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## High tech: Possible to break the Internet?

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The beauty of the Internet is its redundancy, which has led to the widespread urban legend that the Internet was created to withstand a nuclear attack.

However, this is no more the case than to say that the interstate highway system was created for the same reason. It's simply not true.

The highway system is a perfect analogy for the Internet. In the same way that cities and towns are physically connected by roads, so are computers connected via the Internet. You can compare cars carrying people and goods to network packets carrying bits and bytes.

Using this analogy, it's easy to see that there's no simple way to halt traffic on either network by damaging it. Destroying a road in, say Iraq has absolutely no impact on the ability to use a road in the U.S.; and, similarly, damaging a server or data center in one location may not have any impact on the rest. However, there is one key difference: since the Internet is a single network (of networks) it has one centralized, yet distributed, process for routing traffic called the Domain Name System (DNS).

DNS is the Internet equivalent of road signs. If DNS were to experience a complete failure, then network packets would not be able to find their way. It would literally be the equivalent of removing all road signs. You could drive where you needed to go if you had been there very recently, but it would still be a disaster. The same is true with the Internet sans DNS.

If you knew that SDNN.com's IP address, which is a computer's numeric label, is either 174.129.207.106 or 174.129.207.107 then network packets might still be able to reach their destination. But, without DNS to provide updates, navigating the Internet would be harder than Lewis and Clark's expedition of the Louisiana Purchase.

There have been three significant attacks on the global DNS servers in April 1997, October 2002, and February 2007. These servers, formally known as the root name servers, represent 13 IP addresses used to process DNS requests. Due to the importance of these 13 IP addresses, they have been separated into different locations throughout the world. Each location is at a highly secure facility with many redundant servers to support it.

Luckily, all attacks on DNS, to date, have failed to bring down the entire system and as long as one



[1]

Because the Internet is built on a network of redundant servers, it's really nearly impossible to break.

part of DNS works then everything hums along without a problem.

### How does DNS work?

When you enter [www.sdn.com](http://www.sdn.com) <sup>[2]</sup> into your computer's Web browser your computer will first look to one of the 13 root name servers that has information regarding the 20 top level domains (.com, .net, etc) and the 248 country codes (.us, .uk, etc). The root name server will reply that SDNN.com's specific server information can be found at its domain name registrar (in this example that would be GoDaddy.com).

Next, your browser will then ask GoDaddy.com's domain name server for SDNN.com's IP address. GoDaddy's servers will reply with the two IP addresses listed above. From there, the final step is for your computer to go directly to one of these two IP addresses and load the SDNN home page.

Since domain name lookups happen so often, Internet service providers will store the IP address of each Web site visited by their users for a specific amount of time to save a couple steps. This is the reason, when you visit a Web page that doesn't receive much traffic, it may take a few seconds to begin loading on your first visit compared to revisiting the site a few minutes later.



[3]

Joe Moreno blogs on high tech issues.

Since the DNS process is so critical – and it's a single point of failure of the Internet – most root name servers use a method that enables their systems to be redundantly distributed to multiple geographical locations. Over time, the original 13 IP addresses have been made redundant with more than 100 root name servers.

So, you can rest easy that there's no need to write down the IP addresses of your favorite Web sites in your address book. DNS will keep our global traffic signs pointing us in the right direction.

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