# Hurricane Electric IPv6 Certification

[IPv6 Primer](#)

# Step 1. Registering a Domain Name at GoDaddy

The best way I found to do this is to spend $3.17 of real money. I couldn't find a free service that was good enough. Even most paid services aren't really good enough to get you all the way to IPv6 Sage level, because they don't have full IPv6 functionality including glue records (glue records will be explained later).

1. Go to [godaddy.com](http://godaddy.com). In the middle of the page, type your desired domain, and choose a top-level domain. I recommend using **.info** because I know there are top-level glue records for it. But as time passes, more and more top-level domains will have full IPv6 compatibility, so other choices will become OK. Click **Go**.
2. If the domain is available, buy it. You will need a credit card. You will have to enter your real email address, and GoDaddy will offer you a lot of extra features like other domains, email accounts, Web hosting, etc. For IPv6 certification you don't need any of that. You can say No to it all and only pay a total of $2.17 for one year.
3. You can setup the free email account and create a free homepage.

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# Step 2. Registering at Hurricane Electric

1. Go to [http://ipv6.he.net/certification/](http://ipv6.he.net/certification/). In the upper left, click the "**Register**" button. Fill in the form to create an account. Check your email to get your login information, and log in at [http://ipv6.he.net/certification/](http://ipv6.he.net/certification/). You should see a badge at the right of the page with your user name and the message "No Cert Yet".
2. At the upper left of this page, click "Update Info". Change your password to something you can remember.

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# Step 3. NeWb Test

1. In the **NeWb!** section, click the "**IPv6 Primer**" link and study the primer. Then click the "**questions**" link and take the test.
2. When you return to the main page, you should see that your badge has changed to Newbie, as shown.

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## Step 4. Explorer with Gogo6 Tunnel

Since you probably only have IPv4 Internet service, the easiest way to get on IPv6 is to use a Tunnel Broker--a service that converts IPv4 traffic to IPv6. The easiest one is Gogo6.

1. Go to http://gogo6.com/. At the upper middle of the page, click "**Freenet6**". On the next page, click **Sign Up**. Fill in the form to create an account. You will have to read your email and click a link to verify your account, and also fill out a profile form.
2. Go to http://gogo6.com/ and, at the top of the page, click "**Freenet6**". Your name should appear at the upper right of the page--Freenet has recorded your ID with a cookie. In the "Freenet Services" section, click the **Download** button.
3. The next page offers several versions to download. Download the "gogoCLIENT - Basic version" and install it with the default options.
4. Now you need to create a Freenet6 Tunnel account. In your browser at the top, click the "**Services**" link. Scroll down to the "Freenet6" section and click the "**Learn more**" link, as shown below:

### Freenet6

Freenet6 is an IPv6 access service which has enabled over 100,000 people from all over the world to experience the best solution for a smooth and incremental deployment of IPv6. Freenet6 users can get IPv6 connectivity from anywhere, including from behind any NAT device or from outside of their home network. On Freenet6, a single, permanent IPv6 address and a DNS name are assigned to each user, making their PC reachable from anywhere on the IPv6 internet. A full /56 prefix may also be assigned to a router, enabling the distribution of IPv6 connectivity to an entire network.

● LEARN MORE ←

5. On the next page, scroll down to the "Getting started" section, and click the "**here**" link, as shown below on this page. Fill out the form to get a Freenet6 account.

### Getting started

In order to get started download the gogoCLIENT from the download page and install it and then just press connect. It is that simple to get IPv6.

If you want to get a static IPv6 address or get a /56 network you need to get an account on the Freenet6 server. Click here to register. This is different from your gogoNET login.

6. You will have to read your email and click a link to verify your account.
7. When the gogoCLIENT is installed and running, click the "**Advanced**" tab, and select a "Tunnel Mode" of "**IPv6-in-UDP-IPv4 Tunnel (NAT Traversal)**" as shown. Click "**Apply**". This is the best choice because it works almost everywhere.

8. In the gogoCLIENT window, click the "**Basic**" tab. Change the "Server Address" to **authenticated.freenet6.net**
9. In the middle of the window, click the "**Connect Using the Following Credentials**" button. Enter your Freenet6 username and password. Click "**Apply**" and the "**Connect**" button. If a box pops up asking "Save changes before connecting?". Click **Save**.
10. Click the "**Status**" tab. When it connects, you should see a long IPv6 "Local Endpoint Address", as shown below on this page. If you cannot connect, you may have to adjust your router or firewall to allow UDP port 3653.



11. If it's not still open, go to http://ipv6.he.net/certification/ and log in.
12. In the **Explorer** section, click the link in the "When you are ready..." line. You should see a message saying "Congratulations, you have IPv6 connectivity". Click the "**Here**" link to continue.



13. Your badge should now show **Explorer**.

# Step 5. Enthusiast with IIS Web

The next level requires you to have your own domain name and a working Web server.

## Installing IIS

1. IIS (Internet Information Services) is the Microsoft's Web server. Open "**Programs and Features**" from the Control Panel.
2. Click "**Turn Windows features on or off**". Click the "Internet Information Services" box and the "Internet Information Services Hostable Web Core" box, as shown below on this page. Click OK. Wait until IIS is installed.
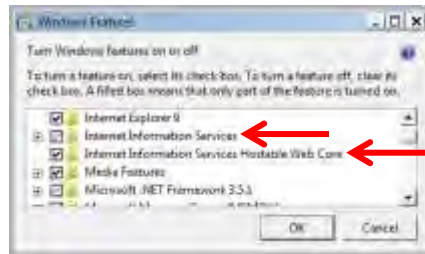


3. In your browser, go to **127.0.0.1**
4. You should see an IIS Welcome page, as shown below. This shows that IIS is listening on port 80 of IPv4.



5. Open a Command Prompt and type in the **NETSTAT -AN** command. Scroll back to see the TCP Listening ports. You should see the IPv6 address **[::]** Listening, as shown below. This means that your Web server is serving pages over every IPv6 address.
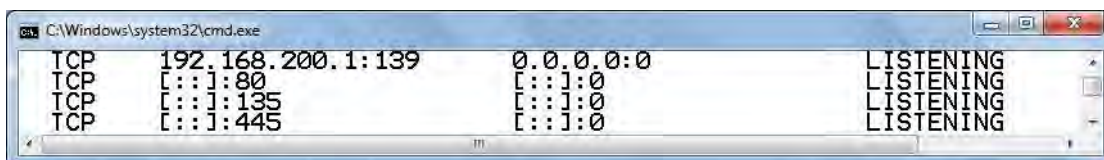
## Entering your IPv6 Address at GoDaddy

1. In Firefox, go to http://godaddy.com. On the top, log in.
2. On the top left side, hover the mouse over "**Domain**". Wait a second for more options to appear. On the right side, in the "Management" section, click "**Domain Management**". You should now be in the "**Domain Manager**".
3. You should see a list of your domains. In the top of this window, under the header "Tools", click on "**DNS Manager**".
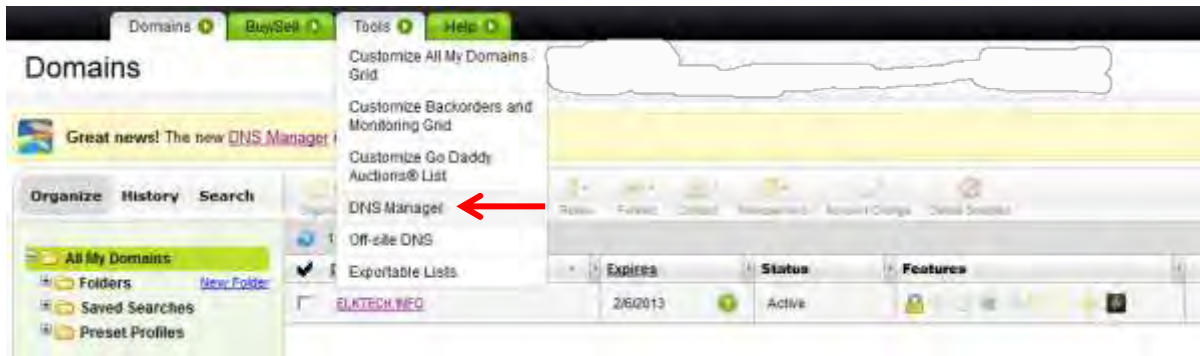


4. On the next page, click on "**Edit Zone**".
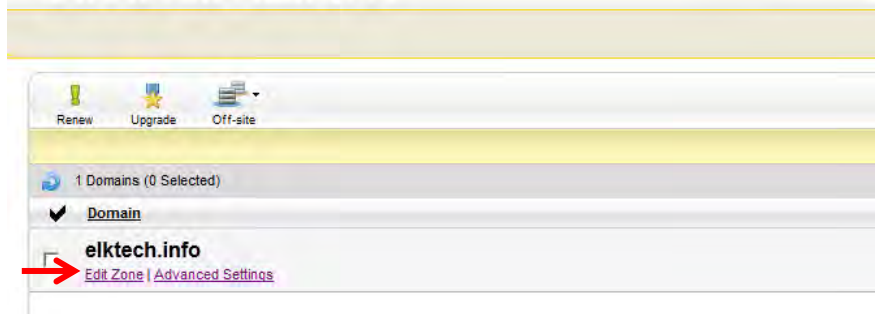


5. Scroll down to the AAAA Record section and click the "**Quick Add**" button. Enter a "Host Name" of **@**. In the "Points to IPv6 Address" field, enter your Local Endpoint IPv6 address. I recommend using copy and paste from the Status tab of the gogoCLIENT utility. Click the "**Save Zone File**" button. Click **OK**.

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## Testing your AAAA Record

6. Open a Command Prompt window. Type in these commands:
   **nslookup**
   **set q=AAAA**
   *YourDomain.info*
   You should see your IPv6 address, as shown below. This shows that DNS can now find your server.

```
C:\Windows\system32>nslookup
Default Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

>set q=AAAA
>elktech.info
Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

Non-Authoritative answer:
Name: elktech.info
Address: 2001:5c0:1000:b::af0f
```

## Troubleshooting DNS

7. You may have to wait a few minutes for DNS to update. In principle, it could take up to 48 hours, but in practice 5 minutes is usually enough. You can watch the process by typing your domain name and then the address of the DNS server to use. 8.8.8.8 is Google's DNS server and it usually updates quickly. If you want to see GoDaddy's DNS record directly, use the DNS server GoDaddy assigned to your account which is shown at the bottom of your DNS management page. It will be something like **ns55.domaincontrol.com**. The image below shows a series of tests, testing: 1) GoDaddy, 2) Google, 3) Hurricane Electric, to see if they all can resolve my domain.

**1)**
```
C:\Windows\system32>nslookup
Default Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

>set q=AAAA
>elktech.info ns55.domaincontrol.com
Server: ns55.domaincontrol.com
Address: 216.69.185.29

Non-Authoritative answer:
Name: elktech.info
Address: 2001:5c0:1000:b::af0f
```

**2)**
```
>elktech.info 8.8.8.8
Server: [8.8.8.8]
Address: 8.8.8.8

Non-Authoritative answer:
Name: elktech.org
Address: 2001:5c0:1000:b::af0f
```

**3)**
```
>elktech.info ns1.he.net
Server: ns1.he.net
Address: 216.218.130.2

Non-Authoritative answer:
Name: elktech.org
Address: 2001:5c0:1000:b::af0f
```

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## Completing the Hurricane Electric Enthusiast Test

1. In Firefox, go to http://ipv6.he.net/certification/ and log in.
2. In the **Enthusiast** section, click the "**Get a User Code**" link and type your domain name (the one you registered at GoDaddy). Click the "**Create URL**" button.

| Help | Step | Description | Data |
|------|------|-------------|------|
| 🛈 | [1] | **Completed: Code generated** | zwp7sfho0o |
| 🛈 | [2] | **Completed: Valid FQDN entered** | http://elktech.info / |
| 🛈 | [3] | **Completed: URL created** | http://elktech.info/zwp7sfho0o.txt |
| 🛈 | [4] | Schedule the test: | Test It! |

3. Now you should see a URL in line [3], something like this: **http://elktech.info/zwp7sfho0o.txt**
4. You need to create a file with that name. The filename does not include **http** or your domain name -- in the example above, the correct filename is: zwp7sfho0o.txt
5. You need to create that file in your Web server's home directory, which is **C:\Inetpub\wwwroot**. To do that, you need to give yourself permission to write in that folder. (Click **Start**, **Computer**. Open drive C:. Open the Inetpub folder. Right-click the **wwwroot** folder and click **Properties**. On the **Security** tab, click **Edit**. Click the **Add** button and add your account. Give yourself Full Control permission. Click **OK**. Click **OK**.)
6. Double-click the **wwwroot** folder to open it. Right-click an empty portion of the folder's window and click **New**, **Text document**. Enter the name specified in the Hurricane Electric URL line and press Enter.
7. In the Hurricane Electric Web page, click the "**Test It!**" button.
8. If you pass the test, you will see the "Enthusiast Questionnaire". When you complete the questionnaire, click the "Here" link to return to the main page.

   If you can't pass the test, try these debugging tips:
   - Turn off your firewall.
   - At a Command Prompt, type these commands:
     ```
     NSLOOKUP
     set q=AAAA
     yourdomain.info 8.8.8.8
     ```
     (This fetches the AAAA record from Google's DNS server )
   - See if the AAAA record is correct. It can take up to an hour or more for DNS to update, so simply waiting a while might fix a DNS problem.
   - You could also open your Web site with a literal IPv6 address in the URL like this: **http://[2001:5c0:1000:b::6ac5]** (*Use your local link address*)

9. On the left, take the Enthusiast Technical Test.
10. Your badge should now show **Enthusiast**, as shown to the right on this page.

# Step 6. IPv6 Email Server

## Installing the Apache James SMTP Server

1. In Firefox, go to http://james.apache.org/download.cgi#Apache_James_Server. In the middle of the page, under "Apache James 2.3.2 is a stable version" click on the **"james-binary-2.3.2.zip"** line. Save the file on your desktop.
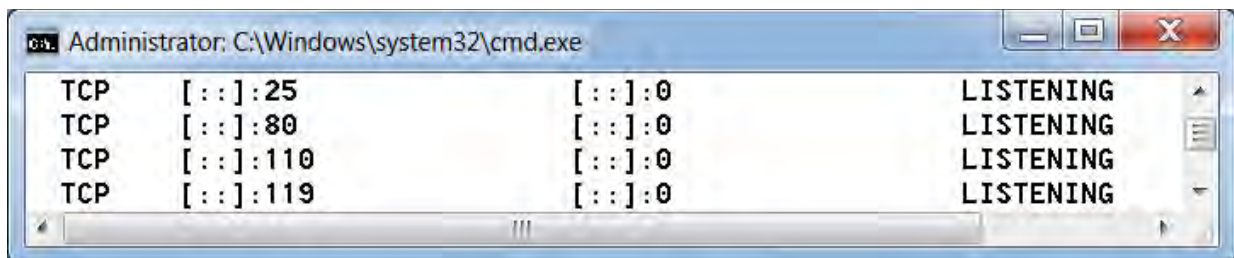
- Binary (Unix TAR): james-binary-2.3.2.tar.gz [PGP ☑]
- Binary (ZIP Format): james-binary-2.3.2.zip [PGP ☑] ←
- Source (Unix TAR): james-2.3.2-src.tar.gz [PGP ☑]
- Source (ZIP Format): james-2.3.2-src.zip [PGP ☑]

2. On your desktop, right-click the apache-james-2.3.2.zip file and click "**Extract All**". Click **Extract**. Double-click the **apache-james-2.3.2** folder to open it. Double-click the **james-2.3.2** folder to open it. Double-click the **bin** folder to open it. Double-click the **run.bat** file.
*Note: If the window flashes briefly and vanishes, that usually means you don't have Java installed. Open a browser, go to **java.com**, and install it.*

3. A Command Prompt window opens, and you see some messages, ending with the messages shown below on this page.

> **Phoenix 4.2**
>
> **James Mail Server 2.3.2**
> **Remote Manager Service started plain:4555**
> **POP3 Service started plain:110**
> **SMTP Service started plain:25**
> **NNTP Service Started plain:119**
> **Fetchmail Disabled**

4. Open another Command Prompt window and type in the **NETSTAT -AN** command. Scroll back to see the TCP Listening ports. You should see the IPv6 address **[::]** Listening on port TCP 25, as shown below on this page. Your email server is ready!

```
Administrator: C:\Windows\system32\cmd.exe
  TCP    [::]:25              [::]:0              LISTENING
  TCP    [::]:80              [::]:0              LISTENING
  TCP    [::]:110             [::]:0              LISTENING
  TCP    [::]:119             [::]:0              LISTENING
```

5. Now you need to add a mail user account to James. To do that, in the Command Prompt window, type this command, followed by the Enter key:
   **telnet localhost 4555**

   *Note: If you get a message saying "'telnet' is not recognized as an internal or external command, operable program or batch file.", that means Telnet is not installed.*

6. To install Telnet, open Control Panel and click "**Programs and Features**". Click "**Turn Windows features on or off**". Check "**Telnet Client**", as shown to the right on this page. Click **OK**.

7. Log in with the use name **root** and a password of **root**. When you see the ""Welcome root. HELP for a list of commands" message type this command followed by the Enter key:
   **adduser *admin password***

   *Note: This adds a user named **admin** with a password of **password**.*

8. Type this command followed by the Enter key:
   **quit**

## Configuring James

1. In your student drive, create a folder named **Mail**.
2. In the Command Prompt window that is running James, press Ctrl+C. When you see the message "Terminate batch job (Y/N)?", type **Y** and press Enter.
3. Navigate to the apache-james-2.3.2\james-2.3.2\apps\james\SAR-INF folder and open the **config.xml** file in <u>WordPad</u>.
4. There are three changes you need to make in this file. First, in the "servernames" section, you need to add a line with your domain name, as shown below:
   **<servername>elktech.info</servername>**

```
<servernames autodetect="true" autodetectIP="true">
<!-- CONFIRM? -->
<servername>localhost</servername>
<servername>elktech.info</servername>
</servernames>
```

5. Second, in the InBoxRepository section, you need to add or change the line with a path to the folder your created in step 1, as shown below:
   **<repository destinationURL="file:///S:/Mail" type="MAIL" />**

```
<!—Default settings: file based repository – enter path
    (use file:/// for absolute) -->
<inboxRepository>
    <repository destinationURL="file:///S:/Mail" type="MAIL" />
</inboxRepository>
```

6. Third, in the dnsserver section, you need to add a real DNS server. I used Google's free server at 8.8.8.8, as shown below:
   **<server>8.8.8.8</server>**

```
<dnsserver>
   <servers>
      <!-- Enter ip address of your DNS server, one IP address
         per server -->
      <!-- element. -->
      <--
         <server>8.8.8.8</server>
      -->
   </servers>
```

7. After making the changes, save the config.xml file and close WordPad.
8. Then start James, as you did before: In the **bin** folder, double-click the **run.bat** file.

## Adding an MX Record to your DNS Zone

1. In Firefox, go to http://godaddy.com. Log in and launch DNS Manager for your domain, as you did previously.
2. Scroll to the bottom of the page. In the "MX" section, there are two records GoDaddy put there, as shown below on this page. Hover over a record to make a red **X** appear on the right side, and click the **X** to delete the record. Repeat the process to delete the other MX record. Click "**Save Zone File**". Click "**OK**".
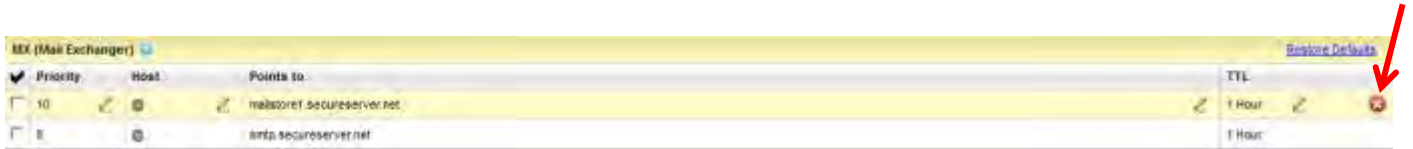


3. In the MX section, click the "**Quick Add**" button. Enter **10** in the leftmost field, which is Priority. Enter **@** in both the other fields, as shown below. Click "**Save Zone File**". Click "**OK**".



## Testing your MX Record

1. Open a Command Prompt window. Type in these commands:
   **nslookup**
   **set q=MX**
2. Then type in your domain name and press Enter. The only "mail exchanger" should be your domain name, as shown below. That will tell email servers to just send the mail to your computer at its known IPv6 address. If you see other mail servers listed, like "mailstore1.secureserver.net", that means your DNS changes were incorrect, or they have not yet been updated. Check your GoDaddy DNS settings.

```
C:\Windows\system32>nslookup
Default Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

>set q=mx
>elktech.info
Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

Non-Authoritative answer:
elktech.info    MX preference = 10, mail exchanger = elktech.info

elktech.info    nameserver = ns56.domaincontrol.com
elktech.info    nameserver = ns55.domaincontrol.com
elktech.info    internet address = 97.74.42.79
```

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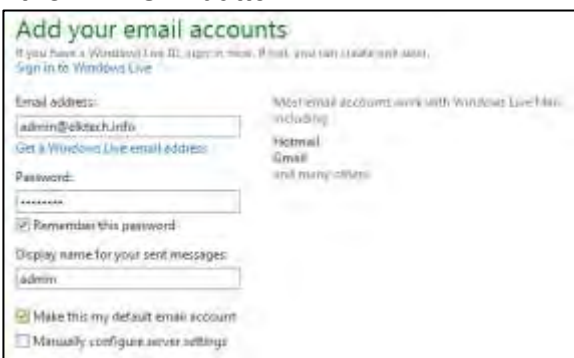## Start the Hurricane Electric Administrator Test

1. In Firefox, go to http://ipv6.he.net/certification/ and log in.
2. In the **Administrator** section, click the "**Generate It!**" link.
3. Enter the email address you create earlier **admin@*yourdomain.info*** in the box below the "Generated" message. Click the "**Send It!**" button.
4. You will retrieve the code later.

[Reset Test]

| Step | Description | Data |
|---|---|---|
| 1 | **Completed: Code generated** | Generated |
| 2 | **Completed: Email address entered:** | admin@elktech.info |
| 3 | **Completed: Email sent:** | Sent! |
| 4 | Tell us what the code was: | [          ] Submit |

## Installing an Email Client

1. Open Windows Live Mail.
2. In the "Mail Account Setup" box, enter your name, your email address (admin@*yourdomain.info*), and the password you configured in James earlier, which is probably **password**. Click the Next button.
3. In the Incoming server information section, select POP as the server type, enter **localhost** as the server address, enter **110** as the Port, uncheck the "requires a secure connection (SSL), Authenticate using **Clear** text, and **admin** as the logon user name.
4. In the Outgoing server information section, enter **smtp.elktech.info** as the server address, **25** as the Port and uncheck both boxes**.**
5. Click the "**Next**" button.
6. Click the "**Finish**" button.



7. In Live Mail, in the left pane, expand your account name and click **Inbox**. Click the "**Get Mail**" button. A message from ipv6.he.net should appear.
8. Find the code in that email message.
9. In Firefox, in the http://ipv6.he.net/certification page, paste in the code from the email message. Click the → button.
10. The "Administrator Questionnaire" opens. Fill it out.
11. On the left, take the Administrator Technical Test.
12. You should now be an Administrator, with a badge like the one shown below.



HE.NET
IPv6
Certified
**Administrator**
elktech
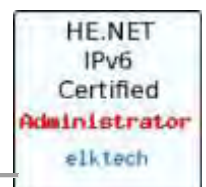
# Step 7. Examining your DNS Records

The rest of the process requires you to set up your DNS records correctly. These instructions use public DNS services.

We use GoDaddy's DNS service for Part 1 and Hurricane Electric's DNS service for the Reverse DNS.

1.  Open a Command Prompt window. Type in these commands:
    **nslookup**
    **set q=all**
    *yourdomain.info*
2.  You should see these items in you nslookup:
    *   AAAA record pointing to your Local Endpoint IPv6 Address
    *   MX record pointing to your domain name
    *   nameserver records pointing to GoDaddy servers, in the "domaincontrol.com" domain

```
C:\Windows\system32>nslookup
Default Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

>set q=all
>elktech.info
Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

Non-Authoritative answer:
elktech.info      AAAA IPv6 address = 2001:5c0:1000:b::af0f
elktech.info      internet address = 97.74.42.79
elktech.info      MX preference = 10, mail exchanger = elktech.info
elktech.info
        primary name server = ns55.domaincontrol.com
        responsible mail addr = dns.jomax.net
        serial = 2012021301
        refresh = 28800 (8 hours)
        retry = 7200 (2 hours)
        expire = 604800 (7 days
        default TTL = 3600 (1 hour)
elktech.info      nameserver = ns55.domaincontrol.com
elktech.info      nameserver = ns56.comaincontrol.com
```

3.  In the Command Prompt window, type this command:
    **exit**

# Reverse DNS

Forward DNS lookups are the normal ones that start with a domain name like elktech.info and look up an IPv6 address like 2001:5c0:1000:b::af0f.

Reverse DNS starts with the IPv6 address and looks up the domain name. This is a common test performed by email servers, to detect spammers. If a domain name doesn't resolve with reverse DNS, that indicates that there is something suspicious about the mail server, and some email servers will refuse to accept the mail.

# Checking your Reverse DNS Resolution

1. Open the "**gogoCLIENT Utility**".
2. Click the **Status** tab. Highlight your "Local Endpoint Address", right-click **Copy**.
3. Open a Command Prompt window. Enter this information:
   **nslookup**
   *Local Endpoint Address* (right-click and Paste)
4. You should see your Reverse DNS Resolution as shown below:

```
C:\Windows\system32>nslookup
Default Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

>2001:05c0:1000:000b:0000:0000:0000:af0f
Server:     disco.gog6.com
Address:      2001:5c0:1000:1::2

Name:       elktech.broker.freenet6.net
Address:      2001:5c0:1000:b::af0f
>
```

This isn't good. Your MX server is *yourdomain.info*, but your reverse DNS resolves to something ending in "broker.freenet6.net". That makes you look like a spammer to mail servers.

# Adjusting the gogoCLIENT Configuration

There are two changes needed here: Reverse DNS Servers and Routing Advertisements.

## Reverse DNS Servers

1. In the gogoCLIENT Utility, click the **Advanced** tab. In the "Reverse DNS Server(s) " section, enter this in the field:
   **ns1.he.net:ns2.he.net**

## Routing Advertisements

2. In the gogoCLIENT Utility, click the **Advanced** tab. At the bottom, check the "**Enable Routing Advertisements**" box. In the "Advertise on Interface" drop-down box, select "**Local Area Connection**" or whatever interface you are using to connect to the Internet.
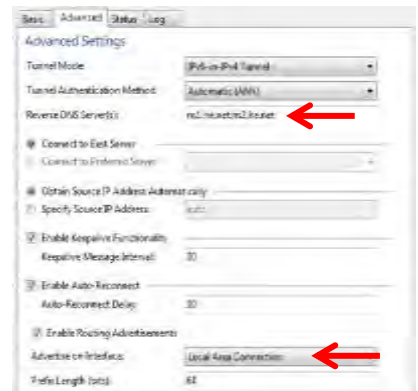
This setting tells Freenet6 that you are not just a single computer, but a router for a network. So Freenet gives you a dedicated IPv6 prefix. This is a real, publicly routed Internet address block, with an incredible number of addresses for you to use--each person who requests it gets more addresses than the entire IPv4 address space for their own use.

3. In the gogoCLIENT Utility, click the **Basic** tab. Click the **Disconnect** button. Click the **Connect** button. In the "Save changes before connecting?" box, click **Save**.

4.  In the gogoCLIENT Utility, click the **Status** tab. You should see your "Delegated Prefix", as shown below on this page.

```
Connection Status
Tunnel Information
    Virtual Tunneling Adapter:              Local Area Connection 2
    Tunnel Mode:             IPv6-in-UDP-IPv4 Tunnel (NAT Traversal)
    Local Endpoint Addresses:                      71.14.144.66
                            2001:05c0:1000:000b:0000:0000:0000:af0f
    Remote Endpoint Addresses:                     64.86.88.116
                            2001:05c0:1000:000b:0000:0000:0000:af0e
    Server Address:                        montreal.freenet6.net
    Delegated Prefix:                     2001:05c0:1113:1c00/56  ←
    Delegated User Domain:               elktech.broker.freenet6.net
    Tunnel Status:                              Connected
    Tunnel Duration:                         15385d 17h9m30s
    Last Error:                                  (none)
```

# Finding Your New IPv6 Address

1.  Open the "Network and Sharing Center" windows. Click on "Change Adaptor Settings". Double-click "Local Area Connection".
2.  In the "Local Area Connection Status" box, click the **Details** button. You should see your IPv6 address, which is your assigned prefix followed by ::1, as shown below.

```
Network Connection Details:

Property                    Value
DHCP Enabled                Yes
IPv4 Address                192.168.1.131
IPv4 Subnet Mask            255.255.255.0
Lease Obtained              Wednesday, February 15, 2012 3:45:05 PM
Lease Expires               Wednesday, February 15, 2012 4:16:48 PM
IPv4 Default Gateway        192.168.1.2
IPv4 DHCP Server            192.168.1.254
IPv4 DNS Server             192.168.1.2
IPv4 WINS Server            192.168.1.2
NetBIOS over Tcpip En...    Yes
IPv6 Address                2001:5c0:1113:1c00::1  ←
                            2001:5c0:1113:1c00:9845:6cc7:108c:7977
Temporary IPv6 Address      2001:5c0:1113:1c00:84d2:f695:5fe9:4266
Link-local IPv6 Address     fe80::9845:6cc7:108c:7977%10
IPv6 Default Gateway
IPv6 DNS Server
```

# Configuring a DNS Zone at Hurricane Electric

1. In Firefox, go to **dns.he.net**
2. On the upper left, log in with the account you are using for the IPv6 Certification tests.
3. On the left, click "**Add a new domain**" In the "Domain Name" box, type your domain name. Click the "**Add Domain!** button. Your domain appears in the "Active domains for this account".
4. Now you need to add some records to your zone. Click the little pencil-and-paper icon just to the left of your domain name.
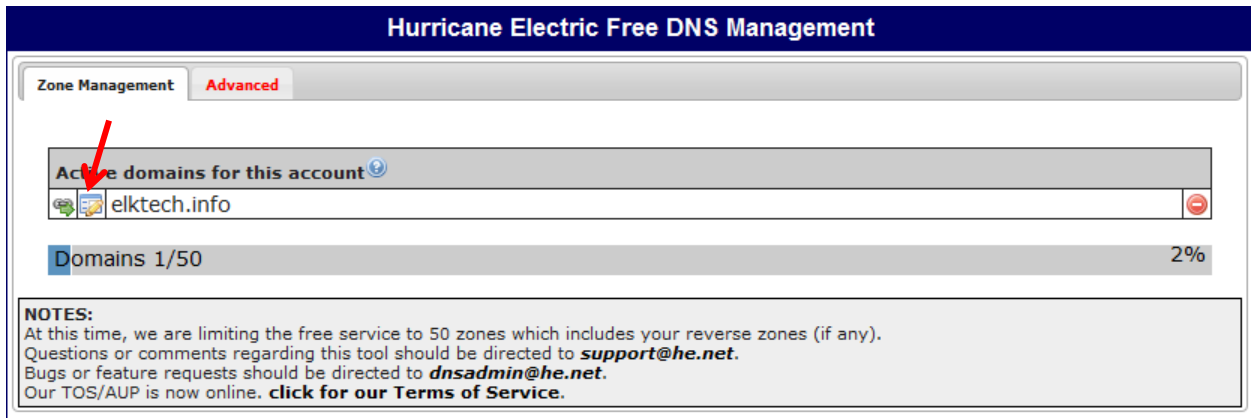


5. A page opens with a chart titled "Hurricane Electric Free DNS Management Managing zone:". Click the "**New AAAA**" tab. In the box that appears, enter a Name of **@** and an "IPv6 Address" of your interface's IPv6 address. Set the TTL to 30 minutes. Click the **Submit** button.
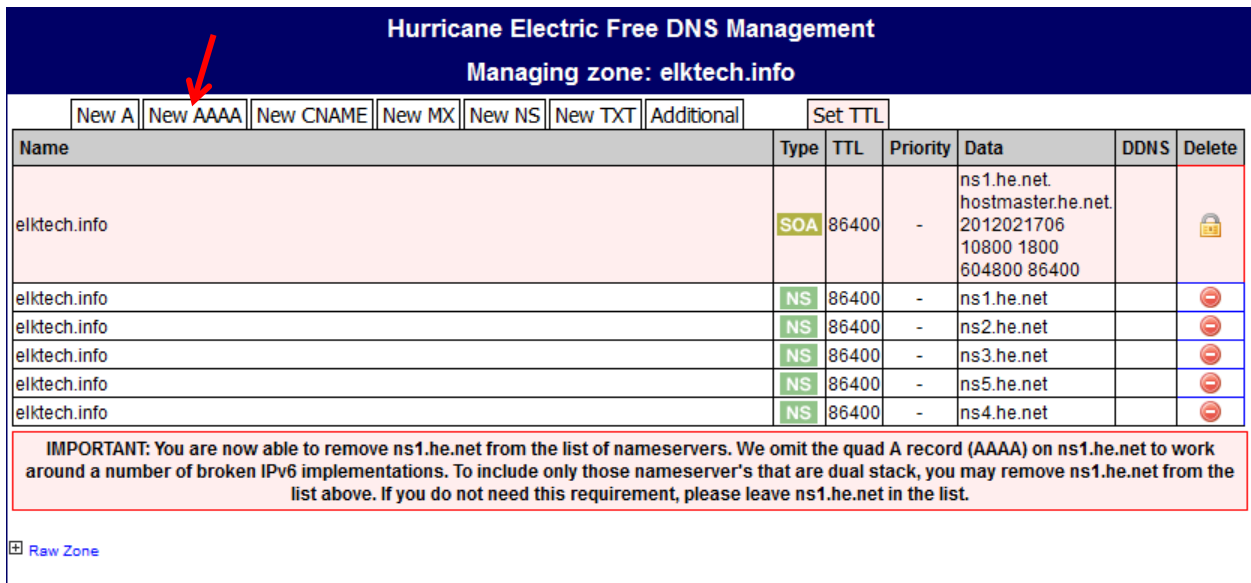


6. Click the "**New MX**" tab. In the box that appears, in the top field, enter **@**, in the "Priority" field, enter **10**, and in the "Hostname" field, enter your domain name. Set the TTL to 30 minutes. Click the **Submit** button.

# Configuring a Reverse DNS Zone at Hurricane Electric

7.  On the left side of the "Hurricane Electric Free DNS Management" page, click "**Return to main**".
8.  On the left, click "**Add a new reverse**" In the "Prefix" box, type your IPv6 Prefix. You will have to add :0000:0000:0000:0000 to the end of your prefix. Click the "**Add Prefix!** button.
    **2001:05c0:1113:1c00:0000:0000:0000:0000/56**  (First part will by your IPv6 prefix)



9.  The prefix now appears in the "Hurricane Electric Free DNS Management" page, as shown below. Click the little pencil-and-paper icon just to the left of your prefix.



10. A page opens with a chart titled "Hurricane Electric Free DNS Management Managing zone:". Enter a "Host Address" of **:1** Type your domain name into the "Hostname" field. Click the **Submit!** button.
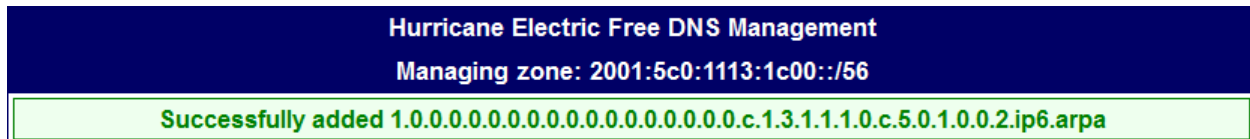
11. A message appears saying "Successfully added...". The reverse DNS record has a long name with your complete IPv6 address in it backwards.



## Changing your DNS Servers at GoDaddy

1. In Firefox, go to http://godaddy.com. On the top, log in.
2. On the top left side, hover the mouse over "**Domain**". Wait a second for more options to appear. On the right side, in the "Management" section, click "**Domain Management**". You should now be in the "**Domain Manager**".
3. Click on your domain name.
4. Click **Set Nameservers** in the middle of the page.
5. On the next page, change the first two nameservers to **NS1.HE.NET** and **NS2.HE.NET**, as shown below. Leave the others blank. Click the **OK** button. A message appears saying "Your changes have been submitted...". Click the **OK** button.



## Testing Your Reverse DNS Configuration at Hurricane Electric

1. In Firefox, go to http://ipv6.he.net/certification/ and log in.
2. In the **Professional** section, in the "Check if your mail server has working rDNS" line, click the **->** button.

3. If you get a red "Your MX does not appear to have working RDNS" message, as shown below on this page, it probably means that your DNS records have not yet propagated to the DNS server used by the test. You may have to wait a few hours. You can test your DNS to see when it updates, as explained below. Otherwise, skip to #9.

---

## Professional

Congratulations, you are an IPv6 Administrator! Tthe next step after geting your IPv6 Email working is to setup Reverse DNS for the mail server's IP. What you will need is:

- An IPv6 enabled mail system, with working RDNS.

**Your MX does not appear to have working RDNS**

| Step | Description | Data | |
|---|---|---|---|
| 1 | Check if your mail server has working rDNS | | -> |

## Testing Forward DNS Records

4. Open a Command Prompt window. Type in these commands:
   **nslookup**
   **set q=all**
   ***yourdomain.info* (**Replace *yourdomain.info* with your domain name)
5. When I tried it, the AAAA record was still pointing to an old address, as shown below. Wait until it changes to NS1.HE.NET

```
C:\Windows\system32>nslookup
Default Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

>set q=all
>elktech.info
Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

Non-Authoritative answer:
elktech.info        AAAA IPv6 address = 2001:5c0:1000:b::af0f
elktech.info        internet address = 97.74.42.79
elktech.info        MX preference = 10, mail exchanger = elktech.info
elktech.info
        primary name server = ns55.domaincontrol.com <----
        responsible mail addr = dns.jomax.net
        serial = 2012021301
        refresh = 28800 (8 hours)
        retry = 7200 (2 hours)
        expire = 604800 (7 days
        default TTL = 3600 (1 hour)
elktech.info        nameserver = ns55.domaincontrol.com
elktech.info        nameserver = ns56.comaincontrol.com
```

**Testing Reverse DNS Records**

6. In a Command Prompt window, if nslookup is still running, type EXIT and press the Enter key to stop it.
7. Type in these commands:
   **nslookup**
   *2001:05c0:1113:1c00::1* (Replace *2001:05c0:1113:1c00::1* with your IPv6 address)
8. If your reverse DNS is working correctly, you will see your domain name in the answer section, as shown below.

```
C:\Windows\system32>nslookup
Default Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

>2001:05c0:1113:1c00::1
Server: disco.gogo6.com
Address: 2001:5c0:1000:11::2

Name:   elktech.info
Address: 2001:05c0:1113:1c00::1

>
```

# Passing the Reverse DNS Test

9. When you pass the test, the "Professional Questionnaire" appears. Fill it out.
10. On the left, take the Professional Technical Test.
11. You should now be a Professional, with a badge like the one shown.

# Step 8: Passing the Guru Test

1. The Hurricane Electric Certification test now shows the Guru test, as shown below. These tests determine if your namesevers are properly using IPv6, which they obviously are, since you are using the Hurricane Electric nameservers. Just click the two "**Test It!**" buttons.

## Guru

Congratulations, you are an IPv6 Professional! To complete the Guru Test you will need:

- The Name Servers for elktech.info need to have a AAAA records
- Those nameservers need to respond to queries made via IPv6

[Reset Test]

| Help | Step | Description | Data |
|---|---|---|---|
| * | 1 | If you need to edit off any subdomains to make it work, please do so here: | elktech.info |
| * | 2 | Check to see that the nameservers associated with elktech.info have IPv6 AAAAs | Test It! |
| * | 3 | Check to see that the nameservers associated with elktech.info are IPv6 accessible | Test It! |

2. When you pass the tests, the "Guru Questionnaire" appears. Fill it out.
3. On the left, take the Guru Technical Test.
4. You should now be a Guru, with a badge like the one shown.

HE.NET
IPv6
Certified
Guru
elktech
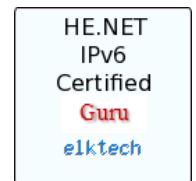
# Step 9: Passing the Sage Test

1. The Hurricane Electric Certification test now shows the Sage test. This determines if your domain name registrar put an IPv6 glue record on the root domain servers. GoDaddy does that for you.
2. Just click the two "**this link**" links.
3. Once they are successful, you will be take the Sage Technical test.
4. The final step is to click the "Update Info" link on the top left of the page and complete your T-shirt size and validate your address.

HE.NET
IPv6
Certified
Sage
elktech

## Step 10: Additional Tests

On the left menu there are five additional "Daily" tests you can take for bonus points. You can receive up to 5 bonus points toward your final grade.

**Daily Tests**
Submit an IPv6 Traceroute
Submit an IPv6 DIG AAAA
Submit an IPv6 DIG PTR
Submit an IPv6 Ping
Submit an IPv6 Whois

### Submit an IPv6 Traceroute

1. Open a Command Prompt window.
2. Traceroute to an IPv6 website like Google.
       **tracert -6 ipv6.google.com | clip**
   Clip is a built-in utility in Windows 7. Just pipe (**|**) it to the end of you command and it will automatically copy the results to the clipboard.
3. In Firefox, go to http://ipv6.he.net/certification/ and log in.
4. Click on "**Submit an IPv6 Traceroute**".
5. Right-click and paste the results of the traceroute into the window and click **Submit**.
6. Check you results, as shown below.

**IPv6 Traceroute Test**

Summary of user's traceroute
Number of reachable hops: 15

Testing Ping6: PING 2a00:1450:400b:c00::63(2a00:1450:400b:c00::63) 56 data bytes
64 bytes from 2a00:1450:400b:c00::63: icmp_seq=1 ttl=53 time=156 ms
64 bytes from 2a00:1450:400b:c00::63: icmp_seq=2 ttl=53 time=156 ms
64 bytes from 2a00:1450:400b:c00::63: icmp_seq=3 ttl=53 time=156 ms

--- 2a00:1450:400b:c00::63 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2011ms
rtt min/avg/max/mdev = 156.374/156.426/156.467/0.038 ms

Validating user's traceroute
Result: Pass ←

## Submit an IPv6 DIG AAAA

DIG (domain information groper) is a UNIX command used to examine DNS records. It is similar to the NSLOOKUP we have been using. DIG is not available on the Windows platform, however it can be added. Here's how:

1. Click here to download the file necessary to install dig on Windows 7. The file downloaded will be called dig-files3.zip.
2. Unzip the contents of dig-files3.zip to the root of your main drive which will typically be the C: drive. You can first create the directory which you should simply call "dig" so the new directory path will be "C:\dig" and then unpack all of the files from dig-files3.zip into C:\dig. The package includes cygwin1.dll, dig.exe, host.exe, libbind9.dll, libdns.dll, libeay32.dll, libisc.dll, libisccfg.dll, liblwres.dll, msvcr70.dll, resolv.conf, sha1sum.exe, and whois.exe.
3. Copy the msvcr70.dll to "%systemroot%\system32\" which typically is the "C:\WINDOWS\system32\" directory. If the file already exists you do not need to copy it from the dig folder to the system32 folder.
4. Copy the resolv.conf file located in "C:\dig" to "%systemroot%\system32\drivers\etc" which is typically the same as "C:\WINDOWS\system32\drivers\etc".
5. Open a new Command Prompt window and test dig on your Windows 7 computer. If you simply type "dig.exe" to see if it is working you should get output similar to the one below.

```
C:dig>dig.exe

; <<>> DiG 9.3.2 <<>>
;; global options:  printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 875
;; flags: qr rd ra; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: (

;; QUESTION SECTION:
;.                              IN      NS

;; ANSWER SECTION:
.                       515760  IN      NS      f.root-servers.net.
.                       515760  IN      NS      i.root-servers.net.
.                       515760  IN      NS      c.root-servers.net.
.                       515760  IN      NS      m.root-servers.net.
.                       515760  IN      NS      e.root-servers.net.
.                       515760  IN      NS      d.root-servers.net.
.                       515760  IN      NS      b.root-servers.net.
.                       515760  IN      NS      k.root-servers.net.
.                       515760  IN      NS      l.root-servers.net.
.                       515760  IN      NS      g.root-servers.net.
.                       515760  IN      NS      h.root-servers.net.
.                       515760  IN      NS      j.root-servers.net.
.                       515760  IN      NS      a.root-servers.net.

;; Query time: 25 msec
;; SERVER: 192.168.1.1#53(192.168.1.1)
;; WHEN: Tue Dec 28 12:39:46 2010
;; MSG SIZE  rcvd: 228

C:dig>
```

6. To make the use of dig convenient you should now add "C:\dig" to the primary users path which can be done by first right-clicking "Computer" and selecting "Properties".
7. Click on "Advanced System Settings" and then on the "Environmental Variable" button at the bottom.
8. In the bottom section, scroll down and select "**Path**" and then click "Edit".
9. Add "**;C:\dig**" to the end of the Variable Value field. Click the OK button to save the settings and then close all other open configuration windows including the Windows 7 Control Panel.
10. Open a new Command Prompt window you should be able to type "dig" and receive the output noted in step five.

11. From the Command Prompt, DIG to Google's IPv6 website saving it to the clipboard.
   **dig *2001:05c0:1113:1c00::1* AAAA | clip** (Replace *2001:05c0:1113:1c00::1* with your IPv6 address)

```
C:\Windows\system32>dig ipv6.google.com AAAA
; <<>> DiG 9.3.2 <<>> ipv6.google.com AAAA
;; global options:  printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 1648
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;ipv6.google.com.              IN    AAAA

;; ANSWER SECTION:
ipv6.google.com.5     IN    CNAME ipv6.l.google.com.
ipv6.l.google.com.    5     IN    AAAA  2001:4860:4002:802::1014

;; Query time: 0 msec
;; SERVER: 192.168.1.2#53(192.168.1.2)
;; WHEN: Tue Feb 21 14:00:08 2012
;; MSG SIZE  rcvd: 82
```

12. In Firefox, go to http://ipv6.he.net/certification/ and log in.
13. Click on "**Submit an IPv6 DIG AAAA**".
14. Right-click and paste the results of the DIG into the window and click **Submit**.
15. Check you results, as shown below.

**IPv6 Dig Test**

Summary of user's dig query
Host name: ipv6.l.google.com
AAAA Record:2001:4860:4001:801::1013
Status: NOERROR
Result: Pass ←

## Submit an IPv6 DIG PTR

1. From the Command Prompt, do a reverse lookup to your website saving it to the clipboard.
   **dig –x *2001:05c0:1113:1c00::1* | clip** (Replace *2001:05c0:1113:1c00::1* with your IPv6 address)

```
C:\Windows\system32>dig -x 2001:05c0:1113:1c00::1
; <<>> DiG 9.3.2 <<>> -x 2001:05c0:1113:1c00::1
;; global options:  printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 1765
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.c.1.3.1.1.1.0.c.5.0.1.0.0.2.ip6.
arpa. IN PTR

;; ANSWER SECTION:
1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.c.1.3.1.1.1.0.c.5.0.1.0.0.2.ip6.a
rpa. 5 IN PTR elktech.info.

;; Query time: 0 msec
;; SERVER: 192.168.1.2#53(192.168.1.2)
;; WHEN: Tue Feb 21 14:50:23 2012
;; MSG SIZE  rcvd: 116
```

2. In Firefox, go to http://ipv6.he.net/certification/ and log in.
3. Click on "**Submit an IPv6 DIG PTR**".
4. Right-click and paste the results of the DIG into the window and click **Submit**.
5. Check you results, as shown below.

**IPv6 Dig Test**

Summary of user's dig query
IPv6 Address: 2001:05c0:1113:1c00::1
Status: NOERROR
Reverse ip6.arpa:
1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.c.1.3.1.1.1.0.c.5.0.1.0.0.2.ip6.arpa.

Validating user's dig query
Result: Pass ←

## Submit an IPv6 Ping

1. From the Command Prompt, Ping to your website saving it to the clipboard.
   **Ping -6 *2001:05c0:1113:1c00::1* | clip** (Replace *2001:05c0:1113:1c00::1* with your IPv6 address)

```
C:\Windows\system32>ping -6 2001:05c0:1113:1c00::1
Pinging 2001:5c0:1113:1c00::1 with 32 bytes of data:
Reply from 2001:5c0:1113:1c00::1: time<1ms
Reply from 2001:5c0:1113:1c00::1: time<1ms
Reply from 2001:5c0:1113:1c00::1: time<1ms
Reply from 2001:5c0:1113:1c00::1: time<1ms

Ping statistics for 2001:5c0:1113:1c00::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

2. In Firefox, go to http://ipv6.he.net/certification/ and log in.
3. Click on "**Submit an IPv6 Ping**".
4. Right-click and paste the results of the DIG into the window and click **Submit**.
5. Check you results, as shown below.

**IPv6 Ping Test**

Summary of user's ping output
IPv6 Address: 2001:5c0:1113:1c00::1

Validating user's ping output

Result: Pass ←

# Hurricane Electric IPv6 Certification

## Submit an IPv6 Whois

1. From the Command Prompt, Ping to your website saving it to the clipboard.
   **whois *2001:05c0:1113:1c00::1* | clip** (Replace *2001:05c0:1113:1c00::1* with your IPv6 address)

```
C:\Windows\system32>whois 2001:05c0:1113:1c00::1
#
# The following results may also be obtained via:
#
http://whois.arin.net/rest/nets;q=2001:05c0:1113:1c00::1?showDetails=
true&showARIN=false&ext=netref2
#

NetRange:        2001:5C0:: - 2001:5C0:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF
CIDR:            2001:5C0::/32
OriginAS:        AS12989, AS6453, AS33018
NetName:         GOGO6-V6-NET1
NetHandle:       NET6-2001-5C0-1
Parent:          NET6-2001-400-0
NetType:         Direct Allocation
Comment:         NS1.GOGO6.COM
Comment:         NS2.GOGO6.COM
RegDate:         2003-03-12
Updated:         2011-02-07
Ref:             http://whois.arin.net/rest/net/NET6-2001-5C0-1
<Output omit>
```

2. In Firefox, go to http://ipv6.he.net/certification/ and log in.
3. Click on "**Submit an IPv6 Whois**".
4. Right-click and paste the results of the DIG into the window and click **Submit**.
5. Check you results, as shown below.

**IPv6 Whois Test**

Summary of user's whois query
CIDR: 2001:5C0::/32

Validating user's whois query

Result: Pass ⬅

# Hurricane Electric IPv6 Certification

## Step 11: Viewing Your Score and Receiving Your Grade

1. On the top left, click the "**Click for main page**" button. Your badge now shows that you are a Sage--Congratulations!
2. Click your badge to show your score, as shown below.

**IPv6 Certification Scorecard**

| Username: elktech | Current Score: **1,005** | HE.NET IPv6 Certified **Sage** elktech |

⊞ **Newbie Test** ; Score: 5 / 5

⊞ **Enthusiast Test** ; Score: 1 / 1

⊞ **Administrator Test** ; Score: 1 / 1

⊞ **Professional Test** ; Score: 1 / 1

⊞ **Guru Test** ; Score: 1 / 1

⊞ **Enthusiast Questionnaire** ; Score: 5 / 5

⊞ **Administrator Questionnaire** ; Score: 4 / 4

⊞ **Professional Questionnaire** ; Score: 4 / 4

⊞ **Guru Questionnaire** ; Score: 4 / 4

⊞ **Enthusiast Technical Test** ; Score: 6 / 6

⊞ **Administrator Technical Test** ; Score: 11 / 11

⊞ **Professional Technical Test** ; Score: 22 / 22

⊞ **Guru Technical Test** ; Score: 20 / 20

⊞ **Explorer Test** ; Score: 1 / 1

⊞ **Sage Test** ; Score: 1 / 1

⊞ **Daily Traceroute** ; Score: 1 / 100

⊞ **Daily Dig (AAAA)** ; Score: 1 / 100

⊞ **Daily Whois** ; Score: 1 / 100

⊞ **Daily Dig (PTR)** ; Score: 1 / 100

⊞ **Daily Ping6** ; Score: 1 / 100

⊞ **Sage Technical Test** ; Score: 9 / 9

⊞ **Validate address and T-shirt request** ; Score: 1 / 1

3. Take your current score and divide by 10 to get your grade (i.e. 1000 / 10 = 100)
4. You can receive up to 5 bonus points.
5. Print a copy of your Scorecard and turn it in to your instructor.
6. Print a copy of your certificate.
7. From Firefox go to **test-ipv6.com/** and see how you do.