

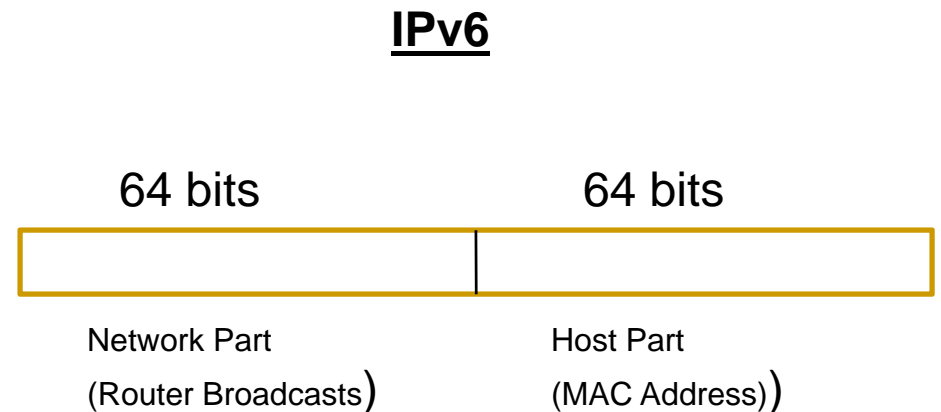
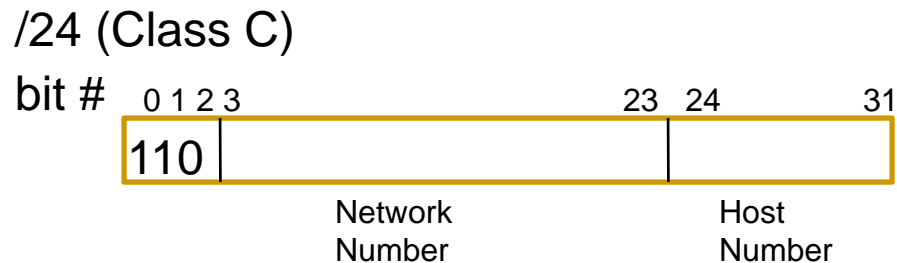
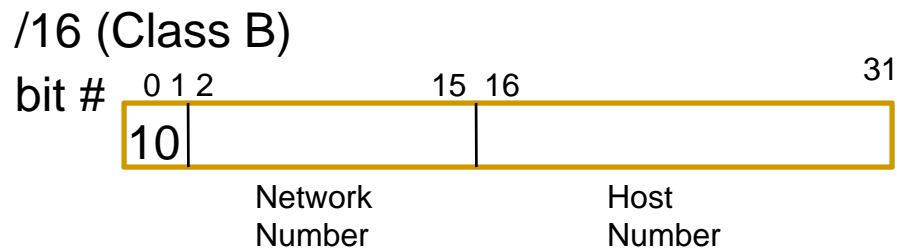
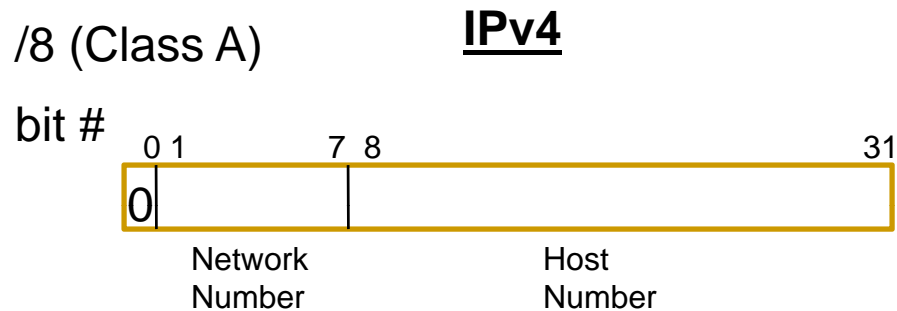
Leading the way to the future of the Internet via IPv6

SuperHappyDevHouse 30 – 01/31/2009

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Understanding IPv6



(Not using manual configuration or DHCPv6)



Understanding IPv6

A significant difference in IPv6:

IPv4: 4 blocks of 8 bits separated by a '.' (Ex: 216.218.186.2)

IPv6: 8 blocks of 16 bits separated by a ':' (Ex: 2001:470:0:76::2)

or

(2001:0470:0000:0076:0000:0000:0000:0002)

(Notice that leading zeros are removed and that '::' can be used only once to represent consecutive zero's)



Understanding IPv6

IPv6 availability depends on your Service Provider, either at home or for work. In a dual-stack environment, IPv4 and IPv6 co-exist along the same connection and don't require any special kind of connection. If dual-stack is not available, you might find yourself using an IP tunneling product or service to bring IPv6 connectivity to you.

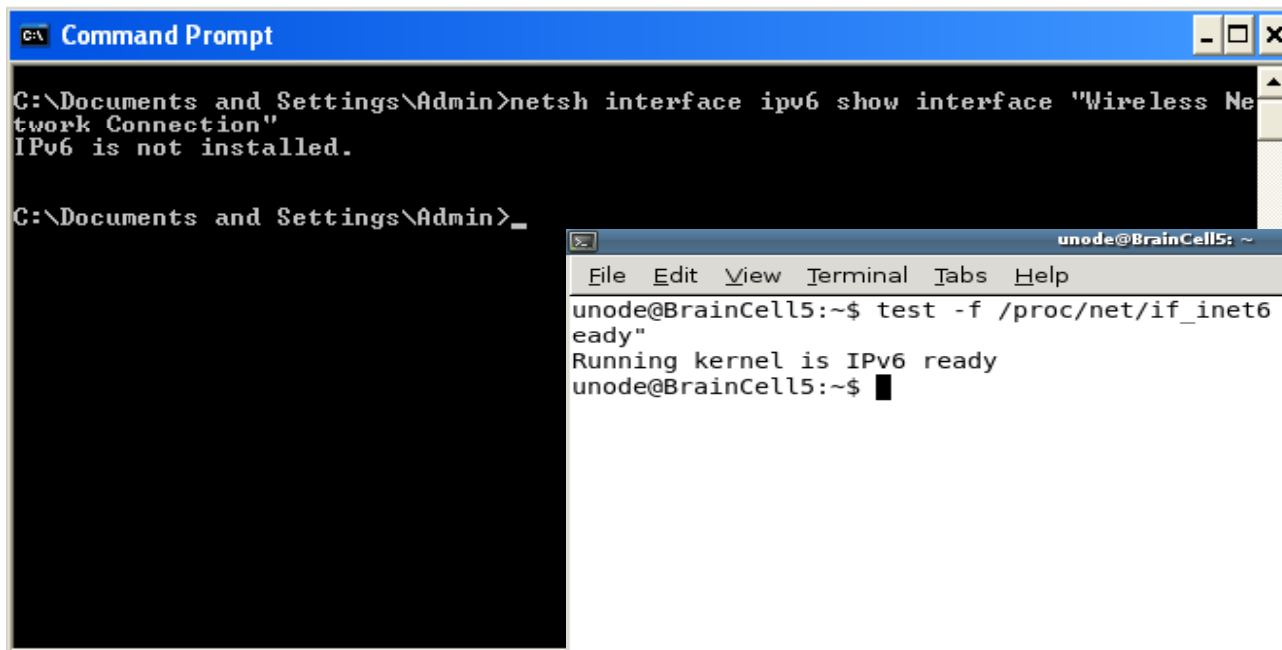
Many Operating System platforms have native IPv6 support:

- Linux, BSD (Free, Open, Net) & MacOSX have had IPv6 support enabled for years
- Windows 2000/2003/XP – had to have it installed optionally
- Vista and Windows 2008 – have native IPv6 support enabled by default



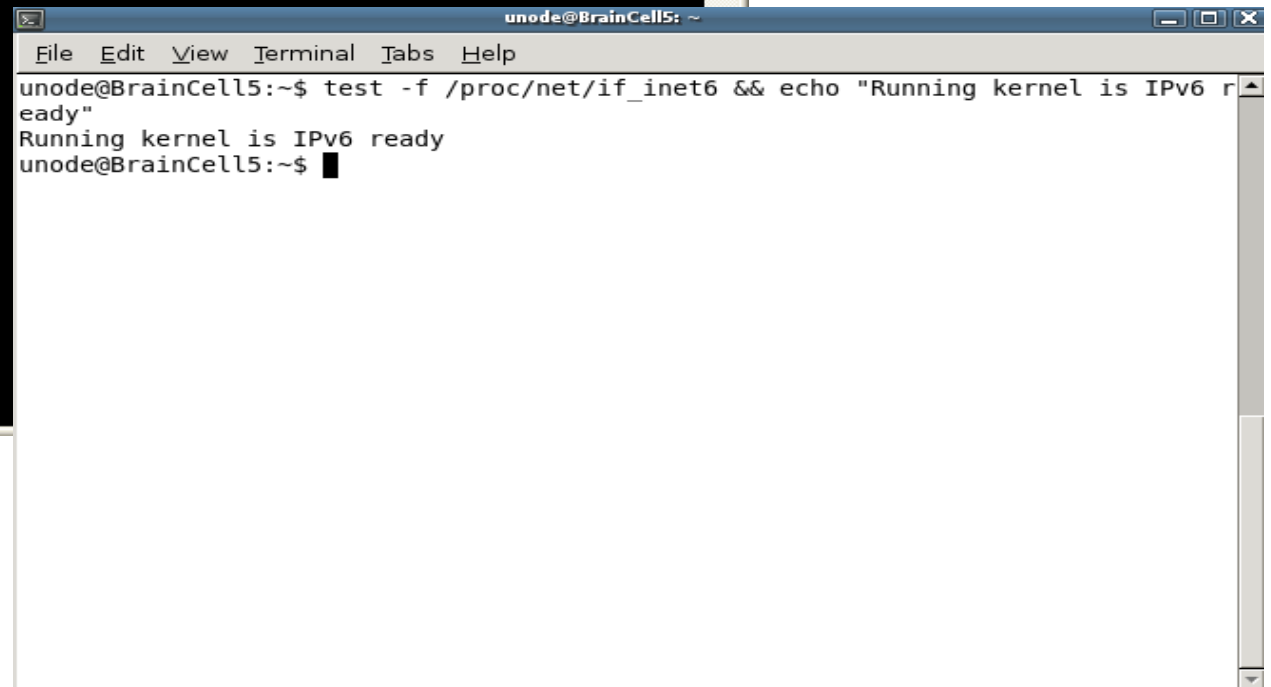
Checking for IPv6 support

Windows XP (SP3)



```
C:\Documents and Settings\Admin>netsh interface ipv6 show interface "Wireless Network Connection"  
IPv6 is not installed.  
  
C:\Documents and Settings\Admin>
```

Linux (Ubuntu 8.10)

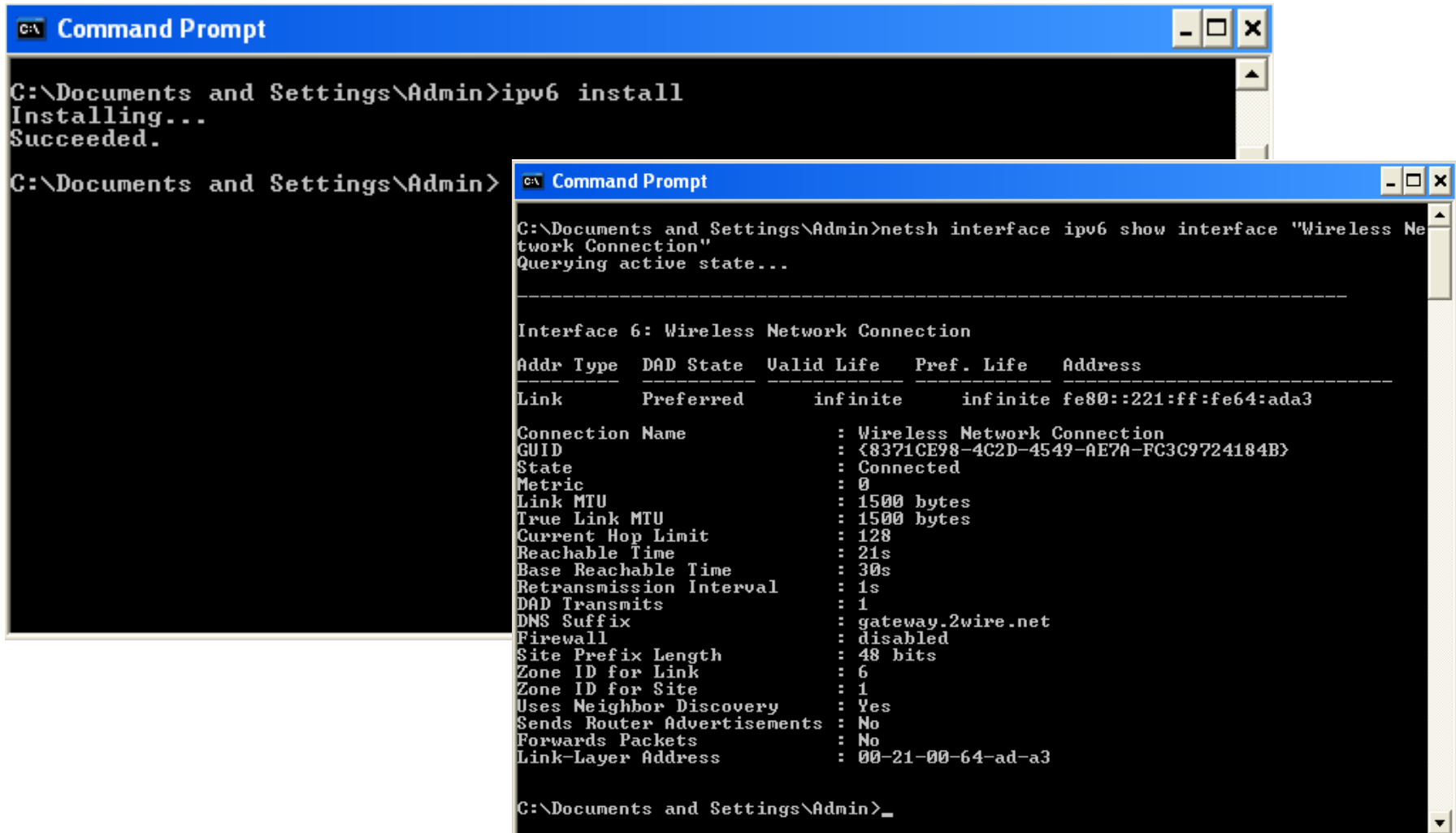


```
unode@BrainCell5: ~  
File Edit View Terminal Tabs Help  
unode@BrainCell5:~$ test -f /proc/net/if_inet6 && echo "Running kernel is IPv6 ready"  
Running kernel is IPv6 ready  
unode@BrainCell5:~$
```

(Must use Windows XP SP3 for most recent IPv6 tools such as 'netsh')



Installing IPv6 (Windows XP Example)



The image shows two overlapping Windows XP Command Prompt windows. The top window shows the successful installation of IPv6. The bottom window shows the configuration details for the 'Wireless Network Connection' interface.

```
C:\> Command Prompt

C:\Documents and Settings\Admin>ipv6 install
Installing...
Succeeded.

C:\Documents and Settings\Admin>
```

```
C:\> Command Prompt

C:\Documents and Settings\Admin>netsh interface ipv6 show interface "Wireless Network Connection"
Querying active state...

-----
Interface 6: Wireless Network Connection
Addr Type  DAD State  Valid Life  Pref. Life  Address
-----
Link       Preferred  infinite   infinite   fe80::221:ff:fe64:ada3

Connection Name      : Wireless Network Connection
GUID                 : {8371CE98-4C2D-4549-AE7A-FC3C9724184B}
State                : Connected
Metric               : 0
Link MTU              : 1500 bytes
True Link MTU        : 1500 bytes
Current Hop Limit     : 128
Reachable Time        : 21s
Base Reachable Time   : 30s
Retransmission Interval : 1s
DAD Transmits         : 1
DNS Suffix            : gateway.2wire.net
Firewall              : disabled
Site Prefix Length    : 48 bits
Zone ID for Link      : 6
Zone ID for Site      : 1
Uses Neighbor Discovery : Yes
Sends Router Advertisements : No
Forwards Packets      : No
Link-Layer Address    : 00-21-00-64-ad-a3

C:\Documents and Settings\Admin>
```



Hurricane Electric's IPv6 Certification

- Prove that you have basic IPv6 knowledge
- Prove that you have IPv6 connectivity and a IPv6 web server
- Prove that you have a working IPv6 email address
- Prove that you have working reverse IPv6 DNS
- Prove that you have name servers with IPv6 addresses that can respond to queries via IPv6

Newbie

Enthusiast

Administrator

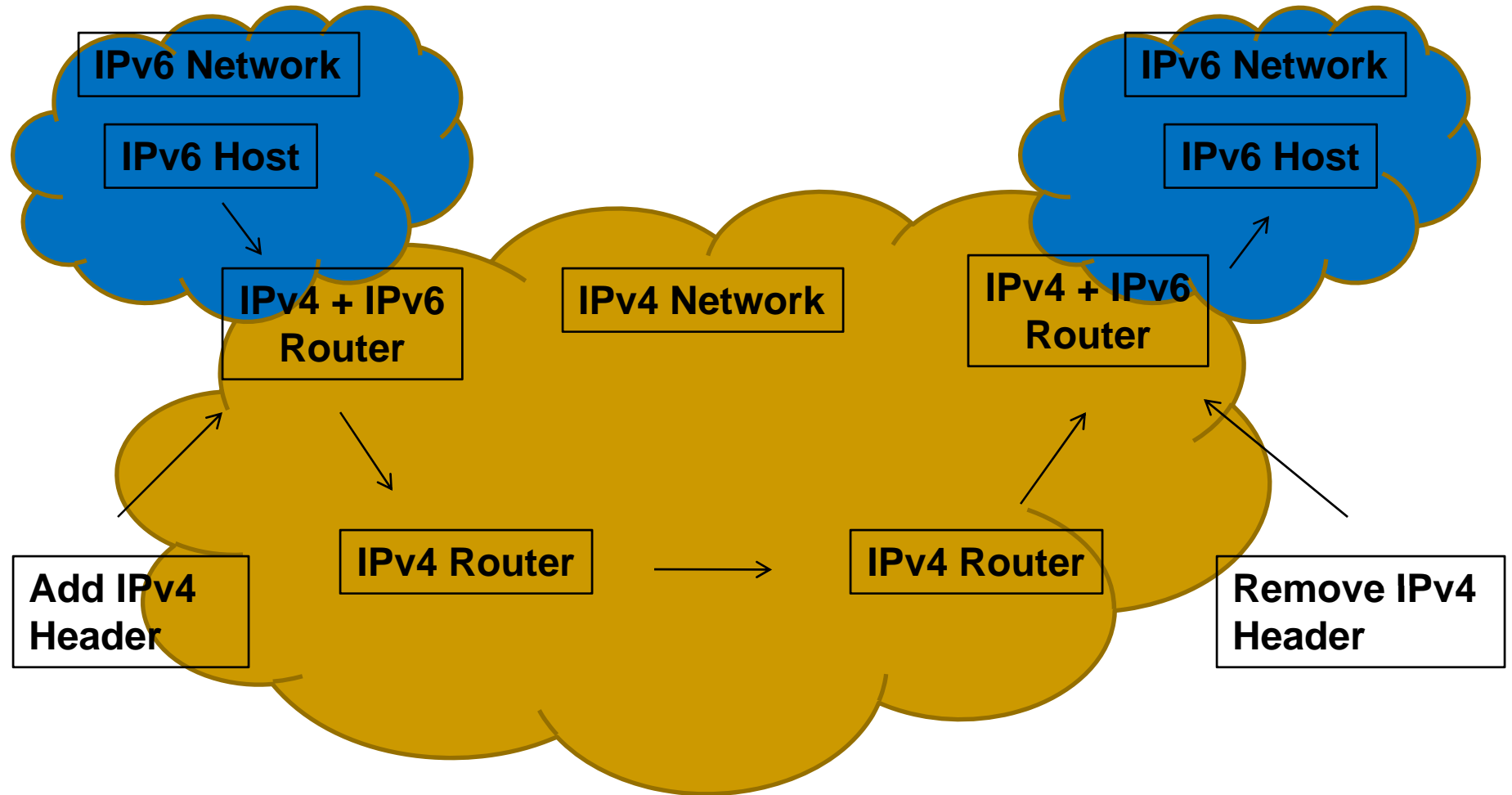
Professional

Guru



<http://ipv6.he.net/certification/>

TunnelBroker – Tunneling of IPv6 packets through an IPv4 Network



Hurricane Electric's IPv6 Tunnel Broker

Hurricane Electric's free tunnel broker service enables you to reach the IPv6 Internet by tunneling over existing IPv4 connections from your IPv6 enabled host or router to one of Hurricane Electric's IPv6 routers.

<http://tunnelbroker.net>

Tunnelbroker Login	Hurricane Electric Free IPv6 Tunnel Broker
<p>Username:</p> <input type="text"/>	<h2>IPv6 Tunnel Broker</h2> <p>Check out our new usage stats!</p> <p>And then hit up our new Forums!</p>
<p>Password:</p> <input type="password"/>	
<input type="button" value="Login"/> <input type="button" value="Register"/>	



Hurricane Electric's IPv6 Tunnel Broker

Account Menu

[Click For Main Page](#)
[Update Info](#)
[Logout](#)

User Functions

[Combine Tunnels](#)
[Create Regular Tunnel](#)
[Create BGP Tunnel](#)

HE IPv6 Tunnel Broker

Name: Humair Ahmed
UserID: dd98afe2b13e930cb0c8e48891c14b3e

HE.NET
IPv6
Certified
Explorer
gopher

Tunnel [0 / 4]

Routed /64

Routed /48

Tunnel Broker News:

+ UPDATE - Jan. 9th, 2009 - By broquea

+ UPDATE - Dec. 4th, 2008 - By broquea

+ UPDATE - September 19th, 2008 - By broquea

+ IPv6 Certification Program - By broquea

+ Re: Website Maintenance - By broquea



Hurricane Electric's IPv6 Tunnel Broker

Account Menu	Setup Regular IPv6 Tunnel
Click For Main Page Update Info Logout	<p>You currently have 0 of 4 allowed tunnels configured.</p> <hr/> <ul style="list-style-type: none">• If you are trying to reclaim a tunnel simply enter your last IPv4 address here. If you have any issues please email ipv6@he.net.• If You have an official ASN and wish to setup a full BGP feed Please use This Form instead. <div><div>IPv4 endpoint (your side of the tunnel) (You are viewing from IP: 75.36.200.156):</div><input type="text"/></div> <div><div>Which Server Is Closest to you?:</div><ul style="list-style-type: none"><input type="radio"/> Fremont, CA USA [72.52.104.74]<input type="radio"/> New York, NY USA [209.51.161.14]<input type="radio"/> London, UK [216.66.80.26]<input type="radio"/> Dallas, TX USA [216.218.224.42]<input type="radio"/> Chicago, IL USA [209.51.181.2]<input type="radio"/> Paris, France [216.66.84.42]<input type="radio"/> Amsterdam, NL [216.66.84.46]<input type="radio"/> Miami, FL USA [209.51.161.58]<input type="radio"/> Ashburn, VA USA [216.66.22.2]<input type="radio"/> Seattle, WA USA [216.218.226.238]<input type="radio"/> Los Angeles, CA USA [66.220.18.42]<input type="radio"/> Hong Kong [216.218.221.6]<input type="radio"/> Toronto, ON Canada [216.66.38.58]</div> <div><input type="button" value="Submit"/></div>




Hurricane Electric's IPv6 Tunnel Broker

Account Menu	Setup Regular IPv6 Tunnel
Click For Main Page Update Info Logout	CREATE 2846 72.52.104.74 75.36.200.156 2001:470:1f04:b1e::1 2001:470:1f04:b1e::2 2001:470:1f05:b1e:: O.K.: Your tunnel has been allocated
User Functions Combine Tunnels Create Regular Tunnel Create BGP Tunnel	Your tunnel has been allocated and created. The endpoints and tunnel server information can be found under Tunnel Details . This page will also have examples to help you get the tunnel up and running on your system.




Hurricane Electric's IPv6 Tunnel Broker

Account Menu	Tunnel Details
Click For Main Page Update Info Logout	<div>Account: <i>gopher</i> Delete Tunnel</div> <div><div>Claim Code: No Code Available</div><div>Global Tunnel ID: 22030 Local Tunnel ID: 2846</div></div> <hr/> <div><div>Server IPv4 address: 72.52.104.74</div><div>Server IPv6 address: 2001:470:1f04:b1e::1/64</div><div>Client IPv4 address: 75.36.200.156</div><div>Client IPv6 address: 2001:470:1f04:b1e::2/64</div></div> <hr/> <div><div>Routed /48: Allocate</div><div>Routed /64: 2001:470:1f05:b1e::/64</div><div>RDNS Delegation NS1: none</div><div>RDNS Delegation NS2: none</div><div>RDNS Delegation NS3: none</div></div> <hr/> <div><div>ASN: none</div><div>Registration Date: Thu, Jan 22, 2009</div></div> <hr/> <div>Example OS Configurations (Windows, Linux, etc.): <div>Linux-net-tools Show Config </div></div> <div><p>The configurations provided are only example configurations and may be different depending on the version OS or tools you are using. If you have any issues getting your tunnel to work please contact us at ipv6@he.net and we will be happy to assist you.</p></div>



Hurricane Electric's IPv6 Tunnel Broker

Account Menu	Tunnel Details
Click For Main Page Update Info Logout	Account: <i>gopher</i> Delete Tunnel
	Claim Code: No Code Available
	Global Tunnel ID: 22030 Local Tunnel ID: 2846
	<hr/>
	Server IPv4 address: 72.52.104.74
	Server IPv6 address: 2001:470:1f04:b1e::1/64
	Client IPv4 address: 75.36.200.156
	Client IPv6 address: 2001:470:1f04:b1e::2/64
	<hr/>
	Routed /48: Allocate
	Routed /64: 2001:470:1f05:b1e::/64
	RDNS Delegation NS1: none
	RDNS Delegation NS2: none
	RDNS Delegation NS3: none
	<hr/>
	ASN: none
	Registration Date: Thu, Jan 22, 2009
	<hr/>
	Example OS Configurations (Windows, Linux, etc.):
	Vista/2008 Show Config 
	Copy and Paste the following into a command windows:
	<pre>netsh interface ipv6 add v6v4tunnel IP6Tunnel 75.36.200.156 72.52.104.74 netsh interface ipv6 add address IP6Tunnel 2001:470:1f04:b1e::2 netsh interface ipv6 add route ::0 IP6Tunnel 2001:470:1f04:b1e::1</pre>

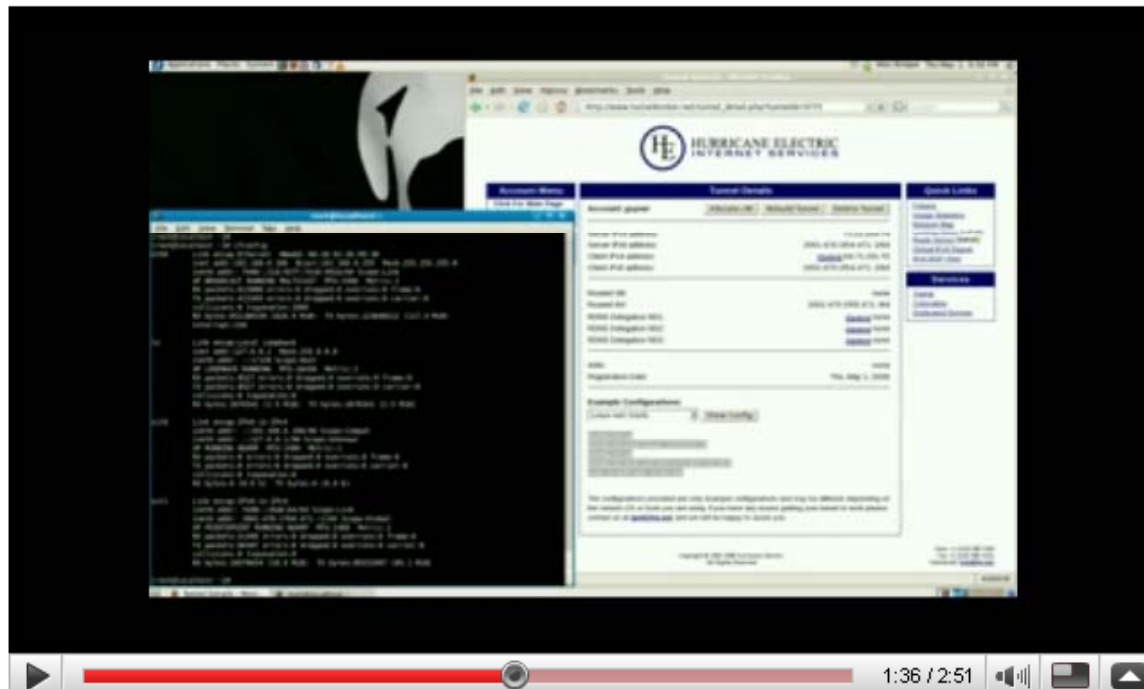


Hurricane Electric's IPv6 Tunnel Broker

Alex Broque – Hurricane Electric Network Engineer and co-developer of the Tunnelbroker provides a tutorial via YouTube video.
(TunnelBroker software has since been updated)

<http://www.youtube.com/watch?v=4o7sk97mltM>

Tunnelbroker.net - Setting up an IPv6 tunnel



Q&A



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<http://he.net/>
hahmed@he.net

Copy of slides available at:
[http://superhappydevhouse.org/f/SHDH30_Hurricane_Electric_IPv6_Presentation_\(Full\).pdf](http://superhappydevhouse.org/f/SHDH30_Hurricane_Electric_IPv6_Presentation_(Full).pdf)

For all questions regarding IPv6 Certification or
the **HE TunnelBroker** contact IPv6@he.net

