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One of the great bene?ts of having such an incredibly long host field is not only the ability to have an absolutely gargantuan number of hosts but also the ability to specify a great deal of uniqueness toward an individual address. As youâ€™re familiar with from your study of basic networking, an individual interface normally contains two addresses, a logical Inter- net protocol address (IP) and a physical MAC address. In IPv4, the MAC address happened to be larger than the IP address. That is, IPv4 addresses were only 32 bits in length, but MAC addresses were 48 bits in length. The original purpose for this design (and still the purpose to this day) is twofold. First, a MAC address speci?es a unique physical address for your computer. Second, it provides an address that a switch can use to forward a frame.

Just in case you haven?t seen one in a while, a typical MCITP Administrator address looks like this: 00-1A-A0-05-2A-B7 Normally, a MAC address is divided into six different sets of two hex numbers for read- ability; letâ€™s do something different for a moment and split the example address into two sets of six hex numbers. The reason why will become clear in a moment.

Now that youâ€™ve separated these two values, letâ€™s shift gears for a moment. Remember earlier whe you read that IPv4 addresses were smaller than MAC addresses? Well, that simply isn?t the case with IPv6. In fact, just the host portion alone is 16 bits larger than the entire MAC address.

Accordingly, a few networking geniuses decided it would be really fun (and really easy) to sort of semi-use the MAC address in the host field. It gives a unique address, and to boot, it allows static addressing without the need to manual enter every single number. I say that the address is ?semi-used?because in order to complete the 64-bit host fields, youâ€™re lacking 16 bits. Thus, you need to insert 16 bits somewhere in the host field to make up for this lack of bits. To do this, you use the hex field:

Then, just to establish a little uniqueness (and for a few more technical MCITP: Server Administrator reasons that are beyond the scope of this book), the seventh bit of the MAC address is ?ipped. So, for this example, the address is as follows:

To achieve 7 bits, you need only the first two values (00). Thus, you take those first two hex numbers and convert them into binary:

And then, you ??ip?the seventh bit:

In hex, this value comes out to 02. Thus, your new address is as follows: 021A:A0FF:FE05:2AB7

Visually, you can think of it like Figure 2.9.

The second way an address can be assigned statically in IPv6 is by doing it the old-fashioned way. And, although it may be a lot more tedious to implement, itâ€™s certainly more easily explained. Just like in IPv4, you can manually punch in an address piece by piece. The only real difference is that one takes decimal notation and the other takes hexadecimal notation and a subnet pre?x. You can see the Windows Server 2008 manual assignment dialog box in Figure 2.10.

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