

Homework 6 Solutions

Problem 1:

- (a) We convert 47 to binary. $47 = 0x2f = b0010\ 1111$. This is a class A address because it starts with 0.
- (b) The first 23 bits of the 32b address is the network address, the rest are the host addresses. We convert to hex and then to binary:
 $0x2f.\ 0x97.\ 0x98.\ 0x00$ or $0010\ 1111.\ 1001\ 0111.\ 1001\ 1000.\ 0000\ 0000$.
We then mark of the last nine bits in the binary address
 $0010\ 1111.\ 1001\ 0111.\ 1001\ 1000.\ \mathbf{0000\ 0000}$.
These we change to ones:
 $0010\ 1111.\ 1001\ 0111.\ 1001\ 1001.\ \mathbf{1111\ 1111}$.
This is the last address in the range, i.e. 47.151.153.255.
The address range is 47.151.152.0 to 47.151.153.255.
- (c) The last nine bits of the address can vary, giving us 512 host addresses.

Problem 2:

We convert the address to binary:

$138.19.55.135 = 0x8a.0x13.0x37.0x87 = 1000\ 1010.\ 0001\ 0011.\ 0011\ 0111.\ 1000\ 0111$.

We try out the prefixes: $138.0.0.0 / 8$ is $1000\ 1010.\ xxxx\ xxxx.\ xxxx\ xxxx.\ xxxx\ xxxx$ and matches.

$136.0.0.0/5$ is $1000\ 1xxx.\ xxxx\ xxxx.\ xxxx\ xxxx.\ xxxx\ xxxx$ also matches.

$138.19.54.0/23$ is $1000\ 1010.\ 0001\ 0011.\ 0011\ 011x.\ xxxx\ xxxx$ also matches.

$138.19.56.0/23$ is $1000\ 1010.\ 0001\ 0011.\ 0011\ 100x.\ xxxx\ xxxx$ does not match.

$138.19.48.0/20$ is $000\ 1010.\ 0001\ 0011.\ 0011\ xxxx.\ xxxx\ xxxx$ also matches.

The longest prefix that matches is $138.19.54.0/23$, so the packet is forwarded to interface 2.