 2020) and its functionality. The name and reference of paper should be given. (10)

Ans: By looking at the loss of information in the transmission for on-line monitoring of bus bar operation status, there are three influencing factors which cause reliability of information transmission they are:

- The physical structure of monitoring system
- communication protocol and the topological structure of information transmission network.
- A routing quality evaluation model is constructed, and a highly reliable path selection algorithm for information transmission is proposed.

Bus bar as power transmission equipment, with its superior performance, high security, easy installation, wide current range, high line optimization and strong expansibility, has become one of the most important components of transmission lines. Due to the stability of bus bar directly determining the operation status of the power system, bus bar failures often cause huge losses to industrial production and normal operation of power system. With the development of Internet of Things (IOT) technology, the on-line monitoring of bus bar

operation has become an important field in the application of IOT . Bus bar running condition on-line monitoring system is composed of wireless sensor nodes, sink nodes and computers.

The WSN regarding bus bar connectors includes three kinds of nodes: sensor node, transfer node and base station. Sensor node is responsible for collecting temperature data; transfer node collects and forwards temperature data; base station receives data information from all other nodes and sends it to PC monitoring system through serial port. Base station is located in the terminal of linear network. After wireless sensor node collects bus bar joint temperature information, it will send the information to base station by multi-hop mode.

Reference:

Research on the Reliability of Internet of Things Information Transmission for Bus bar Operation on-line Monitoring, Yecheng Zhang1,2,*, Guigen Zhou3 and Ning Yang2 1 School of College of Jingjiang, Jiangsu University, Zhenjiang, China 2 School of Electrical Engineering, Jiangsu University, Zhenjiang, China 3 Jiangsu Yineng Electric Co., Ltd., Zhenjiang, China *Corresponding author e-mail: 15050859371@139.com

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