

Assignment 4

Due Monday, May 16. Show your work. Submit your assignment using the appropriate dropbox on the course web site. Assignments submitted after the solutions are made available will be given a mark of zero.

Question 1

Which protocol layer(s) (1 through 3) would be responsible for each of the following functions:

- (a) adding HDLC framing
- (b) specifying the protocol used by the payload
- (c) low-pass filtering
- (d) adding addressing using an address with world-wide scope
- (e) generating/checking a CRC
- (f) adding addressing using an address that is only valid for devices within a building
- (g) amplification

Question 2

Show the byte values (in hexadecimal) of an Ethernet header carrying an IP packet that has a source address of 01:02:03:04:05:06 and a destination address of ff:ff:ff:ff:ff:ff.

Question 3

Someone reconfigured an Ethernet switch and changed various options. Now the activity lights on many of the ports are continuously on, indicating the maximum possible traffic is flowing. Looking at the data coming out of the switch (with Wireshark) you see many identical broadcast frames being sent out. What setting probably needs to be changed back?

Question 4

Briefly, but in more than one sentence, what is RFC 1901 about?

Question 5

The following bytes are the contents of an Ethernet packet starting with the destination address:

```
00 1d 60 9f 21 94 00 1f 16 20 5d e5 08 00 45 00
00 34 66 98 40 00 80 06 00 00 c0 a8 03 23 89 52
3d 01 cf ec 00 50 5a a4 2f 06 00 00 00 80 02
20 00 8a 45 00 00 02 04 05 b4 01 03 03 02 01 01
04 02
```

- (a) What are the source and destination Ethernet addresses?
- (b) What is the value of the length/type field?
- (c) What is the length of the IP packet?
- (d) What is the value of the protocol field in the IP header? What is the name of that protocol?
- (e) What is the value of the IP header checksum?

Question 6

Assuming the encoder starts at the all-zero state, what is the (unpunctured) output of the convolutional encoder shown in the lecture notes for an input sequence of 10011 assuming bit A is output before bit B (*Hint: the first four outputs are 1, 1, 1, 0*)?

Question 7

Design an (8,2) block code with minimum distance of 3. List the different valid codewords and all of the distances between them (there should be 12). Give an example of minimum-distance decoding (introduce a single error and check that you can recover the transmitted data).