

QUESTIONS

2021 - 2022 Sprng CSE 575 FİNAL exam

1. a) Parite bitleri oluşturulurken 1101 0110 1001 1110 paterni Çift parite yöntemi kullanıldığını Varsayın. 2 boyutlu tek bitlik parite yönteminde parite bitlerini bulunuz.  
b) 7 bitlik üreteç, G=10011, Veri bitleri = 10 bitlik sayı(D), CRC ile kalan bitlerini (R) hesaplayınız.
2. a)IEEE 802.11 CSMA/CA MAC Protokolünü açıklayın.  
b) Swich ve router cihazlarını karşılaştırın.
3. a) Hidden Terminal Problemini açıklayın.  
b) Mobilite için kullanılan indirect routing yöntemini açıklayın.
4. a) GSM network'lerinde kullanılan Handoff mekanizmasını açıklayın.  
b) Kablosuz yayınıın kanalları (Wireless Propagation Channels) için kullanılan Path Loss, Shadowing, Muitipath Propagation terimlerini açıklayın.

1a)

Parity blocks

	Parity Bit	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Byte 1	0	1	1	0	0	0	1	0
Byte 2	1	0	1	0	1	1	1	0
Byte 3	1	0	0	1	1	0	0	1
Byte 4	1	1	1	0	1	0	1	0
Byte 5	1	1	1	0	0	1	1	0
Byte 6	1	1	0	1	0	1	0	1
Byte 7	1	1	1	1	0	1	0	0
Parity Byte	1	0	1	0	0	1	1	1

ODD PARITY AGREED

Check both column and row's odd / even condition

1b)

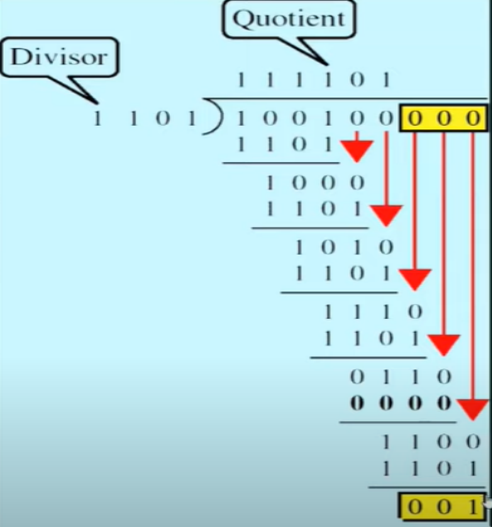
CRC GENERATION AT SENDER SIDE:

- 1- Find length of divisor
- 2- Append L-1 0 bits to original message.
- 3- Perform binary division operation
- 4- Remainder of the division = CRC (L-1 bits)
- Data Transmitted = {Data, CRC}

Data polynomial (D) % Generator polynomial (G)  
= Cyclic Redundancy Check  
D(x) % G(x) = CRC

RECEIVER SIDE:

Use same divisor.  
If remainder==0 it means there are no error.



2a)

IEEE 802.11 is a set of standards for wireless local area networks (WLANs) developed by IEEE. Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) protocol is used to control access to the wireless medium and to prevent collisions. The CSMA/CA protocol is based on the idea of carrier sensing, which means that a device listens to the wireless medium before transmitting. If the medium is busy (i.e., another device is transmitting), the device waits for the medium to be idle before transmitting. If the medium is idle, the device can transmit its data. When two or more devices attempt to transmit data at the same time, a collision occurs, and the data is corrupted. To avoid collisions, the CSMA/CA protocol uses a Random Backoff algorithm. Each device that wants to transmit selects a random backoff time and waits for that time before attempting to transmit again. This way, if two or more devices select the same backoff time, they will not start transmitting at the same time and the collision is avoided.

In addition, the CSMA/CA protocol uses an acknowledgement (ACK) mechanism. After a device transmits a data frame, the receiving device sends an ACK frame to the sender to confirm that the data was received correctly. If the sender does not receive an ACK within a certain time period, it assumes that the data was not received correctly and retransmits the data.

The CSMA/CA protocol provides a basic method for medium access control in WLANs. It is simple, easy to implement, and provides a good balance between performance and fairness. However, it has some limitations, such as poor performance under high load, low throughput, and high delay. Medium access control (MAC) protocol for wireless LANs.

2b)

While a network switch can connect multiple devices and networks to expand the LAN, a router will allow you to share a single IP address among multiple network devices. In simpler terms, the Ethernet switch creates networks (aim is to connect various devices simultaneously) and the router allows for connections between networks. Switch works in data link layer. Router works in network layer. Switch needs at least single network is to connect. Router needs at least two networks to connect.

3)

Hidden Terminal Problemini açıklayınız?

Hidden terminal problem, physical obstruction in the environment (for example, a mountain or a building) may prevent A and C from hearing each other's transmissions, even though A's and C's transmissions are indeed interfering at the destination, B.

Mobil ağlarda Indirect Routing i açıklayınız?

indirect routing: communication from correspondent to mobile goes through home agent, then forwarded to remote.

direct routing: correspondent gets foreign address of mobile, sends directly to mobile.

\* An indirect routing approach is used in the mobile IP standard [RFC 5944].

Home agent is a router on a mobile node's home network which tunnels datagrams for delivery to the mobile node when it is away from home. It maintains current location (IP address) information for the mobile node. It is used with one or more foreign agents.

4a)

Handoff / Handover Mechanism = Frekans değiştirme / Baz istasyonları hücreleri arasındaki geçiş

When a node that is mobile or any device moves from one cell to another cell (changing radio station) that is one coverage area to another coverage area then their is chance that mobile is disconnected. In this process the call is transfer to one base station to another base station. Generally handover is of two types:

1. Soft Handover : When a node move from one cell to another than their is a possibilities that call will continue, this is called soft handover.
2. Hard Handover: When a node moves from one cell to another than their is a chance that call will disconnect called hard handover.

4b)

Multipath Propagation (Çoklu Yön Ayrımı) is a phenomenon that results in radio signals reaching the receiving antenna by two or more paths. Causes: atmospheric ducting, ionospheric reflection / refraction, and reflection from water bodies, mountains and buildings. When the same signal is received over more than one path, it can create interference and phase shifting of the signal.

Path loss is the reduction in power density (attenuation) of an electromagnetic wave as it propagates through space. Path loss is a major component in the analysis and design of the link budget of a telecommunication system. Path loss may be due to many effects, such as free-space loss, refraction, diffraction, reflection, aperture-medium coupling loss, and absorption.

Shadow Fading is variation of the attenuation of a signal with various variables. These variables include time, geographical position, and radio frequency. A fading channel is a communication channel that experiences fading. In wireless systems, fading may either be due to multipath propagation, rain, or shadowing from obstacles affecting the wave propagation.