Networks Homework 1

1. a. The length field is important because there could be padded data inside of the message data (since an Ethernet protocol must be a minimum of 64 bytes), so it helps differentiate what is part of the actual message. In addition, in the case of a collision, the length field will help determine whether only part of the data of a protocol was received, or the entire message.

b. If two hosts on the same Ethernet shared the same hardware address, there would be complications with data sent and received by the two hosts. Data intended for one host would be received by both (since the destination field for the data would be the address of both hosts), one of which the data was not intended for. In this case, both hosts would receive the wrong packets, and would be unable to differentiate which packets were actually intended for them

c. One reason is for synchronization – the preamble allows the Ethernet receiver to synchronize the data sampling clock to the message. Another reason is to help detect collisions – due to its long, predictable pattern, if the pattern is broken at any point, then a collision has most likely occurred.

1. a. X\*(2.5\*10^8)/(2\*5,000,000) = 10,000

x = 400 bits, or 50 bytes.

1. b. 0101101111101110111110111001

c. 0111111010111111101111100011111110

discard frame

1. a. 2D parity can catch all 3-bit errors because the parity of some row will always be wrong. If all 3 bit errors are on the same row, then the parity will be wrong because 3 bits will be changed, changing the number of 1’s or 0’s from odd to even, or vice versa. If 2 bit errors are on the same row, and the third bit is in a different row, then the parity of the row with the third bit will clearly be wrong. If the 3 bit errors are all on different rows, then the parity for all of those rows will be wrong.

b. An example is as follows:

Original:

10010101