

Technical Note #107

Putting Your Lighthouse Pro on the Web

Public IP Addresses

Every website, every personal computer, and every other device that connects to the internet must have a unique IP address. Just like your home mailing address, an IP address must be unique throughout the world. There is nothing mysterious about an IP address- it is just a series of numbers that identify a web site, a personal computer, or even a large corporate server connected to the internet.

No one thinks about IP addresses when browsing the web. When you enter *www.google.com* into your browser, Google's web page just comes up and you're good to go. What really happens though, is that the words *www.google.com* is sent to a large computer on the internet called a *Domain Name Server* or *DNS* for short. This computer works like the white pages in a phone book. It looks up what you typed and gives back an IP address. In this case, it returns *64.233.187.147* which is the unique IP address of Google's web site. In fact, you can enter these numbers directly into your browser and you would get to Google's web site just fine. The whole purpose of these giant DNS servers is so you don't have to keep a list of the numbers (IP addresses) and can use easy-to-remember names instead.

In order for the DNS computers to give back the right IP address, the numbers that make up the IP address must be fixed. This is called a *STATIC IP address*. It simply means that the numbers won't change.

Private IP Addresses

Connecting every computer to the public internet with a unique IP address is not possible. There aren't enough numbers to go around. When your cable/DSL router connects to the internet, the router gets a single, world-wide unique IP address for its use. But what happens when 2 or more people in your house want to use the internet at the same time? With only one IP address, it won't work. The router solves this problem with something called *Network Address Translation* or *NAT* for short. The NAT works closely with another mechanism called *Dynamic Host Control Protocol* or *DHCP* (See Technical Note #104 for further information on DHCP). What this does is allow the router to hand out its own private set of IP addresses to every computer in your house.

The numbers that make up the private or local IP addresses are unique in that the public internet is not allowed to use them. Most routers use *192.168.1.xxx* as the default IP address. Your router is capable of managing up to 254 devices including computers, network printers, or other internet devices (like the Lighthouse Pro) and still only use the one public IP address. The router keeps track of which computer asked for what, then funnels the data through the single public IP address. Every computer in the house thinks it has its own dedicated public IP. What about your neighbor down the street? He might be using the same local IP address as you. It doesn't matter- His house has a unique public IP address too, and the router does the rest.

Static versus Dynamic IP Addresses

With your router managing all the local IP addresses, you don't really care about the public IP address. Internet service providers take advantage of this. They save money by buying a limited set of public IP addresses. When you connect to the internet, they give your router the next available IP address off their list. This scheme is called *DYNAMIC IP ADDRESSING*. What it means is that the your public IP address will change from time to time.

If you wanted to run your own website out of your house, you would want people to type in *www.mysite.com* instead of your actual IP address. As in the Google example above, the DNS computers around the world would then pass out your public IP address to whoever requested it. If your service provider uses Dynamic IP Addressing, you couldn't do this because your public IP address would be changing all the time.

In order to put your Lighthouse Pro on the internet, Dynamic IP Addressing can't be used. This is because you won't know what public IP address to type while you're away from home. There are some work-arounds to this. Many people have discovered that their dynamic IP address only changes from time to time, and when it does, it toggles between two different IP addresses. You could keep links to both addresses in your browser and use whatever one works. The problem with this is that your ISP could gain new subscribers or add more internet equipment and the sets of numbers may change again.

There are hundreds of companies on the internet that offer what is called *Dynamic IP Services*. Basically they communicate with your router to find out your current IP address, then channel all the data through a static IP address they give you. Some of these services are free, while the better ones charge a nominal fee.

The ultimate solution is to get a Static IP from your service provider. Many ISP's now include a Static IP with their premium or high-speed internet residential service. Some offer a Static IP for an additional fee. Check with your ISP to see what's available. These companies are always changing their packages so check them out and see what's currently available.

IP Ports

Before configuring your Lighthouse Pro for web access, you need to know about IP *Ports*. Each IP address has list of recipients called *Ports*. As an example, suppose 10 people live in your house. Each person can receive mail from the post office independently, because their name is on the envelope above the street address. The post office doesn't care who lives there, because they deliver based solely on your street address. IP Ports work the same way.

Each IP address contains 64,000 recipients or Ports. Some ports are dedicated to certain protocols or types of recipients. Port 80 is called the HTTP port, which is dedicated to receiving web pages. Your web browser automatically asks for Port 80 whenever you want to browse a web page. However, when working with IP addresses, you have to ask for a specific port by putting the port number (separated by a colon) after the IP address. To get to Google's web page using ports, you could type in *www.google.com:80* or *64.233.187.147:80*. Since all web browsers automatically asks for Port 80, the port number is not necessary for a web browser.

IP Ports allow a single IP address to be used for web browsing, email, and other functions. Email uses up two ports, one to send and one to receive. Multiplayer computer games require multiple ports. Internet telephone

services (such as *Vonage*) need their own ports. The lower numbered ports are usually dedicated to these standard operations. Port numbers above 5,000 (5,000 through 64,000) are not dedicated to anything and can be freely used. Keep this in mind when setting up ports for the Lighthouse Pro.

In order to put your Lighthouse Pro on the internet, you not only need to know the public IP address of your router, but you need to choose a port. By default, the Lighthouse Pro uses Port 80. This makes it convenient to access the controller from within your local intranet, because you don't have to type in the ":80" at the end of the IP address.

Port 80 may not be the best choice for public access. Port 80 is constantly hammered by search engines and web crawlers, so your internet connection might slow down due to the increase in traffic. Furthermore, if you run a website (or might in the future) or have a webcam, then Port 80 is already taken.

The best solution is to change the Lighthouse Pro's IP port. This can be accomplished by pressing the ADV OPT button on the remote, then navigating down to the HTTP Port setting and entering a new port number. Most people use a number they can remember. Common port numbers to use are 81, 8000, or 8080. You can even use your PIN number or some other number. Just make sure it is above 5000 to be on the safe side.

Setting Up Your Router

Your router needs to know how to pass internet traffic from the outside world to your Lighthouse Pro. To do this, you need to get to your router's configuration web pages and set this up.

Let's assume that you set up the Lighthouse Pro's HTTP Port number to 81, and that the public IP address of your router is 123.456.789.000. [Tip: to find out your public IP address, go to www.whatismyip.com]. Let's also assume that the Lighthouse Pro's IP address is 192.168.1.10. You would access the controller as follows:

Local Web Browser	192.168.1.10:81
Internet Web Browsing	123.456.789.000:81

Let's go through the setup using an actual router, the Linksys WRT54G. To get to the port forwarding setup in this router, you first access the *Applications & Games* page, then select the *Port Range Forwarding* page.

Let's enter the above information into this router:

Application – This is just a name to enter to identify the forwarding. Enter "Lighthouse Pro".

Start/End – This specifies the range of ports that are to be forwarded. Since the Lighthouse Pro only needs one port, we enter "81" as the Start and "81" as the Ending port.

Protocol – The choices are TCP, UDP, or Both. The Lighthouse Pro uses TCP, so select "TCP".

IP Address – This is the IP Address of the Lighthouse Pro. The 192.168.1 portion is fixed on the screen. So we just need to enter the last part of IP address. In our case, Enter "10".

Enable – This lets you turn off the forwarding later on without retyping all the info again. Check the box to enable it.

Click the SAVE SETTINGS button and the router is ready to go.

You won't be able to test your configuration by typing in the public IP address and port number within your local network. The router won't pass traffic out and back in again. Go to the website <http://www.yougetsignal.com/tools/open-ports/> and enter Port 81. This web page will tell you if the port is opened and working. If not, go back and check your entries.