

Internet Topics

## Internet 101 - The Basics

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### Introduction

Publishing and maintaining the SouthernThoughts.Com web site has given me some experience with the Internet - more than I really wanted. By no stretch of the imagination can I be considered an expert, but I know some people who really are experts. Many of them are hard people to know, some have large chunks of personality missing - usually the part dealing with human relations. Yet these are the people who know how the Internet works - so piece by piece I pried the needed information from them.

To save others from the ordeal of dealing with these characters I've decided to write and publish this article. (You can thank me by telling other's to visit the [www.SouthernThoughts.Com](http://www.SouthernThoughts.Com) web site.)

### About this Article

Is reading this Article going to turn you into one of those people who like to sit in dark rooms, stare at computer screens, and refuse to talk to anyone? I hope not, it's not my intent, if you start feeling such urges - stop reading. This Article is for real people - the one's with lives, but still want to know on a functional level how the Internet works.

### What is the Internet?

A general description of the topic of discussion seems like a logical and easy place to start. Logical, yes. Easy, no. Every time I ask the experts, the gurus, the webmasters about this, I get ramblings about this glorious web where everything is connected to everything else with links so robust that they could survive a nuclear explosion, and how it is so complex that no one controls it. All of which is sheer bull designed to hide the "locality" of their knowledge and to increase the mystery of the Internet.

The Internet really is millions of computers connected together - but in a very known and organized fashion. The computers that make up the Internet are fairly delicate things - I wouldn't bet they could survive being dropped much less a nuclear explosion. And I quickly learned that there is a great deal of control in the important areas of the Internet.

The millions of computers comprising the Internet are not connected in a random manner into a monstrous, mysterious, and unknowable web - each and every one of them has a specific and known location and function. All of the computers on the Internet can functionally be divided into four groups:

- **Client Computers** - these are the individual computers used for surfing the Internet. You are probably using one right now - some people use the term "end user computers" but I don't like it.
- **Servers** - these are the computers that serve up the information requested by the Browsers.
- **Routers** - these are special purpose computers that direct the information messages between the Browsers and Servers.
- **Root Servers** - these are very large computers that hold a database used to locate all of the "www." addresses.

The location of each and every computer connected to the Internet is known by a unique IP Address (IP - Internet Protocol). IP Addresses are the four groups of three numbers separated by dots that you sometimes see. No IP Address - no Internet connection - to be a part of the Internet a computer has to have one.

Each computer connected to the Internet must "speak the same language", that is it must be running a program that adheres to a set of communications standards before it can effectively be a part of the Internet. These standards are simply rules for message formatting, communications responses, and communications initiation - these sets of rules are referred to in "computerese" as protocols.

Then there are the "wires" that connect everything. I'm not even going to try to list all of the different types here, they are all graded in kilobits or megabits per second. For now it is enough to know that the bigger the number the faster it is.

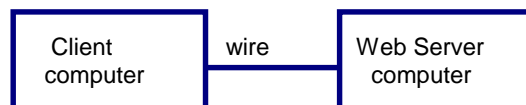
All working together these pieces allow you to key in [www.SouthernThoughts.Com](http://www.SouthernThoughts.Com) into the URL bar on the Browser program running on your computer and get to view the web site containing this page. It is kind of amazing and I know still a bit mysterious - let's move on, examine each piece a little more, assemble them into an Internet, and take some of the mystery out of the thing.

## A Learning Tool

As a learning tool let's use block diagrams to design the Internet. Like most folks I love block diagrams, they are so visual - they can give a sense or relationship without getting bogged down in details. That's what we're after here, relationship. How each piece works in relation to the others is the objective. We'll start simple and keep adding pieces until we've functionally described the whole thing.

### Block Diagram One

Let's start with a two computer Internet - just your computer (running a Web Browser program) and another computer (running a Web Server program).



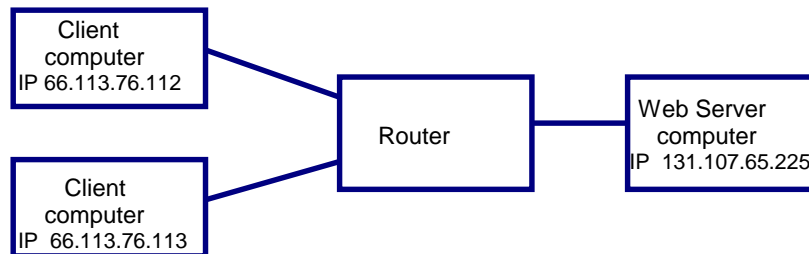
Once connected, these computers can "talk" to each other - that is they can if they both support the IP Protocol. Fortunately the commercially available Web Browser programs and the Web Server programs run on computers that support IP Protocol, so these computers can send messages back and forth.

But it's not enough for a computer to get a message - it must also know what to do with it. To retrieve and display a web page, the content of the messages has to be formatted a certain way for the Web Browser and the Web Server programs can understand and take action. These formatting rules are called the HTML Protocol (HTML - Hyper Text Markup Language), Fortunately the commercially available Web Browser programs and Web Server programs all support HTML Protocol so web pages can be requested and displayed by the Web Browser computer.

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## Block Diagram Two

Adding a third computer complicates our little Internet a bit - but not much. Now each computer has two others it can send messages to and the messages must be directed somehow, the introduction of IP Addresses and a Router does the job.



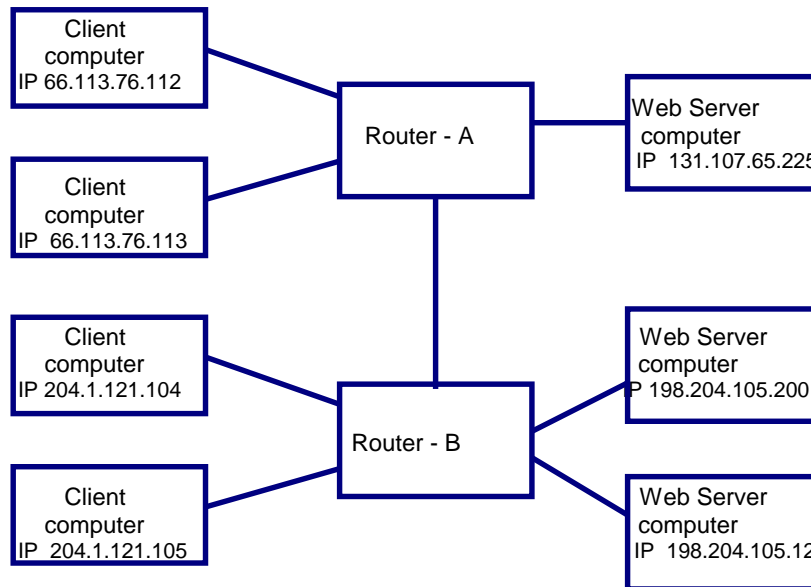
The Router takes the messages from each computer and sends them on to the computer that is supposed to receive them. To enable the Router to direct a message to one particular computer and not the others an addressing scheme must be in place. In normal language each computer would be given a name, but in computerese each is given a number called an IP Address. Each message sent over the Internet must contain the IP Address of the destination computer and the IP Address of the sending computer - this information is called the "Routing Data".

Using the HTML Protocol to format it and the IP Protocol to package it, the Client computer at IP Address 66.113.76.113 can send a request for the web page [www.SouthernThoughts.Com](http://www.SouthernThoughts.Com) through the Router to the Web Server computer at IP Address 131.107.65.225. The Web Server computer at IP Address 131.107.65.225 can then locate the web page, format it according to HTML Protocol, package it in a message according to IP Protocol, and using the return address in the original Routing Data, send it back to the Client computer at IP Address 66.113.76.113. The Web Browser program can then interpret the HTML and display the web page on the screen. All very logical isn't it?

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### Block Diagram Three

To be useful and interesting our little Internet needs to be bigger - so let's add some more Browsers, Routers, and Servers.



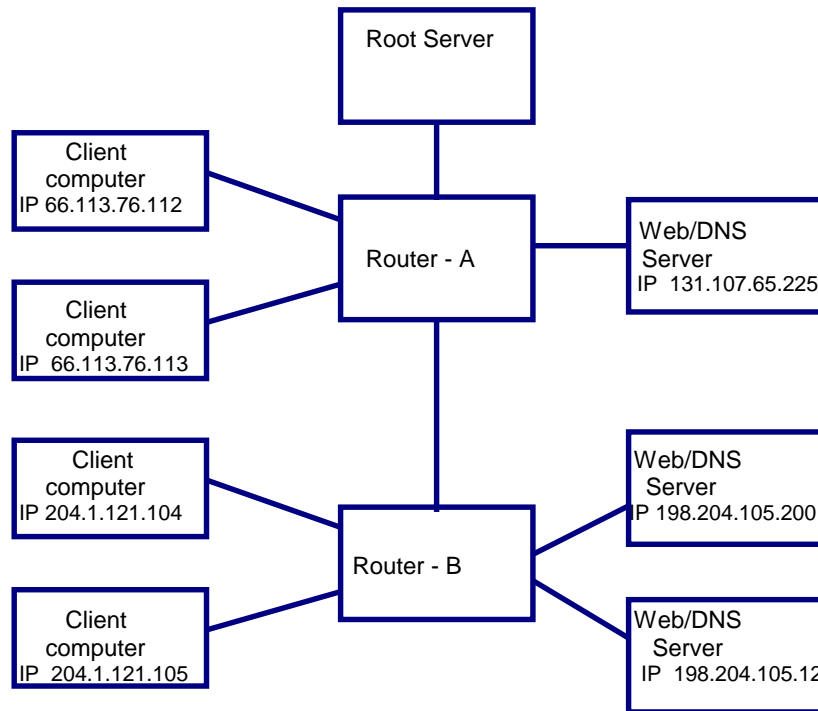
With more Client Computers, Routers, and Servers things work pretty much the same. However now Routers must sometimes send messages to other Routers in order to get them to the destination computer. These transfers of messages from one Router to another are called "Hops" and allow messages originating anywhere in our growing little Internet to be delivered to anywhere else.

Using the HTML Protocol to format it and the IP Protocol to package it, the Client computer at IP Address 204.1.121.105 can send a request for the web page [www.SouthernThoughts.Com](http://www.SouthernThoughts.Com) through Router B and through Router A to the Web Server computer at IP Address 131.107.65.225. The Web Server computer at IP Address 131.107.65.225 can then locate the web page, format it according to HTML Protocol, package it in a message according to IP Protocol, and using the return address in the original Routing Data, send it back to the Client computer at IP Address 204.1.121.105. The Web Browser program can then interpret the HTML and display the web page on the screen. All even more logical isn't it?

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**Block Diagram Four**

IP Addresses - Routers love and need them - but people get enough of IP Addresses in a big hurry. People know web site by their domain names like [www.SouthernThoughts.Com](http://www.SouthernThoughts.Com), not by IP Addresses. In order for Client computers to find web sites by their domain names something needs to be added to our little Internet - that something is a Root Server and some DNS Servers.



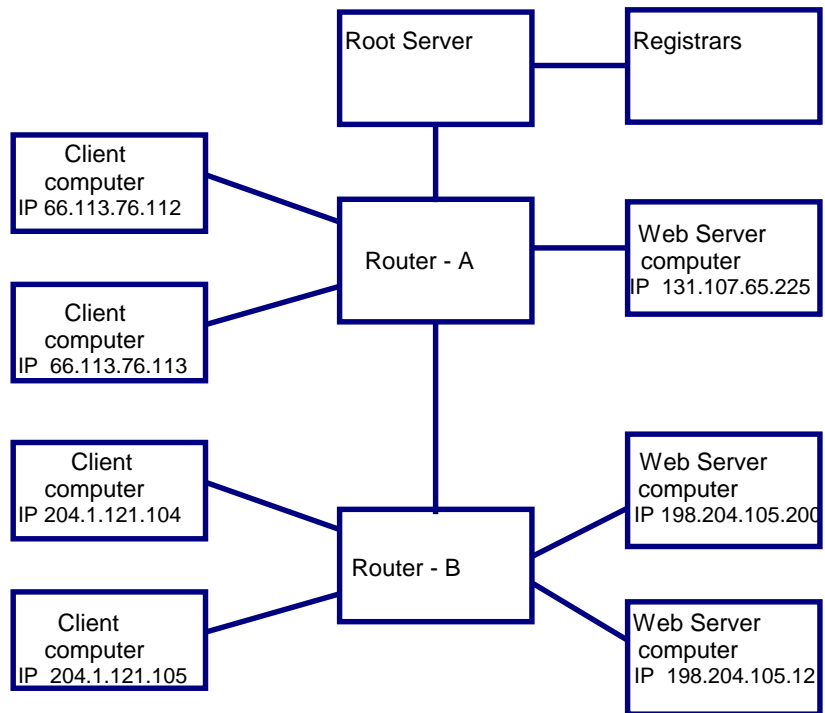
Notice that we have added a DNS function to our Web Server blocks (DNS - Domain Name Service). This function stores all of the IP Addresses of the Domain Names that the server knows about. It also lets the Root Server know which domains it knows about. The Web/DNS Server is said to be "Hosting the DNS" for all of the domains that it knows about. Only one server will host the DNS for a particular domain.

The Root Server contains a big data base that relates the domain names to the Web/DNS servers hosting them.

So for the Web Browser program running on the Client computer at IP Address 66.113.76.112 to request the [www.SouthernThoughts.Com](http://www.SouthernThoughts.Com) web page it first must request the IP Address of the Web Server computer containing the domain from the local Web/DNS Server (Fortunately the commercially available Web Browser programs know how to do this automatically.) The local Web/DNS Server get the IP Address and replies with the IP Address and the Client computer then makes the request for the web page using the IP Address.

### Block Diagram Five

The Root Server is central to the operation of our little Internet. We should protect it so that not just anyone can make changes to the data base, some people may have less than honorable intentions. Everyone should be able to use the data base, but only a trusted few should be allowed to make adds, changes, and deletes to the data base - the trusted few we'll call "Registrars".



As the Registrars are the only ones who can add, change, or delete information on the Root Server, everyone who want to get a web site working on our little Internet has to get a Registrar to create a record on the Root Server for them. The process of getting the Root Server record created is called "Registering the domain name". In this manner the Registrars get the job of policeman for the Root Server data base - the Registrars have to verify that each person requesting a change is actually authorized to do so, a tricky task.

### End of Lesson

That's it. Functionally our little Internet will work fine with the parts described. The real Internet functionally works the same way.

### Our Little Internet VS The Real Internet

Our little Internet is functionally the same as the real Internet - the differences are only matters of numbers, ownership, and details.

The real Internet is bigger than our little Internet - quite a bit bigger. There are millions of Client computers logged onto the Internet at any one time.

While no one owns the Internet, each and every piece of it is owned by someone. Nothing magically appeared - everything was paid for by someone.

- The computers we called Web Browsers are owned by us - the individuals and employees who use the Internet.
- The Routers and Web Servers are typically owned by companies called Internet Service Providers or ISPs. These are the guys we dial into or connect to with our DSL or LAN connections. These are also the guys that host our web sites and provide our Email service - all at a fee of course. ISPs also own (or rent) the communications lines that connect their Routers with the next Routers in the network. Not all ISPs are telephone companies, but many telephone companies are also ISPs.
- The Root Servers are owned by an association called ICANN. This association uses the fees paid by Registrars to pay for the Root Servers - Root Servers are very big and powerful and expensive computers.
- The Registrars own the equipment and systems used to provide their service.

So it's probably more correct to say that no one owns the entire Internet but everyone involved owns a little piece of it.

Obviously there were several million details left out of this description. Admittedly I don't know most of them, and even if I did I wouldn't include them - because you wouldn't read them. The bit twiddlers have an unending supply of technical bulletins, standards documents, specification sheets, etc. from which to get the details - let them have it, we are evidently going to pay them anyway.

### Summary

Now you have a functional concept of how the Internet works - along with an understanding of some of the more important terms used. Does this make you want to sit in cold dark rooms and play with Router settings? Does it make you want to spend months programming bouncing frogs on a web site? I hope not, I would be severely embarrassed if I did that. But if you want or need a more detailed understanding, watch for additional Articles right here on the [www.SouthernThoughts.Com](http://www.SouthernThoughts.Com) web site.

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