ECE435: Network Engineering – Homework 6

Internet Protocol v4

Due: Thursday, 25 October 2018, 3:30pm

For this homework short answers will suffice.

To submit, create a document with your answers (text, pdf, libreoffice, MS Office if you must) and e-mail them to *vincent.weaver@maine.edu* by the homework deadline. Title your e-mail "ECE435 Homework 6" and be sure your name is included in the document.

1. If you recall from previous homeworks we looked at a packet similar to this:

```
0x0000:  0013 3b10 667f b827 ebaf 3711 0800 4500  ..;.f..'..7...E.
0x0010:  0038 572a 4000 4006 69cc c0a8 0833 826f  .8W*@.@.i....3.o
0x0020:  2e7f bda5 0050 cdc4 6a49 3c7b 6ca5 8018  .....P..jI<{l...
0x0030:  00e5 79f4 0000 0101 080a 0104 3e58 34a8  ..y.........>X4.
0x0040:  7bc3 4745 540a                           {.GET.
```

   The IPv4 header begins at offset 0xe. Fill in the name of the field as well as decode the value. For help decoding the IPv4 header see the class notes or else RFC791.

BEGIN IPv4 HEADER	Name of Field	Decoded Value
0x000e: 4		
0x000e: 5		
0x000f: 00		
0x0010: 0038		
0x0012: 572a		
0x0014: 4000		
0x0016: 40		
0x0017: 06		
0x0018: 69cc		
0x001a: c0a8 0833		
0x001e: 826f 2e7f		
END IPv4 HEADER		

2. Which of the following are valid IPv4 addresses?

   (a) 10.10.10.10

   (b) 3232237569

   (c) 0xc0a80801

   (d) 123.267.67.88

3. Early internet adopters got large IPv4 allocations. For example Ford (the car company) owned all of 19.0.0.0/8. What percentage of the entire IPv4 space is that? (This xkcd comic gives an interesting map of the situation: `https://xkcd.com/195/`)

4. A network is described as 192.168.13.0/24.

   (a) What would be the subnet mask for this subnet?

   (b) What would be the lowest IP address you could assign on this subnet?

   (c) What would be the highest IP address you could assign on this subnet?

5. You run the "route" command on a Raspberry Pi and you get an output like the following:

```
pi3:~$ /sbin/route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         192.168.8.2     0.0.0.0         UG    0      0        0 eth0
192.168.8.0     0.0.0.0         255.255.255.0   U     0      0        0 eth0
```

   (a) If a packet is sent to 216.58.192.132, what is its first "hop" on the way?

   (b) If a packet is sent to 192.168.8.50 what is its first "hop" on the way?

6. Use the "ping" command on a network connected machine to `ping www.google.com`.

   (a) What is the round-trip packet time?

   (b) Do you notice anything odd about the hostname that responds?

7. Use the "traceroute" command. It's tracert on Windows.

   (a) `traceroute www.maine.edu`.
   How many hops away is it? Do you recognize any of the names in the hops along the way?

   (b) `traceroute www.facebook.com`.
   How many hops away is it? Do the response times gradually go up for each further hop?