COMP90007 Internet Technologies

Week 6 Workshop

Semester 2, 2019

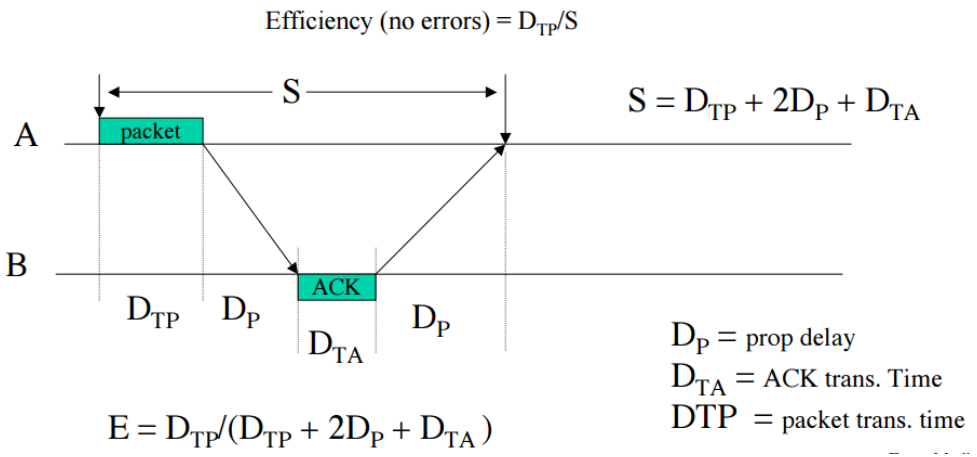
Suggested solutions

Question 1

A channel has a bit rate of 4 kbps and a propagation delay of 20 ms. For what range of frame sizes does stop-and-wait give an efficiency of at least 50 percent?

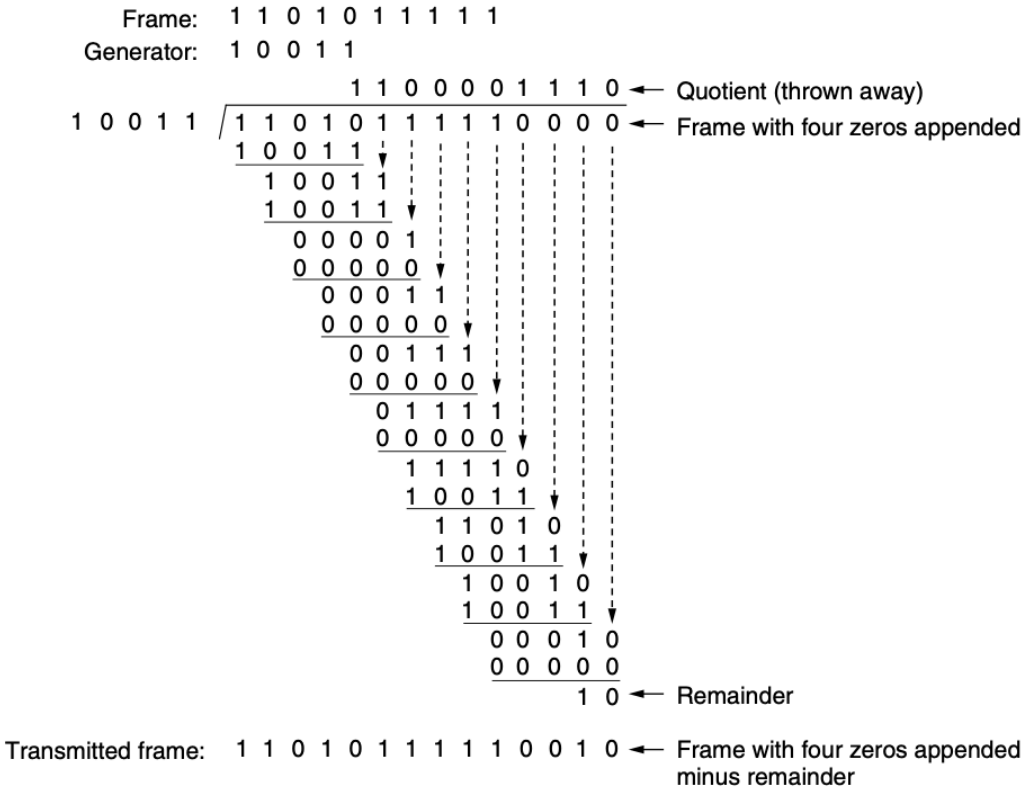
Answer:
Efficiency will be 50% when the time to transmit the frame equals the round trip propagation delay.

At a transmission rate of 4 kbps, 40 ms will transfer 160 bits. For frame sizes greater than 160 bits, stop-and-wait is reasonably efficient.



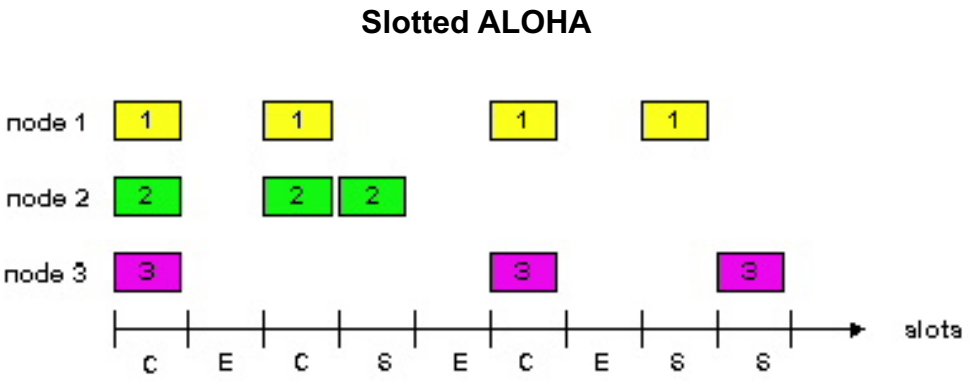
Question 2

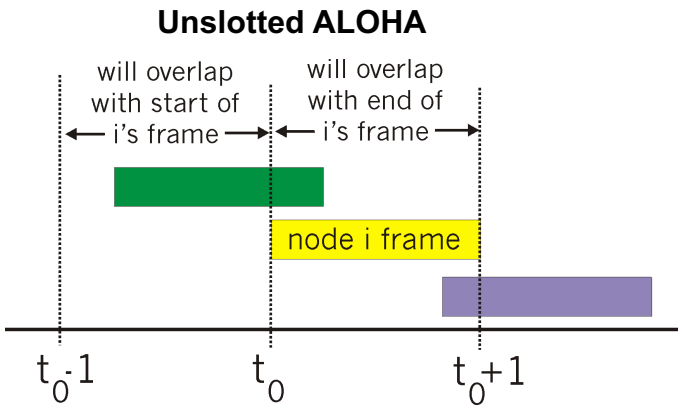
Using the polynomial code method, compute the CRC for the frame: 1101011111 having a generator polynomial G(x) as $x^4 + x + 1$



Question 3

Consider the delay of pure ALOHA versus slotted ALOHA at low load. Which one is less? Explain your answer.





Answer:

With slotted ALOHA, it has to wait for the next slot. This introduces half a slot time of delay. With pure ALOHA, transmission can start instantly. At low load with minimal collisions, pure ALOHA will have less delay.

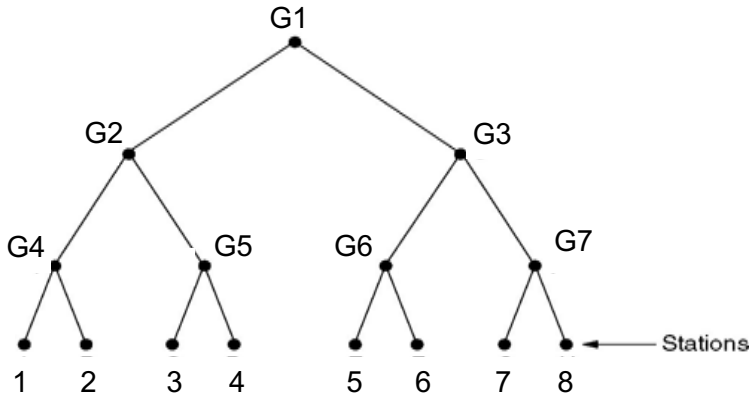
However, at higher loads, there is more probability for collisions in pure ALOHA compared to slotted ALOHA. This is because frames can collide in midway. By enforcing synchronisation, slotted ALOHA is able to achieve much greater efficiency.

Question 4

Eight stations, numbered 1 through 8, are contending for the use of a shared channel by using the adaptive tree walk protocol. If all the stations whose addresses are prime numbers suddenly became ready at once, how many slots are needed to resolve the contention?

Answer:
Stations 2,3,5,7 want to send. 7 slots are needed, with the contents of each slot being as follows:

slot 1: 2, 3, 5, 7 (collision)
slot 2: 2, 3 (collision)
slot 3: 2 (success)
slot 4: 3 (success)
slot 5: 5, 7 (collision)
slot 6: 5 (success)
slot 7: 7 (success)



Question 5

Convert the IP address 11000001, 01010010, 11010010, 00001111 to dotted decimal notation.

Ans. 193.82.210.15

Question 6

Convert the IP address 240.68.10.10 to binary format

Use the following key:

10000000	2^7	128
01000000	2^6	64
00100000	2^5	32
00010000	2^4	16
00001000	2^3	8
00000100	2^2	4
00000010	2^1	2
00000001	2^0	1

Ans. 1111 0000 . 0100 0100 . 0000 1010 . 0000 1010