# How the Internet Works

## THE WORLD WIDE WEB

People all over the World seem to have information to share with us; both good and bad.  Now, with the power of the Internet, it takes only a few seconds for this information to be shared.

To demonstrate, let's take a trip to Queensland, Australia and visit a Web site that sells Australian bush hats.  Click on the image below to open this site and then come back to this presentation.
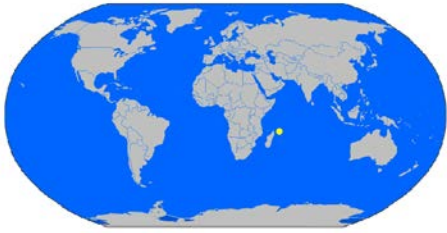


http://www.aussiebushhats.com.au

Welcome to Queensland Australia!

How long did it take you to get to Queensland Australia to look at the information on the Web server that you just spoke to when you clicked on the above link?  I am assuming that if you have high-speed Internet, you were able to see the home page of **Aussie Bush Hats and Oilskins** in just a few seconds.

## NO SUCH THING AS A STRAIGHT SHOT!

http://coursecontent.ntc.edu/CIT/husband/pois/lp3/m11-internetpath.html

Click on the link above and notice how the little yellow ball in the video does not go in a straight line.  Well, the little yellow ball represents the path of your Internet transaction to the Aussie bush hat web site that you had accessed earlier.

Your transaction may take a dozen or so "hops" on Internet routers before it gets to the Web server.  To see where these hops actually are, click on the link below.

http://coursecontent.ntc.edu/CIT/husband/pois/lp3/tracert/tracert.html

## HOW DO COMPUTERS COMMUNICATE?

Every web site and every Internet router has a unique address on the Internet.  This address is called an Internet Protocol (IP) address.  To get to the Web site that you are on, which is **www.aussiebushhats.com.au**, your computer had to get the IP address of that web site.  It did this by asking the domain name servers (DNS) on the Internet for this address.  Click on the link below to see how I found out what the address of the Aussie Web site is.

http://coursecontent.ntc.edu/CIT/husband/pois/lp3/nslookup/nslookup.html

As a final step to setup a communication link between you and the web server, the IP addresses of all of the hops to the Aussie web server will have to be resolved to machine addresses through the Address Resolution Protocol (ARP).   My computer only had to determine the machine address of the first hop (router).   This router had to know the machine address to the second hop or router, and so on.   Click on the image or link below to see if my machine knows what the machine address of the first hop (my router).



http://coursecontent.ntc.edu/CIT/husband/pois/lp3/arp/arp.html

## WHAT MAKES A WEB SITE TICK?

Take a close look at the Aussie Web site. What makes the Web page that you are looking at function the way it does?  To find out, click on **View** and then select **Source**.   See image below.

```
http://www.aussiebushhats.com.au/catalog/index.php - Original Source

1   <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
    transitional.dtd">
2   <html dir="LTR" lang="en">
3   <head>
4   <meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
5   <title>Aussie Bush Hats & Oilskins</title>
6   <base href="http://www.aussiebushhats.com.au/catalog/">
7   <link rel="stylesheet" type="text/css" href="stylesheet.css">
8   <script type="text/javascript" src="js/ie6_script_other.js"></script>
9   <script type="text/javascript">
10
11    var _gaq = _gaq || [];
12    _gaq.push(['_setAccount', 'UA-21658263-1']);
13    _gaq.push(['_setDomainName', 'none']);
14    _gaq.push(['_setAllowLinker', true]);
15    _gaq.push(['_trackPageview']);
16
17    (function() {
18      var ga = document.createElement('script'); ga.type = 'text/javascript'; ga.async = true;
19      ga.src = ('https:' == document.location.protocol ? 'https://ssl' : 'http://www') + '.google-
    analytics.com/ga.js';
20      var s = document.getElementsByTagName('script')[0]; s.parentNode.insertBefore(ga, s);
21    })();
22
23  </script>
24
25
26  <script type="text/javascript" src="js/slideshow/mootools-release-1.11.js"></script>
27  <script type="text/javascript" src="js/slideshow/rokslideshow.js"></script>
```

You will see that the web page is made up of mostly HTML (Hypertext Markup Language) code with a little JavaScript code. This code is what tells your web browser how to display the web page and how to react to your keystrokes and mouse clicks while interacting with the web page.
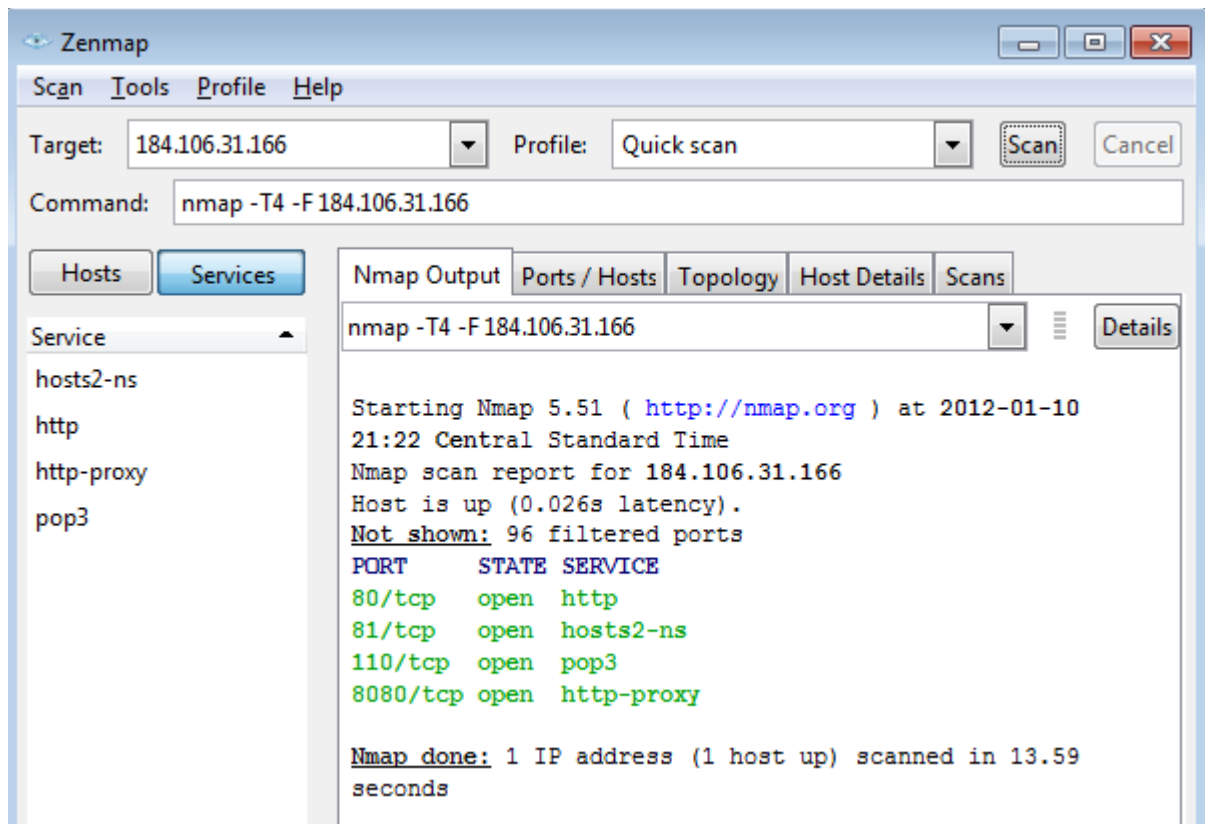
If you explore around in the code you will likely find references to images, hyperlinks (links to other web addresses), JavaScript code and references to E-Mail addresses.

## TCP PORTS AND APPLICATIONS

Have you ever asked yourself, "How do web servers know to display a Web page for me after I type a web address in my browser?"

Every server-level computer connected to the Internet has "network" ready services (applications) waiting to do work for people that make the appropriate requests to run these applications. Some of the Internet services that you may be familiar with include: HTTP, FTP and E-MAIL.

The image below represents the ports that are open on one of the IP addresses returned from the previous NSLookup command (see link above).

The port that you connected to is port 80, which is the default port for most web servers and is what your browser told the Aussie server you wanted. For example, you can change the address to www.aussiebushhats.com.au:80 and you will get to the same Web page.

## IS IT SAFE?

If you want to buy an Australian hat from Aussie Bush Hats is it safe to do so?

One good thing is that whenever you purchase a product from www.aussiebushhats.com.au it is done securely thru HTTPS. See image below. We will talk more about this later.

## WHAT KIND OF SERVER IS IT?

Let's take a look closer at what type of server the Aussie Web server is.

Click on the image below and probe the Aussie Web server by entering **www.aussiebushhats.com.au** in the URL box and then click **Probe**.  You should notice that the server is a Zeus web server (a proprietary web server developed in Cambridge, England).  Note also the versions of network applications that were over time running on that server and the time it took to connect to the server using the probe.



http://www.securityspace.com/sprobe/probe.html

Note:  Knowing the type of server and versions of software is the first step a hacker needs to take to compromise the server.

# E-MAIL

When you send an email it either comes from an e-mail client like MS-Outlook or from a Web server thru HTML code.   An e-mail server is needed to process and store your e-mails to and from your personal computer.   E-mail transactions are sent and received using an e-mail protocol specific to e-mails.

Click on the link below to play an interactive video that will demonstrate this technology.



http://coursecontent.ntc.edu/CIT/husband/pois/lp3/m12-email.html