IQRA NATIONAL UNIVERSITY, PESHAWAR, PAKISTAN

NETWORKS MANAGEMENT

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

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

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 **half duplex lines**
   (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 **attenuation.**
   (a) attenuation (b) propagation (c) scattering (d) interruption
3) Early detection of packet losses improves _____negative_____ acknowledgment performance.
   (a) odd (b) even (c) positive (d) negative
4) Additional signal introduced in the desired signal in producing hypes is called **nosie.**
   (a) fading (b) noise
   (c) scattering (d) dispersion
5) Token is a **____sequence of bit_____** that rotates around the ring.
6) Ring may have up to _____**260_____** (802.5) or _____**250**_____ (IBM) nodes.
7) FDDI can support a maximum of _____**500_____** stations.
8) Error-correcting codes are _____ enough to handle all errors.
9) ACK is a small _____ASCII Character_____ confirming reception of an earlier frame
10) Electronics are _____ 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)

Answer 2: Error Detection: Parity and cyclic redundancy check (CRC) methods can identify errors in the contour. In both cases, almost no additional bits are sent with the real information to confirm that the bits obtained at the opposite end are equivalent to the bits sent. If the possibility of back-checking at the collector end is low, the bits are considered damaged.

Error Correction: the error correction will done by methods.

1) Back Ward Error Correction
2) Forward Error Correction

The first one is backward error correction, which is basic and must be used effectively when the cost of retransmission is not high. For example, optical fiber. In any case, if a remote transmission occurs, retransmission may be too expensive. In the last case, forward error correction is used. The following are two techniques using for error detection.

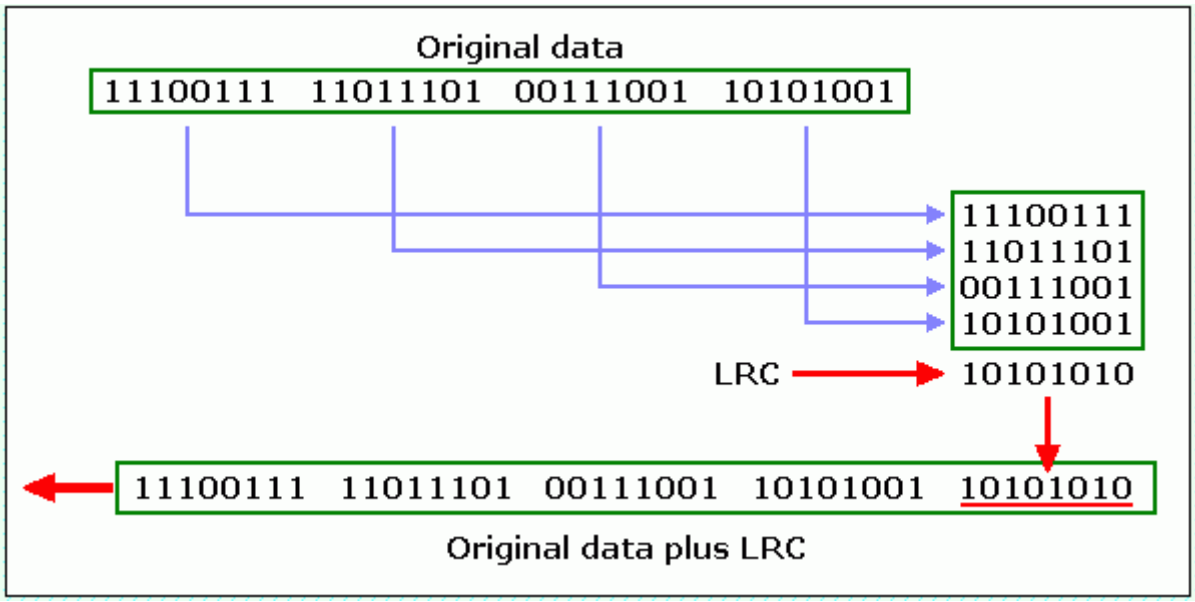
1) Simple Parity check:

A simple parity check code is the most easily error detection. In this code, change the k-bit information word to an n-bit code word of n-bit k+1. Select another block (called parity bit) so that the absolute number in the codeword is 1. Although there are some usages that determine the odd number of 1s. The basic Hamming distance of this classification is dmin = 2, which means that the code is a separate error identification code, which cannot correct any errors.

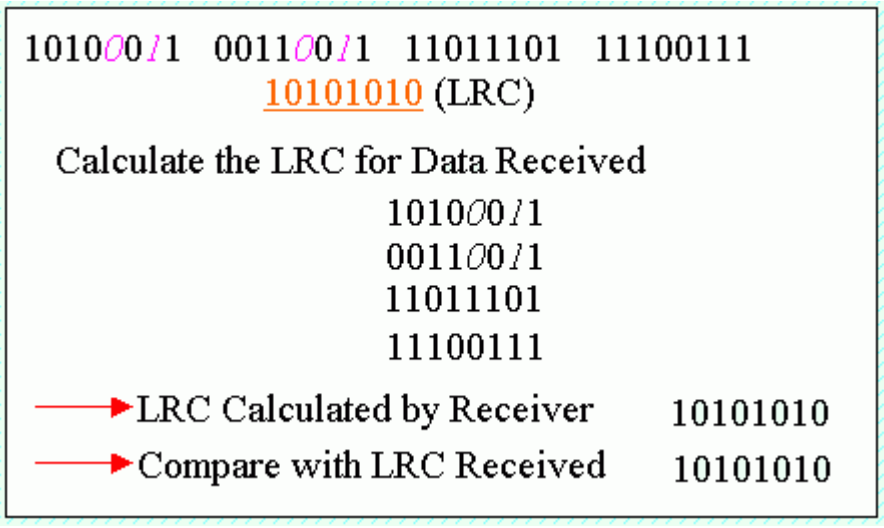
2) Longitudinal Redundancy Check (LRC)

It is an error detection technique used to determine the accuracy of information transmitted and stored. LRC uses parity bits to confirm the accuracy of stored and transmitted information. This is a redundancy check and is suitable for equal bitstream collection. The information to be transmitted is isolated as a transmission obstacle, in which additional inspection information is embedded.

In this error discovery technique, a one-bit square is classified in a table with lines and segments. At this point, the parity bit of each segment is determined, and another column of eight bits is formed, that is, the parity bit of the entire square. After that, connect the newly determined parity bit to the first message and send it to the beneficiary.



LRC increases the possibility of identifying sudden errors. The n-bit LRC can distinguish n-bit burst errors without much expansion. However, if two bits in a single information unit are damaged, and two bits in the same situation in another information unit are damaged, the LRC checker will not recognize the error.



Note that although the fifth and seventh of the first and second information units have been changed, the LRC determined by the beneficiary is still equivalent to the acquired LRC. Therefore, the recipient checker cannot recognize this burst error.

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

Answer 3: **Encoding**

Encoding is the process of converting data into the format required to meet a variety of information processing needs, including:

• Program compilation and execution

• Data transmission, storage and compression/decompression

• Application data processing, such as file conversion

The type of code used to convert characters is called the American Standard Code for Information Interchange (ASCII), which is the most commonly used encoding scheme for files containing text. ASCII contains printable and non-printable characters, representing uppercase and lowercase letters, symbols, punctuation marks, and numbers, respectively. Unique numbers are assigned to certain characters.

Types of Encoding: The following are types.

HTML Encoding:

HTML encoding is mainly used to represent various characters so that they can be used safely in HTML documents (as the name indicates).

URL Encoding:

When we include some characters with special meaning in the URL, or want to make the characters beyond the printable range, URL encoding will work. To URL-encode a character, we simply add% to its hexadecimal value.

Unicode Encoding:

Unicode encoding can be used to encode characters in any language or writing system in the world. Unicode encoding contains several encoding schemes.

i. 16 bit Unicode encoding
ii. UTF-8 Encoding

Base64 Encoding:

Base64 is used to represent binary data using only printable characters. Generally, it is used to encode user credentials in basic HTTP authentication and also to encode email attachments for transmission via SMPT.

Hex Encoding:

Basically, for hexadecimal encoding, we only use the hexadecimal value of each character to represent the character set. Therefore, if you want to represent the word "hello", it would be:

68656C6C6F

Characteristics of amplitude modulation

- Easy to execute
- You can use a circuit composed of not many parts for demodulation
- The AM recipient is moderate because no specific segmentation is required.

Scientifically, it can be clarified in three stages.

Carrier-signal equations:

$C(t) = C \sin(\omega c + \varphi)$

Where:

carrier frequency in Hertz is equal to $\omega c / 2 \pi$

C is the carrier amplitude

φ is the phase of the signal at the start of the reference time

Modulating signal equations:

$m(t) = M \sin(\omega m + \varphi)$

Where:

modulating signal frequency in Hertz is equal to $\omega m / 2 \pi$

M is the carrier amplitude

φ is the phase of the signal at the start of the reference time

Overall modulated signal for a single tone:

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

The constant A is needed because it represents the amplitude of the waveform.

Frequency modulation (**FM**):

Frequency modulation (**FM**) Often associated with interchangeable frames; for example, you can find a variety of music stations on the FM band of the radio.

Characteristics of frequency modulation, FM:

Resilience to noise: One of the room for repeated adjustments is its versatility for marker level varieties. This regulation is uniquely communicated as a unique species in relapse.

Easy to apply modulation at a low power stage of the transmitter: Another preferred position for recursive adjustment is related to the transmitter.

It is possible to use efficient RF amplifiers with frequency modulated signals: Consider using non-linear RF boosters to enhance the FM signals in the transmitter, which are more efficient than the direct signals required for any kind of signal (such as AM and SSB).

FM Equation:

The basic FM equation is presented in Equation:

$$y(t)=A\sin(2\pi fct+I\sin(2\pi fmt)),$$

where the parameters are defined as follows:

- fc= carrier frequency (Hz)
- fm= modulation frequency (Hz)

- I= modulation index

Phase modulation (**PM**):

Phase modulation (**PM**) It is a modulation mode used to adjust communication signals for transmission. It encodes the message signal as a change in the instantaneous phase of the carrier. Phase modulation is one of the two main forms of angle modulation and frequency modulation.

Characteristics:

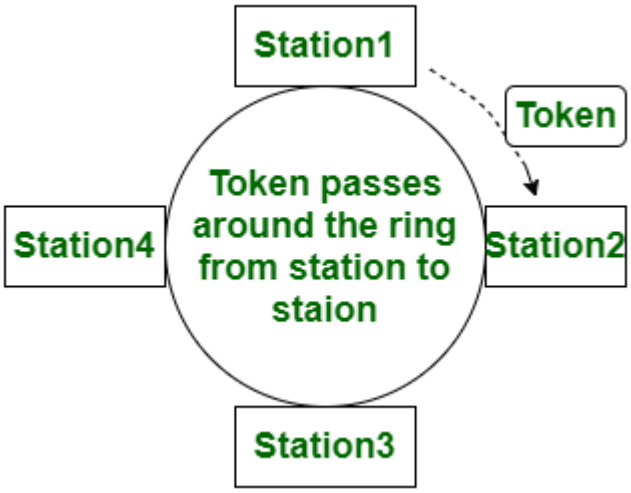
Noise immunity better than AM but not FM
Signal-to-noise ratio (SNR) is not as good as in FM
PM is primarily for some mobile radio services
Modulation index is proportional to modulating signal $m(t)$

Pm signal can be mathematically explained as;

$$\theta i(t) = 2\pi f c\, t + kp\, x(t)$$

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

Answer 4: **Token Ring :** The token ring ignores the physical ring. The token ring is characterized by the IEEE 802.5 specification. In Token Ring, there is a workstation and a unique shell called a token. A site in the token ring can send a summary of information on the occasional opportunity to contain a token. After the information transfer was very effective, the token was pointed out (issued). Token ring is a star-casting topology that can handle the needs of some hubs that may provide token requirements.



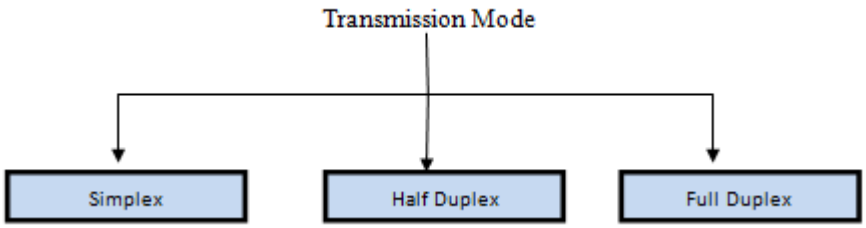
Ethernet :

IEEE 802.3 is a characteristic of Ethernet. It utilizes CSMA/CD components. This means that if multiple sites exist for a call at the same time, all sites will be closed. To continue, sit tight for a while. Unlike Token Ring, it does not take advantage of any requirements. Moreover, it is not as expensive as the token ring system.

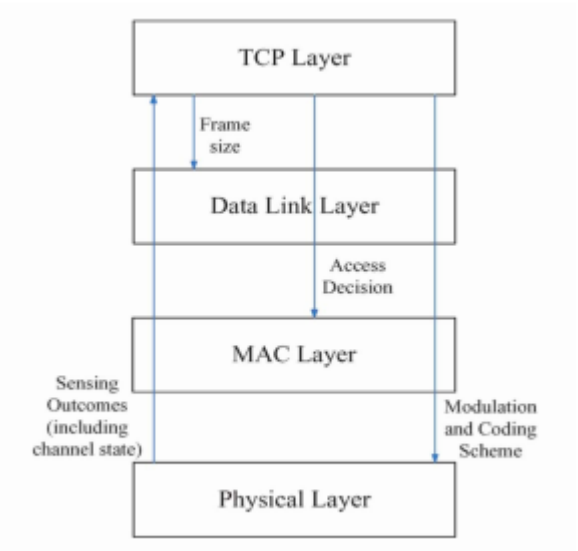
Our Choice is Ethernet: Because Token Ring is very old. Moreover, Token Ring is essentially used in the framework of heavy traffic. If all other methods fail, 100M/s Ethernet will be several times faster than 16M/s token ring. At any time, the cost of Ethernet hardware is much cheaper than Token Ring. In any case, there is only a $15 action card and a major issue of $40.

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)

Answer 5: The transmission mode in the computer network. The transmission mode involves the component of moving information between two gadgets associated on the system. It is also called the communication mode. These patterns guide the process of data flow. There are three types of transmission mode.



The transmission start from transport layer in OSI model by using different protocol. The following figure shows complete functionality of transmission in network layer.



If all goes well, packets reach layer 3 (network), with their logical address.

And like any good carrier, the transport layer must guarantee quality in the delivery and reception of data.

In turn, as in all transport, it must be managed. For this we have a quality service (QoS - Quality of Service or Quality of Service). This is a very important concept, and is used for example in the Erlang B tables, remember? In simple terms, the standards and actions aimed at guaranteeing the desired quality of service, based on error recovery and control of data flows. But let's not lose focus here, just remember that QoS is in the transport layer.

Function: to face all the questions of transport, delivery and reception of network data, with quality of service.

Protocols: TCP, UDP, SPX.

Devices: Routers.

PDU: Now it's called a Segment.

Reliable transmission: Since UDP does not have many prerequisites, it provides faster association. Similarly, TCP is slower, but gradually reliable. If you need speed rather than firm quality, then you should use UDP instead of TCP. TCP arranges the arrangement of information package sequencing, confirmation, error identification and correction.

Paper: [1] Navrattan Jain “Cross-Layer Design at Transport Layer in Wireless Networks: Issues and Possible Solutions” DOI: 10.13140/RG.2.2.33476.99203 2019.