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Why you want IPv6

1.0.3, en, xiando

You need IPv6. You just don't know it yet. Find out how to get it, how to benefit from it and how it will increase your shareholder value.

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1. What is IPv6, and why would I care?

Internet is built upon a protocol suite called TCP/IP. This abbreviation stands for [transmission control protocol](#), and [Internet protocol](#).

When your computer communicates with the Internet a unique IP address is used to transfer and receive information. Yesterdays IP standard is called IPv4. Sadly most ISPs and services still only deliver this ancient technology standardized in September 1981. What you will want after reading on is IPv6, also referred to as IP Next Generation (IPNG).

1.1. Background: The IP shortage

IP version 4 defines a 32-bit address. This means there are 2^{32} (4,294,967,296) unique IPv4 addresses

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available. This may should like a big number. It is not, most of them are already tied up and the internet is simply running out of IPs. The address shortage problem is aggravated by the fact that portions of the IP address space have not been efficiently allocated.

The wall: Network Address Translation

A cheap trick called NAT (wikipedia.org), or Network Address Translation (Speak Freely), was widely implemented to temporary sholve the IP address shortage. A NAT firewall is placed between the real Internet and local aera networks. NAT (say no) allows computers on the local network to connect with the outside world, but because the machines on the local network do not have their own Internet IPs they can not be accessed from the outside. This one-way system works, but it destroys the end to end transparency internet is based upon. Boxes on the real Internet become servers and the boxes behind all become clients.

NAT is very popular because it allows LAN administrators to be very sloppy with security because they can hide behind a central firewall instead of securing every box and service properly like they should. It forces consumers to be consumers like they should be in the eyes of evil cooperations and litigious bastards, because they are not allowed to run any services.

1.2. Some Very Huge numbers

Compare the numbers ..and realize why IPv6 is great

4,294,967,296 Total number of IPv4 IPs

18,446,744,073,709,551,616

Number of IPs in a IPv6 /64 prefix, the typical space a home user gets

IPv6 gives citizens the opportunity to become real Internet precipitants. Ipv4 makes citizens consumers who are only able to connect to compartmentalize networks run by companies or governments. This is why the establishment does not want Ipv6.

There is a total of 2^{128} , or 340,282,366,920,938,463,463,374,607,431,768,211,456 unique IPv6 adresses.

1.3. Who uses IPv6 today, how widespread is it?

The linuxreviews project had 642074 unique visitors using IPv4 and 555 using IPv6 in June 2004.

According to these numbers less than a percent (0.086%) of the Internet browsers are IPv6 ready.

Truly hardcore 1337 Nerds are the only ones who use Ipv6 today.

2. Understanding IPv6 addresses

IPv6 IPs have 8 notations of 4 hex numbers (0-f). May look like

2001:0DB8:400:965a:0000:0000:0000:0001 and 2001:0DB8:400:965a:::1 (the same

address).

:: is used to short down IP addresses. :: means that the space in between is filled by zeros and can only be used once in an address.

```
2001:0DB8:400:965a:: is short for
2001:0DB8:400:965a:0000:0000:0000:0000
```

```
2001:0DB8:400:965a:0042::1 is short for
2001:0DB8:400:965a:0042:0000:0000:0001
```

You can strip leading zeros, 2001:0DB8:400:965a:0042::1 becomes 2001:DB8:400:965a:42::1.

2.1. Know your prefix

Prefix	Number of IPv6 IPs	Space
127	2	none
120	256	xx
64	18,446,744,073,709,551,616	xxxx:xxxx:xxxx:xxxx
48	1,208,925,819,614,629,174,706,176	xxxx:xxxx:xxxx:xxxx:xxxx
32	79,228,162,514,264,337,593,543,950,336	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx

Allocation means the address space available for subnets and more IPs. If you have a /127 address you can only connect one box to the IPv6 interface, with a /48 you can connect "all the devices in the world" using the allocation.

If your prefix is 2001:0DB8:0400::/48 then you are assigned all space beginning with 2001:0DB8:0400. You can use the space 2001:0DB8:0400:xxxx:xxxx:xxxx:xxxx:xxxx.

To organize yourself 2001:0DB8:0400::/48 can be divided into the subnets

- 2001:0DB8:0400:000e::/64
- 2001:0DB8:0400:000f::/64

3. Subnet Matrix Table

```
2001:0DB8:0400:000e:0000:0000:0000:402b
  ||| ||| ||| ||| ||| ||| ||| ||| |||
  ||| ||| ||| ||| ||| ||| ||| ||| ||| 128
  ||| ||| ||| ||| ||| ||| ||| ||| ||| 124
  ||| ||| ||| ||| ||| ||| ||| ||| ||| 120
  ||| ||| ||| ||| ||| ||| ||| ||| ||| 116
  ||| ||| ||| ||| ||| ||| ||| ||| ||| 112
  ||| ||| ||| ||| ||| ||| ||| ||| ||| 108
  ||| ||| ||| ||| ||| ||| ||| ||| ||| 104
  ||| ||| ||| ||| ||| ||| ||| ||| ||| 100
```

```
||| 96
||| 92
||| 88
||| 84
||| 80
||| 76
||| 72
||| 68
||| 64
||| 60
||| 56
||| 52
||| 48
||| 44
||| 40
||| 36
||| 32
||| 28
||| 24
```

4. Get IPv6 NOW: Free IPv4 to IPv6 tunnel brookers

You must setup a tunnel if you ISP does not provide native Ipv6. You can use sixxs and their heartbeat client if you have a dynamic IP, static IP is (as always) preferable.

You should ping all the tunnelbrookers POPs (points of presence) to determine the one closest to you.

- :-D SixXS – Six Access
 - ◆ Major operation with Points of Presence in Estonia, Finland, Germany, Ireland, Italy, Netherlands, Portugal and United Kingdom.
 - ◆ Known to be a very stable service.
 - ◆ Reverse DNS works
 - ◆ Uses a "credit" system. Uptime is rewarded with credits. The credits can be used to "buy" subnets and other goodies.
 - ◆ Very simple setup: 10 Easy steps to IPv6 (sixxs.net)
 - ◆ Optionally, use the 6bone Handle Creator to get a 6bone handle required by sixxs.
- :-) BTexact IPv6 Tunnel Broker Service /48
 - ◆ Located in United Kingdom (only POP)
 - ◆ HOWTO: use the BTexact Tunnel Broker and get connected to the IPv6 Internet
 - ◆ Gives you a /48 prefix
 - ◆ Reverse DNS works
- :-) freenet6.net /48
 - ◆ US Operation with a nice client for dynamic IPs
 - ◆ Too slow to be usable from Europe
- The XS26 Project
- singnet.com.sg /127
- www.uk6x.com
- Unix-Servers.de IPv6 Team recommended at hs247
- ipv6-net.ge (You must understand German)
- AS8758 IPv6 Tunnel Broker (IRC blocked)
- IPv6 Australia
- Malaysia Advanced Network Integrated System IPv6 Tunnel Broker 30 days only (you can

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- re-register)
- [IPv6 Dynamic Tunneling Portugal](#)
- [consulintel euro6ix](#) down (unknown)
- [Unixcore Infrastructure](#) **DOWN FOREVER** :-& (will never come back)

thnx 2 tydel6, #ipv6, efnet

Check [ipvtb: an implementation of the IPv6 Tunnel Broker](#) for BSD software if you already have IPv6 and want to become a broker yourself.

4.1. The Standard way of setting up a IPv6 tunnell

First, make sure your firewall (if any) is not blocking **protocol 41**! Yes. `` protocol 41``, *not port 41*.

Netfilter:

```
ipchains -I input -j ACCEPT --proto 41
```

Iptables:

```
iptables -A INPUT -j ACCEPT -p 41
```

Example for a tunnel through <http://tunnel-broker.singnet.com.sg/>

```
ip tunnel add singnet mode sit remote 165.21.10.19 ttl 255
ip link set singnet up
ip -6 addr add 2001:0DB8:ffff:5b::cf/127 dev singnet
ip -6 route add 2001:0DB8:ffff:5b::ce/127 dev singnet
ip -6 addr add 2001:0DB8:ffff:5b::ce/127 dev eth1
```

And if you ever want to remove it:

```
iptunnel show
iptunnel del singnet
ip -6 addr del 2001:0DB8:ffff:5b::cf/127 dev singnet
ip -6 addr del 2001:0DB8:ffff:5b::ce/127 dev eth1
ip -6 route del default dev singnet
```

NOTE: default is ignored when `ipv6_forwarding = enabled` on Linux Kernel version < 2.4.21. **You must use** `2000::/3` instead of default when **forwarding is enabled** on a < 2.4.21 Linux Kernel. Many RedHat boxes "out there" use older kernels where you must use `2000::/3`.

When IPv6 is up and running on your router you should use [radvd](#), Linux IPv6 Router Advertisement Daemon, to automatically add and configure your LAN network.

5. How and why Ipv6 can make your life more glamorous, your job easier to do and significantly increase your shareholder value

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Having a truckload of IPs makes a lot of things much simpler. You can give each service running a IP of its own. More importantly, each device connected gets a unique IP.

You can use `radvd` and other tools to advertise IPv6 routes so they are configured automatically.

Generally IPv6 is smooth because you can use programs like gnomemeeting without worrying about NAT if you do not have a real IPv4 adress.

Totally Unimportant

Roomers say there is a significant amount of publicly open IPv6-only ftp and websites with content generally unavailable or hard to get on the old net. Using such services, if they do exist, may or may not be illegal. Such locations should never be exposed to the open, only shared with trusted friends. These sites usually only have one folder like /incoming or /upload where everyone can read and write as they please.

5.1. Radio stations

There is no real reason to use IPv6 for your radio unless you have native IPv6, Most IPv6 streams are relayed from IPv4, and the original ipv4 stream is usually a better choice.

- icecast.version6.net
- [ICECAST2 over IPv6 Live transmited radio stations \(poznan.pl\)](#)
 - ◆ [NRK mPETRE](#)
 - ◆ [radio192](#)
- [Experimental IPv6 relay for MP3 audio streams](#)

5.2. Free open newsservers

Free alt.binaries.* is one of the great IPv6 attractions.

newszilla6.xs4all.nl	Xs4all	17.0 Terabyte
news.ipv6.scarlet-internet.nl	Scarlet	4.0 Terabyte
news.ipv6.estpak.ee	Elion	

5.3. Visiting IPv4 sites through IPv6 – "Anonymous" web surfing

I was amazed to find that [SixXS](#) offers a [SixXS IPv6 to IPv4 Website Gateway](#) that is free and open to everyone. All you need to do is add `.sixxs.org` at the end of the website you want to surf anonymously.

<http://www.google.com.sixxs.org> <http://www.google.com> Google

<http://www.slashdot.org.sixxs.org> <http://www.slashdot.org> Slashdot

Please only use this service in order to be anonymous or to visit IPv4 only sites if you don't have IPv4 support — if they experience abuse they will probably close down this excellent service.

"The real (your) client IP is given in the X-Forwarded-For HTTP header just like normal gateways/proxies."

5.4. Internet Time Servers

- [Hexago's IPv6 only primary \(stratum 1\) ntp server](#)
- [Viagénie experimental IPv6 NTP primary stratum 1 server](#)

5.5. Internet Relay Chat

IPv6 is great for shell providers and BNC users because a single /64 prefix gives you a "unlimited" vhosts. Know that many irc servers k-line you for DNS Spam (`i.have.a.stupid.vhost.org`). Also know that some servers only allow one connection from each IP, and some servers limit the number of connections from a /64. If you have a /48 then you should divide 10–20 IPs on separate /64s, having 1000 shell users all using irc on the same /64s is a bad idea.

Check the separate list of [IPv6 supported irc servers](#).

5.6. Links to more IPv6 fun

- [version6.net](#)

6. The major responsibilities of using Ipv6

You must have a firewall and complete control of the services when you are in a Ipv6 environment. Every computer is a equal node on the Internet. Where the NAT firewall stops all unestablished connections from the outside Ipv6 welcomes it.

Many services, like xinetd, must have a configuration option enabled before they listen for ipv6 requests. But not all. As with Ipv4 you should have complete control of what you are running, and a firewall protecting you against script kiddies.

7. Links to pages with tools that may help you on your way

Is IPv6 working?

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- ipv6.aerasec.de
- mirrors.bieringer.de
- [Linux: IPv6](#)
- [KAME Project](#) (animated turtle when using IPv6)
- whatismyip.everdot.org

IPv6 Traceroute services

- [IPv6 traceroute from LavaNet](#)
- [Sixxs IPv4 and IPv6 Traceroute](#)
- [The Great Plains Network](#)
- [Traceroute from www.tumori.nu](http://www.tumori.nu)

8. Where And What you can read about IPv6

- [HS247 IPv6 News & Links](#). Has forums.
- [Official 6bone Webservice List](#)
- [Current Status of IPv6 Support for Networking Applications](#) (deepspace6.net)
- [Linux Mobile IPv6 HOWTO](#)
- [linuxdevcenter: Connecting Your Network to the IPv6 Internet with Linux](#)
- SUN: [IP Version 6 IPv6](#)
- [IPv6 TDOI Network](#)
- [Deep Space 6, the Linux IPv6 Portal](#) ([mirror](#))
 - ◆ [Configuring tunnels with iproute2](#)

Linux

- [Peter Bieringers IPv6 HOWTO](#)
- [Gentoo IPv6 Router Guide](#) (gentoo.org)
- [Debian GNU/Linux -- Debian IPv6 Project -- Setup Instructions](#)
- [Jims LAN IPv6 global connectivity howto](#) (debian)
- [Supporting IPv6 on a Linux Server Node](#) (linuxjournal)
- [Peter Bieringers Linux: IPv6 page](#)
- [The whole IPv6 BGP table](#)

BSD

- [OpenBSD IPv6 HOWTO: My 6bone router using OpenBSD](#)
- [KAME Project](#)

DNS

- [IPv6 Reverse DNS Zone Builder for BIND 8+ .ARPA/.INT revDNS](#)
- [IPv6 DNS Setup Information](#)

Chinese Linux Documentation Project

- [Linux IPv6 HOWTO](#)
- [Linux 2.4 Advanced Routing HOWTO](#)

9. Notes for Solaris users

Solaris uses the file `/etc/inet/ipnodes` for IPv6 hosts, the file `/etc/hosts` can not contain Ipv6 hosts on Solaris systems. A peculiar issue is that `/etc/inet/ipnodes` can be used for Ipv4 hosts too, but it can ONLY contain a Ipv4 host OR ipv6 a host for a given domain. This mean that you should place your Ipv6 hosts in `/etc/inet/ipnodes` and your Ipv4 hosts in `/etc/hosts` if you are using both Ipv4 and ipv6 on a Solaris system.

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