IPV4 TO IPV6 MIGRATION **Rick Wylie** CEO KeyOptions

MacSysAdmin 2011



4	.1. IPV6 Terminology
Deering &	IPv6 terminology relev
RFC 2460	Protocol [3], IPv6 Add Address Autoconfigurat
path M	address
Note:	host
interf	тр
arrivi	11
discar	
receiv	
former	
requir	interface
with n	link
3. IPv6	
+-+-+-	
Versi	
+_+_+_	
+-+-+-	
÷	link-laver identifi
+	IINX-IAYEI Identiii
Ť	
+_+_+_	link-local address
+	
+	
Ť	
+-+-+-	multicast address
Versio	
Traffi	
Flow L	neighbor

ant to this specification from the IPv6 ressing Architecture [5], and IPv6 Stateless ion [17] is included below. An IP layer identifier for an interface or a set of interfaces. Any node that is not a router. Internet Protocol Version 6 (IPv6). The terms IPv4 and IPv6 are used only in contexts where it is necessary to avoid ambiguity. A node's attachment to a link. A communication facility or medium over which nodes can communicate at the link layer, i.e., the layer immediately below IP. Examples are Ethernet (simple or bridged); Token Ring; PPP links, X.25, Frame Relay, or ATM networks; and Internet (or higher) layer "tunnels", such as tunnels over IPv4 or IPv6 itself. A link-layer identifier for an \mathbf{er} interface. Examples include IEEE 802 addresses for Ethernet or Token Ring network interfaces, and E.164 addresses for ISDN links. An IPv6 address having a link-only scope, indicated by having the prefix (FE80::/10), that can be used to reach neighboring nodes attached to the same link. Every interface has a link-local address. An identifier for a set of interfaces (typically belonging to different

nodes). A packet sent to a multicast address is delivered to all interfaces identified by that address.

A node attached to the same link.



IP - A BIT OF HISTORY





ARPANET hosts start using Network **Control Protocol** (NCP)

INWG is created with Vinton Cerf.

Telnet specification (RFC) 318) is published

Bob Metcalfe's Harvard Ph.D. thesis outlines the idea for specification (RFC 454) is

Minitel is deployed across France by France Telecom

1981

1976

Queen Elizabeth II sends an email

1983

The cutover from NCP to TCP/IP happens on January 1



..... and some fruit company releases a thing called a Mac. It'll never never catch on!

The number of hosts breaks 1,000

1984

An Internet worm burrows through the Net, affecting 10 percent of the 60,000 hosts on the Internet

1988

IETF start to think about successor to IPv4 -forecast IPv4 to last until about 2017!

1987

An email link is established between Germany and China using CSNET protocols. The thousandth RFC is published. The number of hosts breaks 10,000

1989

The number of hosts breaks 100,000. Clifford Stoll writes *Cuckoo's Egg*. The number of hosts breaks 1,000,000.

1992

990

1991

The World Wide Web (WWW) is developed by Tim Berners-Lee and released by CERN

1994

Internet shopping is introduced



RFC 1883 Draft IPv6 Specification is released. Domain names no longer free. The Vatican comes online

1995

Worldwide population reaches 254 million users

2000

RFC 3315 DHCPv6 **2003**

1998 RFC 2460 IPv6

made a standard

2003

Worldwide population reaches 580 million users Internet users reaches 1.08 BILLION Google registers a /32 IPV6 prefix Vint Cerf joins Google

2005

2004

RFC 3775 IPv6 Mobility Specification

2007

RFC 4942 IPv6 Security considerations



RFC 5722 Handling of overlapping IPv6 fragments

IANA central registry depleted

2009

OI FEB 2011

2010

IANA allocation guidelines for the IPv6 routing header

19 APR 2011

APNIC central registry depleted

World IPv6 day 08 June 2011

IPV4 - Let the bidding begin!!!!

05 OCT 2011

The greatest innovator since Thomas Edison passes away.....



The End Is Nigh!!!

NO MORE ALLOCATION OF IPv4 addresses!



So What About IPv5?

- Developed in the late 70's and was suppose to be an addition to IPv4
- Really designed to transmit voice and other Real Time Apps
- Concentrated on QoS
- Really the pre-cursor to VOIP!

• Was to be the Internet Streaming Protocol (ST, ST2, ST+)



Potential IPv4 Replacements

- Protocol (Pv6)
- •RFC I475:TP/IX:The Next Internet (IPv7)
- •RFC 1621: PIP The P Internet Protocol (IPv8)
- RFC 1606: A Historical Perspective On The Usage Of IP Version 9

• RFC 1752 Recommendation for the IP Next Generation

• RFC 1374: TUBA - TCP and UDP with Bigger Addresses (IPv9)



IPv4 Addressing - 32 Bit

- IPv4 address: 192.168.1.10 IPv4 address:
- Four bytes
- ·2^32 total addresses
- ·2^32 total addresses 4 billion
- Are you kidding?



IPv6 Addresses - 128 Bit

- IPv6 address
- •2001:05c0:1000:000b:0000:0000:0000:66fb

- 2¹28 total addresses

• Omitting unnecessary zeroes; - 2001:5c0:1000:b::66fb • Eight fields, each 16 bits long 4 hexadecimal characters



So What Is 2^128? 340 undecillion, 282 decillion, 366 noncillion, 920 octillion, 938 septillion, 463 sexillion, 374 quintillion, 607 trillion, 431 billion, 768 million, 211 thousand, 456



And So What.....

2,147,483,648 IPv6 addresses each!!

2 billion, 147 million, 483 thousand and 648

$2^{128}/(2^{33} \times 2^{64})$ - Assume remove the 64-bit address for the MAC address.



I.I.I.I - 254.254.254.254









US Government IPv6 Transition Timeline











Figure 2: Federal IPv6 Transition Phases and Timelines



IPv4 And IPv6 Are Not The Same

- $IPv4 \neq IPv6$ features
- IPV6 does not have ARP. It uses ICMPv6
- ICMPv6 is critical to IPV6 functionality
- DHCPv6 / Router advertisement.



IPv4 & IPv6 - The Bottom Line

- We've run out of IPv4 address space
- IPv6 must be adopted for continued Internet growth
- IPv6 is not backwards compatible with IPv4
- We must maintain IPv4 and IPv6 simultaneously for many years
- IPv6 deployment has begun



IPv4 Header Format



<--->

е	Total Length	
	Flags	Fragment Offset
		Header Checksum

Source Address

Destination Address

Padding







IPV6 COMPARISONS



Common Misconception...

- SLAAC will compromise my network.
- •Our Internet Service Provider (ISP) does not offer IPv6 services, so we can't use it.
- It would be too expensive and complex to upgrade our backbone.
- We have enough IPv4 addresses; we don't need IPv6.

The introduction of IPv6 puts our current IP infrastructure our networks and services at risk



What's New In IPv6

- Extended address space
- StateLess Address AutoConfiguration (SLAAC)
- Simplification of the Header format
- Mandatory security IPSec
- Improved support for options and extensions.
- RADVD Router Advertisement Daemon



Router ADVertisement Daemon

- Uses NDP to advertise IPv6 router addresses and prefixes on link-local networks
- RADVD used in SLAAC networks
- Manages responses router advertisement (RA) to router solicitation requests (RS) to discover routers on the network.
- •RA includes the routing prefix used, link MTU, and address of the responsible router.
- Airport extreme has RADVD embedded..... more later



IPv6 Mobility

- IPv6 allows you to have true mobility
- More efficient as it avoids triangular routing
- Really useful with voice calls over network boundaries

riangular routing



Jumbograms

- Theoretically can carry 4GB!!!
- Jumboframes limited to 9000 bytes

Bonus points...... Extra performance due to not having to continuously transmit headers..



IPv6 Differences

- Allocation of networks are more efficient than IPv4 (partially resolved by CIDR - Classless inter-Domain Routing)
- Some assignments are $(56 (2^{72}))$ and (2^{80}) addresses
- Multicast support

• Smallest network assignment is /64 - That 4 billion times larger than the current IPv4 range!)























Usually managed by BGP traditional uses HA, LOAD Balancing and DNS









Hardware/Software Support No Good

- Application and OS behavior is inconsistent • Firewalls, IDS, etc have weak IPV6 support
 - except from the big guys
- A lot of switches, and load balancers also lack support



Caution

- Things may still break.....
 - IPv6 illegal gateway going to a black hole
 - delay in going to IPv4
- As time goes by this is getting less



Will It Break Email?

- Short answer NO
- However if mail server are incorrectly configures yes.
- •AND the old adage.. DNS DNS DNS!!!!!

incorrectly configures yes. DNS DNS!!!!!



No More NAT

- Will increase network speed
- Will help simplify networks
- Security concerns replaced by Stateful firewalls in IPv6 (amongs other techniques)




Future Users Will Be....

- Public IPv4-only
- Shared IPv4-only
- Public IPv4 and IPv6
- Shared IPv4 and IPv6
- IPv6-only



Why Migrate?

E or resp. is leir managio in it e network should make a communent, rip the band-Ald off, start planning the migration, and just do it. t of II en sprocht mana ment a stwork sert G - David eg vice presid ing.



ADDRESSING



Global Routing Prefixes

Allocation

Unassigned

Reserved

Global unicast

Link-local unicast

Local IPv6 address

Private administration

Multicast

Prefix		
::0/8		
2000::/3		
FE80::/10		
FC00::/7		
FD00::/8		
FF00::/8		



Address Notation - Pure IPv6 An IPv6 address has 128 bits, or 16 bytes: 2001:DB8:0000:0000:0202:B3FF:FE1E:8329

This can be abbreviated to: 2001:DB8:0:0:202:B3FF:FE1E:8329

or this: 2001:DB8::202:B3FF:FE1E:8329



Prefix Notation

Prefix notation in the form IPv6 address / Prefix Length

 Start with this:
 2001:DB8:0000:0056:0000:ABCD:EF12:1234/64

 Short Version:
 2001:DB8::56/64

 Uncompress:
 2001:DB8:0000:0000:0000:0000:0000:00056

 What it should be:
 2001:DB8:0:56::/64



Address Notation - Mixed

be set as follows:

IPv4 address of 192.168.0.2

Can be represented as 0:0:0:0:0:0:192.168.0.2 or ::192.168.0.2

or more correctly

::COAB:2

In networks where there is both IPv4 and IPv6, the address notation can



IPV6 And DNS

Your IPv4 DNS is

KOT.com. IN MX 10 Sydney.kot.com. KOT.com. IN MX 10 Melbourne.kot.com. Sydney.kot.com. IN A 4.2.2.1 Melbourne.kot.com. IN A 8.8.8.8

IPv6 DNS Becomes

KOT.com. IN MX 10 Sydney.kot.com. KOT.com. IN MX 10 Melbourne.kot.com. Sydney.kot.com. IN A4.2.2.1 Sydney.kot.com. IN AAAA 2001:db8:10:133::1 Melbourne.kot.com. IN A8.8.8.8 Melbourne.kot.com. IN AAAA 2001:db8:10:133::2











Covert Channels

- IPv6 can be used as a covert channel because of the identification of the individual device in a network
- The 64 bit extension EUI-64
- Can protect from outside hackers by using IPSec
- Simplest way is to not use Stateless autoconfiguration
- Use DHCPv6 instead

or use a firewall with IDS etc etc (the usual rules apply)



Trojan And Wormhole Propagation

- All modern OS's have IPv6 enabled by default Most of the OS's try to encapsulate IPv6 in IPv4 packets IPV6 traffic becomes undetected to IPS's etc.

- Solution.....
 - Deploy IPv6 on the intranet so tunnels will be disabled.
 - Can apply same security policies as IPv4



Privacy Address

- In effect the address changes dynamically
- Not so good for servers.

Using privacy extensions on SLAAC is good for the client



What About Servers?

- Server will have static addresses so in effect are vulnerable • Will need to make sure all security measures are in place Consider implementing MT6D - Moving Target IPv6 Defence Ensures anonimity of server on the internet whilst allowing
- - persistent connections.
- Developed by Virginia Tech Check it out



ICMPv6 Filtering

- Blocking ICMP on firewalls will break it IPv6!
- Unlike ICMP, ICMPv6 does:
- •So let it on through!!
- RFC 4890 provides guidelines for filtering ICMPv6

Pathe MTU discovery, Router discovery, Neighbour Discovery, Mobile IPv6, multicast mangement and address reconfiguration.



Other Risks

- Many security appliances are not ready for IPv6, so it often bypasses them
- Torrents run over IPv6
- Some VPN appliances are not ready, so IPv6 connections must bypass them



Privacy Risks

- Anyone who has your IP address also has your MAC address!
- There is a "Privacy Extensions" technique to avoid this, enabled by default.



SO WHATS THE PLAN MOVING FORWARD?



Waht Needs To Be Done?

- ISPs need to plan for a migration plan
- Content providers need to plan for dual support
- Business and education need to plan for migration and dual support
- Equipment Manufacturers need to have dual stack support
- Need to look at adoption needs across a whole organisation and beyond



IPv6 Adoption Needs

- IPv6 address space
- IPv6 connectivity (native or tunnelled)
- Operating systems, software, and network management tool upgrades
- Router, firewall, and other hardware upgrades IT staff and customer service training



TRANSITION MECHANISMS



So What Are Your Choices?

- Ignore IPv6: Stay on IPv4-only
- Gateways: Devices that convert IPv6 to IPv4
- Tunnel IPv6 over IPv4
- Dual-Stack: IPv4 and IPv6 together
- Nirvana: IPv6-only



IPv6 Tunnels

- Fast and easy to set up
- Not the best for security or performance
- Free IPv4-to-IPv6 Tunnels
 - Gogo6.com
 - Sixxs.net
 - Tunnelbroker.com



Teredo / Miredo

- Provides IPv6 connectivity behind NATs Done by tunnelling IPv6 within UDP Teredo (Miredo) is specified in RFC 4380 Teredo IPv6 service Prefix : 2001:0000: / 32



SO WHAT ABOUT OSX AND IOS?



IPv6 And OSX





So What About Lion?

•DHCPv6 works •Privacy / Temporary SLAAC addresses enabled by default



LOOKING FOR A CHEAP IPV6 GATEWAY?



Airport Extreme!! Yes Really!

- Best to have Firmware 7.5.2 or better
- Does 6to4 tunnelling
- Has radvd enabled (bonus poin
- No DHCPv6 (..... well yet anyv
- And security.....

	Logging & Statistics MobileMe IPv6 IPv6 Firewall
nts)	This pane lets you configure IPv6 on your Time Capsule. Choose whether your Time Capsule will use link-local only tunnel between the IPv6 Internet and Host IPv6 Mode ✓ Tunnel
vay)	E Block incoming IPv6 connections
	Remote IPv4 Address:
	IPv6 Default Route:
	LAN IPv6 Address:



Basic Firewall And Teredo Support

- IPv6 firewall only enabled if blocking incomming IPv6 Connections
- Simple filtering



Logging & Statistics Mo	bileMe IPv6 IPv6 Firewall	
Customize the IPv6 firewall.		
 Allow Teredo tunnels Allow incoming IPSec authentication 		
If you want to provide access to specific devices on your network from computers outside your network, click Add (+) and enter the IPv6 address and/or port for the device.		
Exceptions:	Description	
	+ - Edit	



What About IOS?

- Absolutely
- over
- Should be addressed in latest iOS updates
- IPv6 cannot be disabled in iOS (YAY!!!)

 No fallback from IPv6 to IPv4 if the connection "blackholes" • However, if the error is generated by the network, it will fail



Troubleshooting IPv6 Connections

- MacOSX resolver cache IPv4 addresses
- If an IPv4 address is already cached with FQDN, then it won't find the IPv6 address
- Manually clear the DNS cache
 - sudo dscacheutil -flushcache

Determining The KAME Version

- This is the project to create an IPv6 stack and tools -concluded 2006
- MacOSX
 - •sysctl -a grep kame_version

Most of the components moved to FreeBSD, NetBSD and

OSX - IPv6 Privacy Addresses

 Enabled by default in Lion to enable in Snow Leopard # sysctl -w net.inet6.ip6.use_tempaddr=1

OSX Server Issues

- Server Admin does not support IPv6
- To use IPv6 firewall on OSX Server:
 - Edit /etc/ipfilter/ip_address_groups.plist

<key>IPv6Mode</key> <string>NoRules</string> <key>IPv6Control</key> <false/>

http://blog.atariwiki.strotmann.de/roller/cas/entry/managing_the_macos_x_ipv6

IPv6 Changes In 10.7

- IPv6 privacy addresses are enabled by default.
- •DHCPv6 is supported.
- •NFS client supports IPv6.
- •SMB client supports IPv6.

HERE'S SOMETHING I PREPARED EARLIER....



Deepdarc - Teredo For OSX



deep darc deep and darc stuff

FortmeonCith

Teredo for MacOS X

Wednesday, February 21, 2007 by darco Posted in Apple, Projects, IPv6

As some of you may know, I've been playing around with IPv6 quite a bit lately. One specific IPv6 technology which has gotten me quite excited is the Teredo automatic tunneling protocol. Teredo allows you to obtain a globally routable IPv6 address when you only have access to the IPv4 internet, even if you are behind a NAT router¹!

Support for the Teredo protocol is actually in WindowsXP, but it is disabled by default. However, that has changed for Windows Vistawhere IPv6 and Teredo are enabled by default². This is important because this means that relatively soon, widespread deployment of IPv6 will become a reality. This is great for Windows users, but what about

other platforms?

Miredo is an open-source (GPL) user-space teredo implementation for linux and BSD. Someone went thru the effort to get miredo to work on MacOS X, but setting it up is not something your average joe can accomplish. What is needed is an installer package.

Well, that's exactly what I'm putting together. I'm releasing a prerelease version of the package today for early-adopters and power-users. You just download it, install it, and you should have IPv6 connectivity. It's that simple!

Prerelease 2

Download Here: Miredo Installer for MacOS X (Universal), and source code

Fe	eredo for Mac	OS X					
		Reader 🖒	Q-	Google			
	Popular v						
						Search	
		A	bout	Contact	Login	Projects	



TUNTAP - Fixes 3





Home FAQ

Overview

What is it?

The TunTap project provides kernel extensions for Mac OS X that allow to create virtual network interfaces. From the operating system kernel's point of view, these interfaces behave similar to physical network adapters such as an Ethernet network interface. However, the virtual interface does not send the packets into a wire, but makes them available to programs running in the system.

The software comes as a pair of kernel extensions that create virtual network interfaces on the IP and Ethernet level, respectively. These kind of network interfaces are commonly referred to as tun and tap devices on Unix-like platforms. This way of interfacing with the operating system's network stack is available on many platforms (cf. the <u>TUN/TAP</u> wikipedia article).

2-bit	: Prob	lem
TunTap - Home		
ws (10) • Popular •	Reader C Google	
or Mac OS X		

Q Download Development



Miredo For OSX



Miredo

.



6			
Time Machine St	tartup Disk		
Time Machine St	tartup Disk Miredo (32-bit)	0	
Time Machine St	tartup Disk Miredo (32-bit)	Q	
Time Machine St	tartup Disk Miredo (32-bit)	Q	
Time Machine St	tartup Disk Miredo (32-bit)		
Time Machine St Teredo Tunnel: Mode: Server:	tartup Disk Miredo (32-bit)		
Time Machine St Teredo Tunnel: Mode: Server: Bind Address:	tartup Disk Miredo (32-bit) Miredo (32-bit) Autoclient ‡ teredo.remlab.net 0.0.0.0		
Time Machine St Teredo Tunnel: Mode: Server: Bind Address: Bind Port:	Autoclient \$ teredo.remlab.net 0.0.00		



HURRICANE ELECTRIC

BGP Toolkit Home

Quick Links

BGP Toolkit Home BGP Prefix Report BGP Peer Report Bogon Routes World Report Multi Origin Routes DNS Report Top Host Report Internet Statistics Looking Glass Free IPv6 Tunnel IPv6 Certification IPv6 Progress Going Native Contact Us Home

Welcome to the Hurricane Electric BGP Toolkit.

You are visiting from 2001:0:53aa:64c:0:d52:2aa7:2ab2

Announced as 2001::/32 (Teredo)

Your ISP is AS29432 (TREX Tampere Region Exchange Oy)

Search

Updated 05 Oct 2011 05:55 PST © 2011 Hurricane Electric

×.



IPV4 Test 10.6.8

Summary	Tests R	un	Tech	nical	Info	Sha	re Re	sults /	Conta	ct
f	Your IP	v4 a	addres	s on t	the pu	ublic	ntern	et app	bears to	be 213
	No IPve	ad	dress	detec	ted [r	nore ir	nfo]			
	World I	Pv6	day is	June	e 8th,	2011	. No	proble	ems ar	e antici
When a Conne		a publisher offers both IPv4 and IPv6, your browser ctions to IPv6-only sites are timing out. Any web site								
								Your	Your D	NS
										You
10/10			or you	r IPv4	stab	ility a	nd re	adine	ss, whe	en publi
0/10	for your IPv6 stability and readiness, when public									

3.88.213.76

pated for you with this browser, at this location. [more info]

appears to be happy to take the IPv4 site without delay.

that is IPv6 only, will appear to be down to you.

/e IPv6 Internet access.

r readiness scores

shers offer both IPv4 and IPv6

shers are forced to go IPv6 only

Sta







Congratulations! You appear to have both IPv4 and IPv6 Internet working. If a publisher publishes to IPv6, your browser will connect using

Your IPv6 connection appears to be using Teredo, a type of IPv4/IPv6 translation using a public gateway. The quality for this may suffer, as

Your readiness scores

Test IPv6 10.7.1

Test IPv6 FAQ IPv6 Day Local Times Mirrors

Test your IPv6 connectivity.

Summary Tests Run Technical Info Share Results / Contact

i i

Your IPv6 address on the public Internet appears to be 2001:0:53aa:64c:0:696:2aa7:2ab2 Your IPv6 service appears to be: Teredo

(unknown result code: teredo-ipv4pref)



World IPv6 day is June 8th, 2011. No problems are anticipated for you with this browser, at this location. [more info]

Congratulations! You appear to have both IPv4 and IPv6 Internet working. If a publisher publishes to IPv6, your browser will connect using IPv6. Note: Your browser appears to prefer IPv4 over IPv6 when given the choice. This may in the future affect the accuracy of sites who guess at your location.

Your DNS server (possibly run by your ISP) appears to have IPv6 Internet access.

Your readiness scores

for your IPv4 stability and readiness, when publishers offer both IPv4 and IPv6 10/10

for your IPv6 stability and readiness, when publishers are forced to go IPv6 only 10/10

Click to see test data

(Updated server side IPv6 readiness stats)

Your IPv4 address on the public Internet appears to be 213.88.213.77



Stats



Test your IPv6 connectivity.

Tests Run Technical Info Share Results / Contact Summary Test with IPv4 DNS record ok (0.408s) using ipv4 Test with IPv6 DNS record ok (1.834s) using ipv6 Teredo Test with Dual Stack DNS record ok (0.397s) using ipv4 Test for Dual Stack DNS and large packet ok (1.397s) using ipv6 Teredo Test IPv4 without DNS ok (0.400s) using ipv4 Test IPv6 without DNS ok (1.773s) using ipv6 Teredo Test IPv6 large packet ok (0.748s) using ipv6 Teredo Test if your ISP's DNS server uses IPv6 ok (0.723s) using ipv6 Teredo

Click to see Technical Info



Performance Testing

- Don't get funky, just use HTTP or FTP file transfers.
- Use WireShark to Monitor
- Example http://speedtest.tele2.net -
- Operated bt Tele2 Sverige AB

TELE 2

You are connected via IPv4 from 150.101.203.104 To force the usage of IPv6, visit Speedtest6.Tele2.NET.

Tele2 Speedtest

This service is running on a Sun Fire X2100 with a 10GE NIC connected to the Tele2 Swedish core network. The node is located in Stockholm, Sweden. TCP windows have been slightly tweaked to support higher throughput.

We provide a variety of testfiles with different sizes, for your convenience. 100MB 1GB 10GB 50GB 100GB 1000GB

These are sparsefiles and so although they appear to be on disk, they are not limited by disk speed but rather by CPU. Warp9, the server that is currently hosting this service, is able to sustain some 500MB/s (~5Gbps) of throughput.

Sparse files, such as the ones provided here, can be created with something along the lines of: dd if=/dev/zero of=my_large_file bs=1 count=0 seek=10G

FTP

In addition to the files offered here via HTTP, there is also an FTP server setup to serve files, you'll reach it at ftp://speedtest.tele2.net

Contact

If you are interested in performing more in-depth studies and high-performance measurements, please contact bgp4-adm _at_ swip.net directly.

Copyright @ 2008 Tele2



KAMOLOSO



SO WHAT IS THE REAL STATUS OF IPV6 AROUND THE GLOBE?



So

- <u>http://www.mrp.net/IPv6_Survey.html</u>
- Looks at 5 things
 - Web servers accessible via IPv6
 - Email deliverable via IPv6
 - DNS names servers accessible via IPv6
 - NTP service accessibe by IPV6
 - Jabber service accessibel via IPv6



RESOURCES



RFC's

Mobile IPv6 RFC 3775 RFC 2117 (documents router alert option) RFC 2676 (documents QoS routing mechanisms) RFC 2460 - Internet Protocol, Version 6 (IPv6) Specification



Cool Sites

http://www.subnetonline.com/pages/subnet-calculators/ipv4-to-ipv6-converter.php

http://www.potaroo.net/

http://www.mrp.net/IPv6_Survey.html

http://ipv6.he.net

http://www.sixxs.net

http://bgp.he.net/



IPv6 Resources

Pv6 Intelligence http://ipv6int.net/systems/mac_os_x-ipv6.html

Derek Morr's Living with IPv6 blog http://www.personal.psu.edu/dvm105/blogs/ipv6/

SIXXS http://www.sixxs.net/wiki/SixXS_Wiki

ARIN IPv6 Wiki http://whois.arin.net/index.php/Main_Page

IPv4/IPv6: The Bottom Line http://arin.net/knowledge/v4-v6.html http://www.teamarin.net

http://www.kame.net

Theres is no Plan B: Why the IPv4-to-IPv6 transition will be ugly: http://arstechnica.com/business/news/2010/09/ there-is-no-plan-b-why-the-ipv4-to-ipv6transition-will-be-ugly.ars

Hurricance Electric:

http://ipv6.he.net

Teredo Overview

http://technet.microsoft.com/en-us/library/ bb457011.aspx

Miredo: http://www.remlab.net/miredo/



THANK YOU

