

# How Domain Name Servers Work

Brain, Marshall. "How Domain Name Servers Work." 01 April 2000. HowStuffWorks.com. <<http://computer.howstuffworks.com/dns.htm>> 12 October 2008.

If you spend any time on the Internet sending [e-mail](#) or browsing the Web, then you use **domain name servers** without even realizing it. **Domain name servers**, or DNS, are an incredibly important but completely hidden part of the Internet, and they are fascinating. The DNS system forms one of the largest and most active distributed databases on the planet. Without DNS, the Internet would shut down very quickly.

In this article, we'll take a look at the DNS system so you can understand how it works and appreciate its amazing capabilities.

When you use the Web or send an [e-mail](#) message, you use a **domain name** to do it. For example, the URL "<http://www.howstuffworks.com>" contains the domain name **howstuffworks.com**. So does the e-mail address "[iknow@howstuffworks.com](mailto:iknow@howstuffworks.com)."

Human-readable names like "[www.howstuffworks.com](http://www.howstuffworks.com)" are easy for people to remember, but they don't do machines any good. All of the machines use names called **IP addresses** to refer to one another. For example, the machine that humans refer to as "[www.howstuffworks.com](http://www.howstuffworks.com)" has the IP address **70.42.251.42**. Every time you use a domain name, you use the Internet's domain name servers (DNS) to translate the human-readable domain name into the machine-readable IP address. During a day of browsing and e-mailing, you might access the domain name servers hundreds of times!

Domain name servers translate domain names to IP addresses. That sounds like a simple task, and it would be -- except for five things:

- There are billions of IP addresses currently in use, and most machines have a human-readable name as well.
- There are many billions of DNS requests made every day. A single person can easily make a hundred or more DNS requests a day, and there are hundreds of millions of people and machines using the Internet daily.
- Domain names and IP addresses change daily.
- New domain names get created daily.
- Millions of people do the work to change and add domain names and IP addresses every day.

The DNS system is a **database**, and no other database on the planet gets this many requests. No other database on the planet has millions of people changing it every day, either. That is what makes the DNS system so unique.

## IP Addresses

To keep all of the machines on the Internet straight, each machine is assigned a unique address called an **IP address**. IP stands for **Internet protocol**, and these addresses are [32-bit numbers](#) normally expressed as four "octets" in a "dotted decimal number." A typical IP address looks like this:

[70.42.251.42](#)

The four numbers in an IP address are called **octets** because they can have values between 0 and 256 ( $2^8$  possibilities per octet).

Every machine on the Internet has its own IP address. A [server](#) has a static IP address that does not change very often. A home machine that is dialing up through a [modem](#) often has an IP address that is assigned by the [ISP](#) when you dial in. That IP address is unique for your session and may be different the next time you dial in. In this way, an ISP only needs one IP address for each modem it supports, rather than for every customer.

If you are working on a Windows machine, you can view your current IP address with the command **WINIPCFG.EXE** (**IPCONFIG.EXE** for Windows 2000/XP). On a UNIX machine, type **nslookup** along with a machine name (such as "nslookup www.howstuffworks.com") to display the IP address of the machine (use the command **hostname** to learn the name of your machine).

For more information on IP addresses, see [IANA](#).

As far as the Internet's machines are concerned, an IP address is all that you need to talk to a server. For example, you can type in your browser the URL **http://70.42.251.42** and you will arrive at the machine that contains the Web server for HowStuffWorks. Domain names are strictly a human convenience.