PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Final Examination: Semester I Academic Year: 2004

Date: 30 August 2004 Time: 13.30 – 16.30

Subject: 240-360 Introduction to Communication Systems and Networks Room: Robot

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ทุจริตในการสอบ โทษขั้นต่ำคือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียน 1 ภาคการศึกษา

Instructions

- There are 10 questions in this paper exam. Answer ALL questions,
- The answer can be in either Thai or English,
- Calculators, books, and notes are not allowed.

1. According to the definition of burst error, more than one error bit can be occurred in a transmission. This is because noise period is longer than one bit transmitted period. If the noise period is 2 ms, what is the maximum number of error bits in the following cases? (10 Marks)
   a) A transmission rate is 3 kbps
   b) A transmission rate is 128 kbps
   c) ทำการส่งข้อมูลด้วยอัตราเร็ว 1 Mbps

2. Hamming Code can be applied for FEC (forward Error Correction) technique, as shown below (10 Marks)

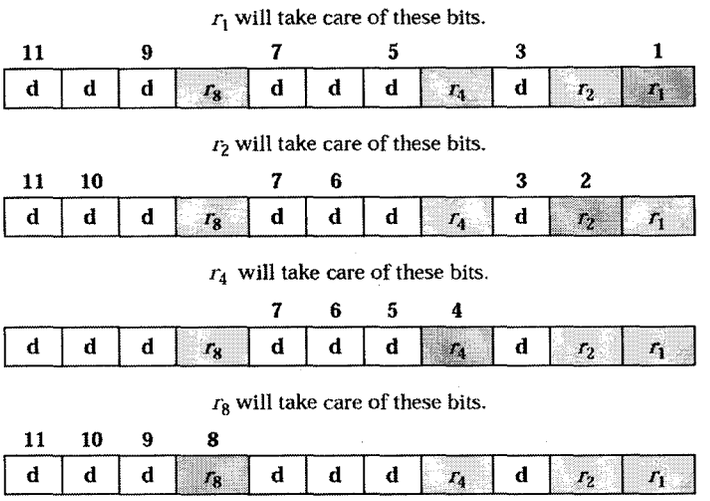


Figure 1 Redundant bit calculation using Hamming Code

a. If the original data is 1001101, what is the data code after using Hamming Code?
b. If the following data is received by the receiver, 10010100101, is this data corrupted? If yes, which bit position is in error? (Please show your calculation)

3. Use the figure below, which describes a Go-Back-N ARQ operation, to answer the following questions (please try to give your reasons to support your answers): (10 Marks)

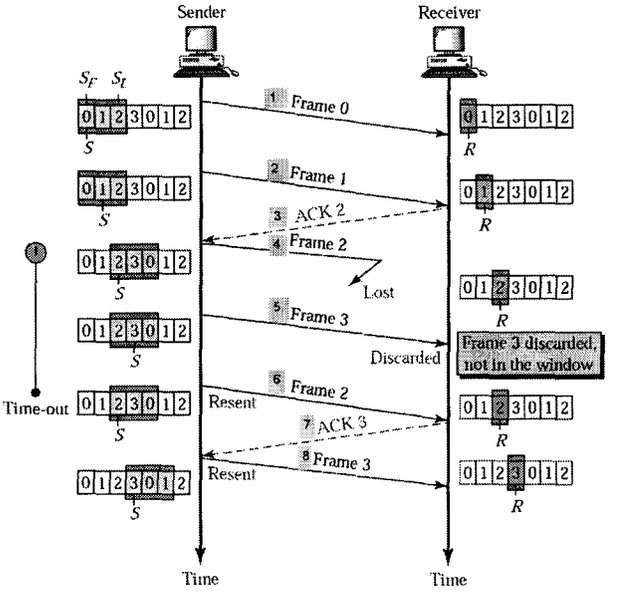


Figure 2 Go-Back-N operation

Answer the following questions for Go-Back-N ARQ:

a. Why does the receiver not reply ACK of Frame 0 (step no. 1)?
b. What will happen if the receiver does not send ACK2 (step no. 3)?
c. What will happen if the receiver does not reply ACK 3 (step no. 7)?
d. In Go-Back-N ARQ, a window size must be less than a number of data unit in one block (2^m-1). Why? (You may use a sample flow diagram to explain your idea).

4. Below is the Selective Repeat ARQ operation. Answer the following questions: (10 Marks)

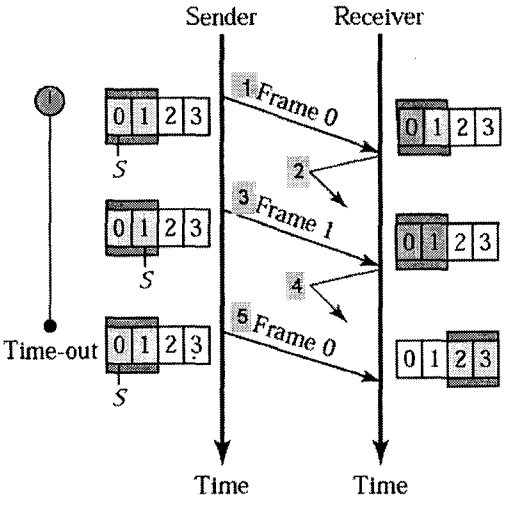


Figure 3 Selective Repeat ARQ operation

a. What will happen in step no. 6 and 7?
b. If ACK of step no 4 is received by the sender, what will happen in step no. 5?

5. In a Stop-and-Wait ARQ system, the bandwidth of the line is 10 Mbps, and 1 bit takes 10 ms to make a round trip. What is the bandwidth-delay product? If the system data frames are 1000 bits in length, how long does it take to transmit 10 Mbytes data? Assume that all data are received correctly, e.g. no error and dropped. (10 Marks)

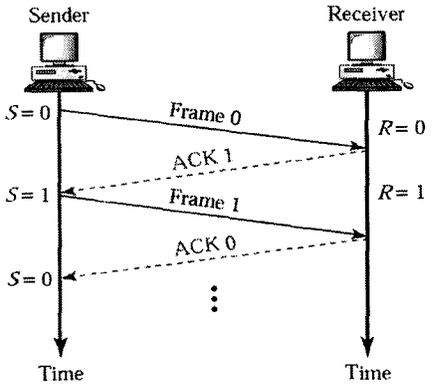
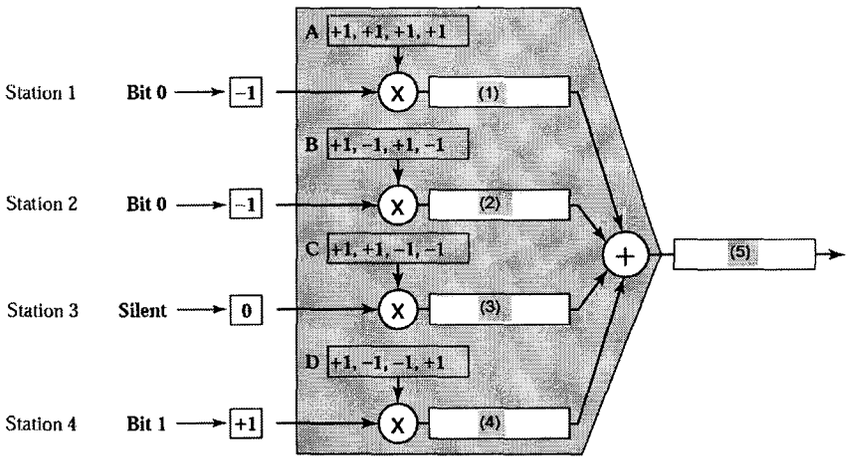


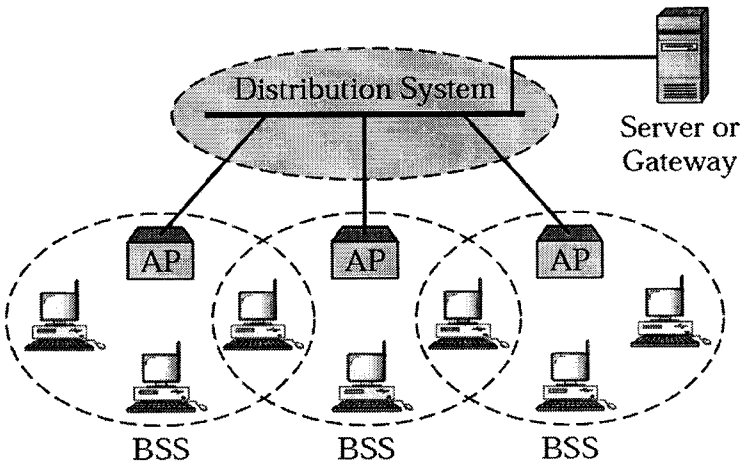
Figure 4 Stop-and-Wait ARQ operation

6. In controlled access schemes, there are 3 mechanisms: Reservation, Polling, and Token Passing. Please describe how each mechanism works. (10 Marks)

7. From picture of CDMA Multiplexer, write down the code sequence in (1), (2), (3), (4), and (5). Please show the encoding rule and how to get such figures. (10 Marks)



8. The figure below shows a sample wireless network scenario. Each BSS (Basic Service Set) has only one AP (Access Point). The BSSs are connected through "distribution system", which is usually a wired LAN. (10 Marks)



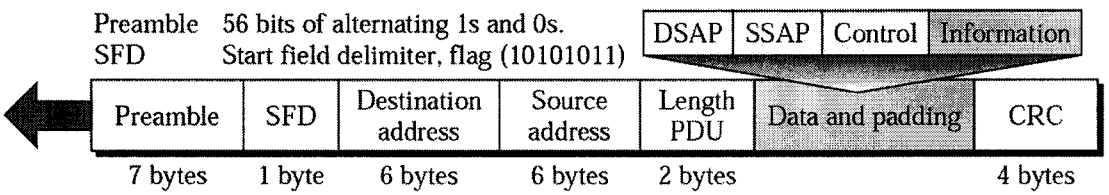
a. There are 3 types of mobile terminals, describe limitations of each type.

b. What is the main function of AP and Distribution System?

9. As we have known that CSMA/CD is used for Wired-line Ethernet, e.g. traditional Ethernet, Fast Ethernet. However, in wireless Ethernet, it uses CSMA/CA. Why does CSMA/CD can not be used in wireless LAN? (10 Marks)

10. Answer the following questions: (10 Marks)

a. In Ethernet frame, there is preamble field which contains 7 bytes of alternating 0s and 1s. Why is it in such form (alternating 0s and 1s)?



b. What is Padding (in Ethernet frame)?

c. What is "Bit stuffing" in HDLC?

d. What is ATM (Asynchronous Transfer Mode)?