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
2) The loss in the signal power as of an Electromagnetic signal is called attenuation
3) Early detection of packet losses improves ____positive_______ acknowledgment performance.
4) Additional signal introduced in the desired signal in producing hypes is called dispersion
5) Token is a ________**star**_____________ that rotates around the ring.
6) Ring may have up to ______24______ (802.5) or _____________ (IBM) nodes.
7) FDDI can support a maximum of _______500_______ stations.
8) Error-correcting codes are ____not sufficient______________ enough to handle all errors.
9) ACK is a small _______control frame_____________ confirming reception of an earlier frame
10) Electronics are ______smaller___________ 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)

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

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

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)

Q2:

Answer **:** **Error detection** is the detection which is caused by noise during the transmission from the transmitter to the receiver.

Error correction is the detection which is reconstruction of the original and error-free data.

How to Detect and Correct Errors?
To detect and correct the errors, rhe additional bits are added to be data bits at the time of the transmission.
The additional bits are called parity bits. They allow to detection or correction the errors.
The data bits along with the parity bits form a code word.

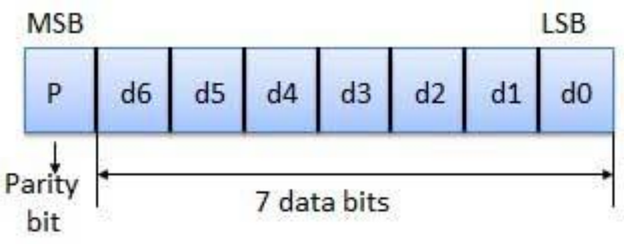
Application

Error detection and error correction schemes are used in the following transmissions:

Internet
Deep-space telecommunications
Satellite broadcasting
Data storage
Error-correcting memory

Parity Checking of Error Detection

It's the simplest technique for detecting and correcting errors. The MSB of an 8-bits word is used as the parity bit and remaining 7 bits are used as data or message bits. The parity of 8-bits transmitted word can be either even parity or odd parity.



Even parity -- Even parity means the number of 1's in the given word including the parity bit should be even (2,4,6,....).
Odd parity -- Odd parity means the number of 1's in the given word including the parity bit should be odd (1,3,5,....).

Use of Parity Bit

The parity bit can be set to 0 and 1 depending on the type of the parity required.
For even parity, this bit is set to 1 or 0 such that the no. of "1 bits" in the entire word is even.
For odd parity, this bit is set to 1 or 0 such that the no. of "1 bits" in the entire word is odd,

Diagram is given below:

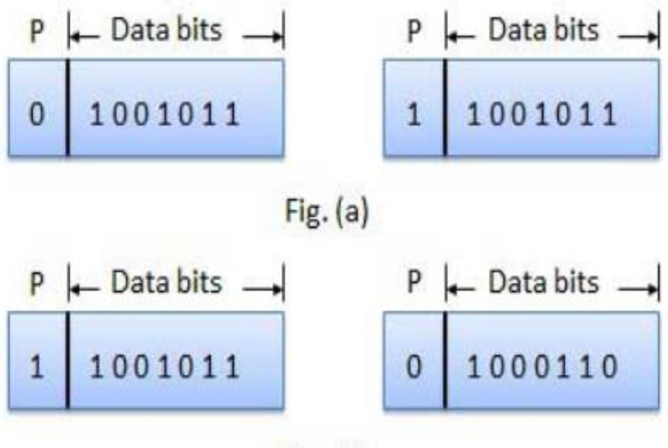


Fig. (a)

One other technique utilized for the purpose of error detection is the **application of redundancy bits**, where bits are added in order to the enable the discovery of errors.
Other popular approaches for error detection are:

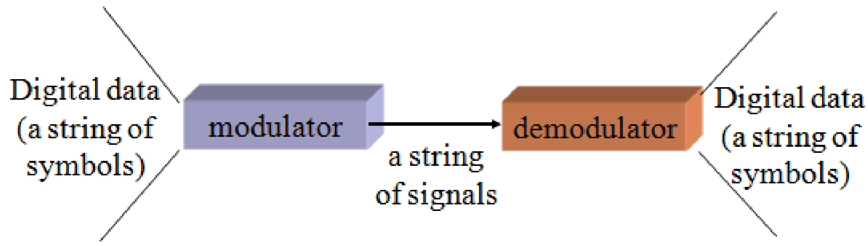
- **Simple Parity Check**
  - Chunks of data from the source undergo a check bit or parity bit maker system, where a parity of:
  - 1 is added if it has an odd number of 1's, and
  - 0 is added if it has an even number of 1's
  - The system makes the total number of 1's even, which is why it is referred to as even parity checking.

- **Two-dimensional Parity Check**

  Parity check bits are computed for each row, and then computed for all columns. Afterwards, both are transmitted along with the data. These computed parity check bits for both rows and columns are then compared with the parity bits computed on the received data.

Q3:

Anawer: Encoding: is the process of converting the data or a given sequence of characters, symbols, alphabets etc., into a specified format and transmission of data is called Encoding.



Types Of Encoding:

Unipolar

Unipolar encoding uses only one level of value 1 as a positive value and 0 remains . Unipolar encoding has one of its states at 0 Volts, it's also called Return to Zero (RTZ)

Polar

Polar encoding uses two levels of voltages positive and negative. For example, the RS:232D interface uses Polar line encoding. The signal does not return to *zero;* it is either a positive voltage or a negative voltage. Polar encoding may be classified as non·return to zero (NRZ), return to zero (RZ) and biphase

Biphase

Biphase is implemented in two different ways as Manchester and Differential Manchester encoding.

In Manchester encoding, transition happens at the middle of each bit period. A low to high transition represents a 1 and a high to low transition represents a 0.In case of Differential Manchester encoding, transition occurs at the beginning of a bit time, which represents a zero

Bipolar

Bipolar uses three voltage levels. These are positive, negative, and zero. Bit 0 occurs at zero level of amplitude. Bit 1 occurs alternatively when the voltage level is either positive or negative and therefore, also called as Alternate Mark Inversion (AMI). There is no DC component because of the alternate polarity of the pulses for Is. Figure describes bipolar encoding.

<u>Frequency modulation</u> FM, is used in many applications from broadcasting to communications and offers several advantages over other modes.

- Frequency modulation uses the information signal, $V_m(t)$ to vary the carrier frequency within some small range about its original value.

Here are the three signals in mathematical form:

Information: $V_m(t)$
Carrier: $V_c(t) = V_{co} \sin (2 p f_c t + f)$
FM: $V_{FM} (t) = V_{co} \sin (2 p [f_c + (Df/V_{mo}) V_m (t)]t + f)$.

- For a FM baseband signal, x(t):

xFM (t) = Ac cos 2πf c t + 2πk f x(τ)dτ −∞ t [∫

<u>Phase modulation</u> :PM can be used for both analogue and digital data, but it is for data & phase shift keying that it is most widely used.

- In adding the baseband signal itself, rather than the integral of the baseband signal, causes the phase to vary according to the baseband value. Thus, phase modulation is actually a bit simpler than frequency modulation.

$x_{PM}(t) = \sin(\omega_C t + x_{BB}(t))$

- For a PM baseband signal, x(t):

xPM (t) = Ac cos 2πf c t + k p [x(t)

Amplitude modulation: AM is being used less in its basic format, but it provides the basis of many other more advanced types of modulation for which its operation is key.

- Let m(t) represent the modulation waveform. For this example we shall take the modulation to be simply a sine wave of a frequency f_m, a much lower frequency (such as an audio frequency) than f_c:

y(t) = [A + Mcos(ωmt+φ].sin(ωct)

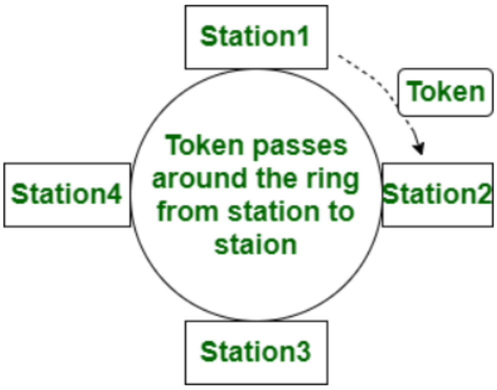
- For a AM baseband signal, x(t):

y(t) = A.sin(ωct)+A M2[sin((ωc+ωm)t+φ)]+A M2[sin((ωc−ωm)t−φ)].

Q4:

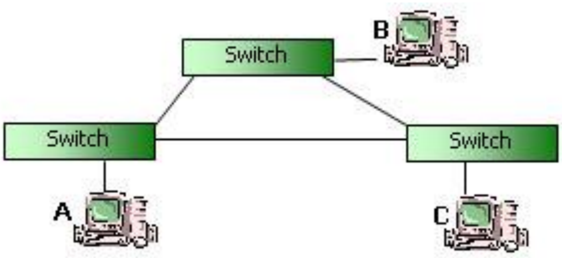
Answer: **<u>Token ring</u>** is a computer networking technology used to build local area networks. It uses a special three-byte frame called a *token* that travels around a logical *ring* of workstations or servers. In token ring, there is a station and a special frame called token. A station in token ring can transmit data frame if it contains a token. and token circles the ring like any frame until it encounters a station that wishes to transmit data.

Diagram of Token Ring.



Ethernet is a technology that connects wired local area networks (LANs) and enables the device to communicate with each other through a **protocol** which is the common network language. This LAN is a network of computers and other electronic devices which covers a small area in your places like in the office, house, room or building. Unlike LAN, wide area network (WAN) covers much larger geographical areas.

Diagram of Etherent



Token ring is better than Etherent.

- Token ring is deterministic.
- Token ring costs more than Ethernet.
- The token ring contains routing information than Ethernet
- The token ring handles priority than Ethernet
- it’s a Star shaped topology than Ethernet

- Token ring networks cope well with high network traffic loadings.
- They were at one time extremely popular but their popularity has since been overtaken by Ethernet.
- Token ring networks have suffered from network management

Q5:

Answer: a reliable protocol is a communication protocol that notifies the sender whether or not the delivery of data to intended recipients was successful. Reliability is a synonym for assurance, which is the term used by the ITU and ATM Forum.

Reliable protocols typically incur more overhead than unreliable protocols, and as a result, function more slowly and with less scalability. This often is not an issue for unicast protocols, but it may become a problem for reliable multicast protocols.

• How to fix corrupted frames

✓ Error correcting codes too expensive.

✓ Should discard frames (retransmission)

- **Mechanisms of Reliable Transmission**:

There are two mechanism which are given below

✓ Acknowledgements (ACK)

• Small control frame (a frame with header only but no data) sent back indicating successful frame delivery

✓ Timeouts

- If the sender does not receive an ACK in a predetermined time the original frame is retransmitted

Example :

50 kbps satellite link, 500 ms RTT, 1K frame size – 1024 bytes x (8 bits / byte) / 0.500 s = 16.4 kbps » 0.5 s x 50 kbps = 25000 bits x (1 byte / 8 bits) = 3.1K.

Daigram:

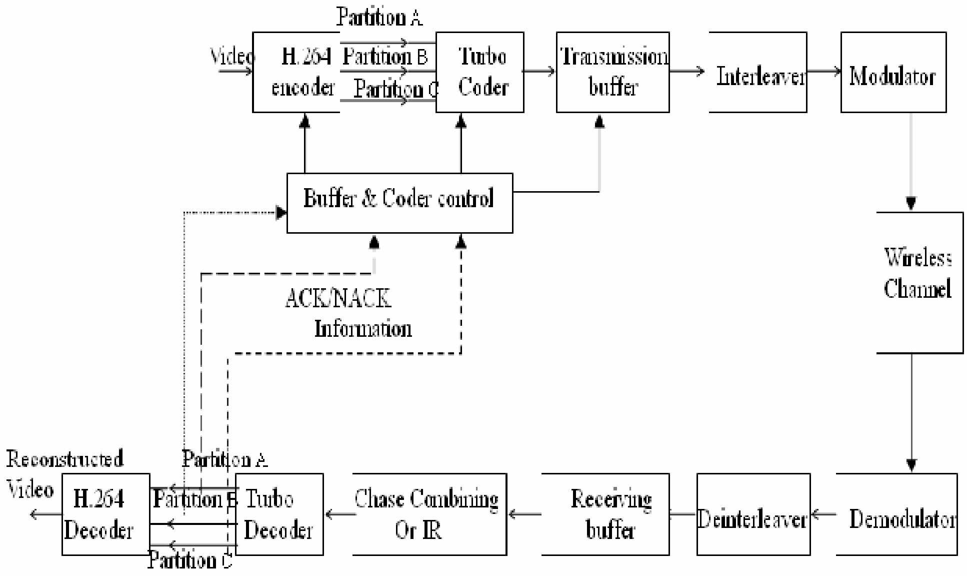


Fig. 1. H-UEP system of H.264 video transmission.

Summary

- Network needs:
- Reliable delivery –
- In order delivery – Flow control
- • Building blocks:– Algorithms: stop-and-wait, go-back-n, selec8ve repeat .