

REPRESENTING NETMASKS AND SUBNETS

Representing Netmasks

We've already seen that you can represent a netmask as a dotted quad, just like an IP address, but unfortunately, this is not the only notation in common use. The list below shows all the commonly used representations:

- Netmasks are 32bit binary numbers, just like IP addresses, so they can be represented using dotted quads, just like IP addresses. This is the most intuitive representation of a netmask, and for our example network it would be 255.255.255.248. This is the most commonly used representation, and is used in the System Preferences app on OS X and the Windows Control Panel.
- Netmasks can also be written in hexadecimal, every group of four bits gets converted to a symbol between 0 and f in the following way:

$$0000 = 0$$

$$0001 = 1$$

$$0010 = 2$$

$$0011 = 3$$

$$0100 = 4$$

$$0101 = 5$$

$$0110 = 6$$

$$0111 = 7$$

$$1000 = 8$$

$$1001 = 9$$

$$1010 = a$$

$$1011 = b$$

$$1100 = c$$

$$1101 = d$$

$$1110 = e$$

$$1111 = f$$

In computer science hexadecimal numbers are signified by pre-fixing them with 0x, so our example netmask can be written as 0xffffffff8. This is by far the least human-friendly representation, but it is the one BSD Unix, and OS X, use in the output from the ifconfig command.

- A netmask can also be represented in bits, that is to say, the number of the 32 possible bits that are set to 1. So, for our example network, it has a netmask of 29 bits.

Representing Subnets

The correct way to write down a subnet definition is as follows: IP_ADDRESS/NETMASK, where any of the above representations for netmasks are permissible

This means that our example subnet above can be written in all the following ways:

192.168.0.0/255.255.255.248

192.168.0.0/29

192.168.0.0/0xfffff8

Source: <https://www.bartbusschots.ie/s/2014/12/07/taming-the-terminal-part-25-of-n-ip-subnets/>