For example, here's how the network address is extracted from an IP address using the 20-bit subnet mask from the previous example:

```
144 . 28 . 16 . 17
IP address: 10010000 00011100 00100000 00001001
Subnet mask: 11111111 11111111 11110000 00000000
Network ID: 10010000 00011100 00100000 00000000
144 . 28 . 16 . 0
```

Thus, the network ID for this subnet is `144.28.16.0`.

The subnet mask itself is usually represented in dotted-decimal notation. As a result, the 20-bit subnet mask used in the previous example would be represented as `255.255.240.0`:

```
Subnet mask: 11111111 11111111 11110000 00000000
255 . 255 . 240 . 0
```


TIP

Don't confuse a subnet mask with an IP address. A subnet mask doesn't represent any device or network on the Internet. It's just a way of indicating which portion of an IP address should be used to determine the network ID. (You can spot a subnet mask right away because the first octet is always `255`, and `255` isn't a valid first octet for any class of IP address.)

The great subnet roundup

You should know about a few additional restrictions that are placed on subnet masks — in particular:

- The minimum number of network ID bits is eight. As a result, the first octet of a subnet mask is always 255.
- The maximum number of network ID bits is 30. You have to leave at least two bits for the host ID portion of the address, to allow for at least two hosts. If you used all 32 bits for the network ID, that would leave no bits for the host ID. Obviously, that doesn't work. Leaving just one bit for the host ID doesn't work, either. That's because a host ID of all ones is reserved for a broadcast address — and all zeros refers to the network itself. Thus, if you used 31 bits for the network ID and left only one for the host ID, host ID 1 would be used for the broadcast address and host ID 0 would be the network itself, leaving no room for actual hosts. That's why the maximum network ID size is 30 bits.
- Because the network ID is always composed of consecutive bits set to 1, only nine values are possible for each octet of a subnet mask (including counting 0). For your reference, these values are listed in Table 6-2.