APAN/QUESTnet 2004

IPv6 in Oz

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AARNet 2004

IPv6 Working Group
Session 1 – Current Status of IPv6 in Australia

QUESTnet 2004
5th July

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AARNet IPv6 Working Group - Introduction

- Introduction
  - A small "steering" committee interacts with a larger community that is the IPv6 Working Group.
- Operation
  - The Steering Committee meets by video conference, email and occasional face-to-face meetings.
  - It reports to the CEO of AARNet Pty Ltd.
  - Contact and interaction with the Steering Committee can be made directly to its members, or the Working Group Support Officer, or by joining the mailing list: ipv6-l@lists.aarnet.edu.au
  - The web site is the official record of the group: http://www.aarnet.edu.au/engineering/wgs/ipv6/

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IPv6 Working Group

- established at the end of 2002;
- Steering Committee began meeting mid 2003.
- The Working Group's aim is to promote and encourage the use of IPv6, including rolling the service out to AARNet members.

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AARNet IPv6 Working Group – Steering Committee

- Michael Biber (Chair) — APNetworx
  Mike is the CEO of an Australian Consulting, Education and Network Software distribution company, Asia Pacific Networx (APN). He is the Chair of the IPv6 Forum in Australia/New Zealand and External Relations Director of the Advanced Networking Forum Australia (ANFA).
- Pryadarsi Nanda — University of Technology, Sydney
  Pryadarsi is currently on leave.
- Chris Myers — GrangeNet
  Chris is Advanced Communications Services Coordinator for GrangeNet, responsible for IPv6 and multicast service deployments, the Distributed Data Centre Mass Storage (DDCMS) Prototype Project and the Access Grid Storage System Project. As well as his involvement with IPv6, Chris has initiated BoF Groups on Gaming and Simulation, Engineering MPLS, Lambda, Security, Measurement and Network Attached Storage (NAS).
- Darren Skidmore — University of Melbourne
  Darren works as an Academic at the University of Melbourne, in the Department of Information Systems. Besides IPv6, his research interests are in the adoption of open source software by organisations, changes in the nature of the Internet, and legal issues in Information Systems.

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AARNet IPv6 Working Group - Goals

Goals of the group include

- IPv6 rollout guides;
- providing documentation and relevant links;
- assisting implementation of IPv6 through AARNet;
- involvement in activities to promote IPv6.

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AARnet IPv6 Working Group - Some Objectives

Objectives include, but are not limited to:

- small research LAN rollout guide;
- campus rollout guide;
- demonstrate interconnection of IPv6-only subnet to the IPv4 world;
- IPv6 best practice guides;
- provide documentation and tools to assist analysing and debugging IPv6:
  - network issues
  - DNS issues
  - routing issues

Some Objectives (cont)

- IPv6 tools and tips documentation;
- promote IPv6 networking, programming and applications;
- evaluate IPv6 firewall options;
- examine cost recovery options for IPv6 traffic; and
- provide fault tolerance / survivability information.

What's so special about IPv6?

- Implications of IPv6 for Broadband and Mobility Networks
- Comparing IPv6 Advantages over IPv4 and assessing the unique value propositions for IPv6
- Assessing the impact of migration from IPv4 to IPv6 on existing applications and customers
- Identifying the impact of IPv6 on Business Strategies for Voice Data Video Convergence

IPv6 is about Freedom

- Ability at some point to renumber a network easily.
  - avoids ISP lock-in.
- NAT is about control
  - No NAT with IPv6 is about peer-2-peer computing and the Freedom to also not live with the client/server control model as a matter of market and customer/user choice.
- Freedom to have privacy
  - By using IPsec peer-2-peer all that is exposed is the IPv6 Header and Options. That means no one gets to see the IP Layer Suite layers 4 and 5 data at all. Not ISPs, Not Routers, Not Switches, Not Network Manager Stations, Not snooping Clients, Not Anyone, EXCEPT the peer at the end of the connection.
    The trust model from IPsec is all about Freedom as I equate part of Freedom with PRIVACY. As IPv6 can be deployed as business and technical model without NAT it supports that Freedom with IPsec, which IPv4 with NAT simply cannot.
  - Comment from Jim Bound , Chair, Nav6TF (www.nav6tf.org)

Activities of the Working Group

- Web site
- Email list
- Miniconf
- AARnet IPv6 Tunnel Broker
- Freenet6 server
- IPv6 Ready Program
- Campus rollout guide
- Targeting related groups

AARnet IPv6 Working Group - web site

- http://www.aarnet.edu.au/engineering/wgs/ipv6/
- Web site includes
  - configuration guides;
  - network design;
  - troubleshooting;
  - other resources;
  - papers and presentations;
  - information on the activities of the Working Group.

AARnet IPv6 Working Group - email list

AARNet email list: ipv6@lists.aarnet.edu.au used for

- discussion of issues regarding IPv6;
- sharing of experiences using this technology;
- facilitating discussion of the Working Group's objectives and current issues;
- dissemination of outcomes of the Group's activities;
- sharing of information from other sources.

AARnet IPv6 Working Group – Miniconf Activity

Miniconf, Adelaide January 2004, in conjunction with Linux Conference.

- Workshops:
  - designed for people new to IPv6;
  - information on global routing, device configuration, provider independent addressing and issues with IPv6.
- Presentations:
  - Mobile IPv6: Mobility in a Wireless Internet
  - Modeling and Simulation of IPv6 Networks
  - AARNet IPv6 Tunnel Broker
  - IPv6 Status, Activity and Prospects in Australia

AARnet IPv6 Working Group - Papers & Presentations

- These can be found on the Working Group's web site at http://www.aarnet.edu.au/engineering/wgs/ipv6/presentations/

AARNet - Tunnel Broker

- IPv6 tunnel broker set up in AARNet in 2003;
  - enables connection to the IPv6 backbone without a native IPv6 connection
  - http://broker.aarnet.net.au/
- Currently AARNet is tunneling IPv6 into an AARNet router and tunneling on to IPv6 research networks.
- During 2004 AARNet will provide native IPv6 routing over all its infrastructure using the AARNet3 network.

AARnet - Freenet 6 Server

- Installed & operational
- Offers tunnels for IPv6 services over IPv4 clouds
- Part of the standard transition mechanisms that may be attractive to communicate with imbedded legacy systems after IPv6 migration.

IPv6 Forum Australia

Aims to

- educate;
- provide case studies and implementation self help;
- promote *IPv6 Ready* interoperability test suites to Australian hardware and software developers;
- act as a clearing house for vendors, carriers, developers and end users; and
- remove the barriers to IPv6 adoption, including the identification of any regulatory or government policy impediments.

Current Initiatives

- **Korea to invest $160 million in IPv6 by 2007**
  - The Korean government aims to put the nation in a leadership role in the world-wide Internet equipment market and make it an internet super power by commercialising IPv6 technology early on.

    (Source: Korea Herald, 19 Sep 2003).

US DoD

- DoD 8100.1 IPv6 Procurement Policy – June 9, 2003
  - IPv6 is vital for the US version of network-centric warfare, the Global Information Grid (GIG) project.
  - The GIG involves networked sensors, platforms and other IT and existing national security systems. It is designed to share resources and expand US security data and analysis.
  - The US Defense Department intends to migrate parts of the GIG to IPv6 between 2005 and 2007, and fully adopt the standard by 2008. The first applications to be ported to the network will include basic language translation, military gaming and simulations.
  - As from October 1 2003, ALL US DoD GIG Network Hardware and Software purchases must be IPv6 compliant.
  - "The Australian ADF intends to follow this US lead."
    - Marc Ablong, Director Information Management Futures, ADoD
      - The Australian, July 22, 2003

ISOC Committed to Promotion of IPv6

- **Internet Society Mission Statement**
  "To assure the open development, evolution and use of the Internet for the benefit of all people throughout the world."
- The Internet Society advises governments and others against actions that would restrict how technology can evolve in the future.
  http://www.isoc.org/isoc/mission/
- Since 1992 ISOC has been the organisational home for the Internet Engineering Task Force (IETF), which develops the standards that ensure the stability, reliability, security, and scalability of the Internet.
- The Society in particular sees IPv6 as one of the technologies that will help support social and economic development and has a specific policy position for the promotion of IPv6.

IPv6 Ready Logo Program

http://www.ipv6ready.org/

http://43.254.18.162/

HTTPv4 and HTTPv6

IPv6 Ready Logo Program

- Launched September 1, 2003
- To avoid confusion in the mind of customers, a globally unique IPv6 Ready logo programme has been defined.
- The IPv6 Ready logo will give confidence to users that IPv6 is both currently operational and provide a clear indication that the technology is future-proof.
- The IPv6 Ready logo programme will contribute to the feeling that IPv6 is available and ready to be used TODAY.

IPv6 Logo Programme Phases

- Phase I (Short term period) :
  - In a first stage, the Logo will indicate that the product includes IPv6 mandatory core protocols and can interoperate with other IPv6 Ready IPv6 equipment.
- Phase II (Long term period) :
  - The "IPv6 Ready" step implies proper care, a technical consensus and clear technical references.
    The IPv6 Ready logo will indicate that a product has successfully satisfied strong requirements stated by the test contract.
    To avoid confusion, the logo "IPv6 Ready" will be generic.
    The programme defines the test profiles with associated requirements for specific functionalities.

IPv6 Ready Programme
Further Information

- **Phase-1 Test Specification Policy**
  - For ROUTERS and HOST (Ver. 1.3)
    - IPv6 Specification
    - ICMPv6 for IPv6 Specification
    - Neighbor Discovery
    - IPv6 Stateless Address Autoconfiguration
- **Interoperability test scenario**
  - The Interoperability Test Scenarios correspondent to above specification is available.
- **Test Suite**
  - Platform
    - download latest version of v6eval. [6eval reference manual]
  - Scripts
    - For HOSTS and ROUTERS…NETWORKS under discussion
  - Samples of test results

Source: http://www.tahi.org/ume/

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Infrastructure is Ready

"Another emerging technology that's creating new opportunities for test firms is IPV6, which is picking up momentum outside of its current Asia/Pacific stronghold (see Verio Launches IPV6 Services , TeliaSonera Gets IP Address Tranche , and IPv6 Coming to America). Spirent Communications has already identified that emerging opportunity by including IPV6 in its recently launched ServiceEdge program (see Spirent Makes Services Play). Now Agilent is looking to capitalize on the growing demand for IPV6 products by adding extra functions to its N4180A NetworkTester (see Agilent Unveils IPV6 Test Tool)."

www.lightreading.com June 14, 2004

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The IP-over-Everything Internet

- Always-on devices
  - –ADSL, cable modems... games consoles…
- Voice and data convergence
  - –mobile IP telephony – VoIP, UMTS and beyond
  - –compare cellular ownership to Internet hosts
  - –TiVO, …personal entertainment/HA
- Mobile ad-hoc computing
  - –wireless devices/PDAs (e.g. 802.11),
  - –Bluetooth...
- Need UNIQUE address space as a tech enabler
  - –100s IP addresses per person or household?

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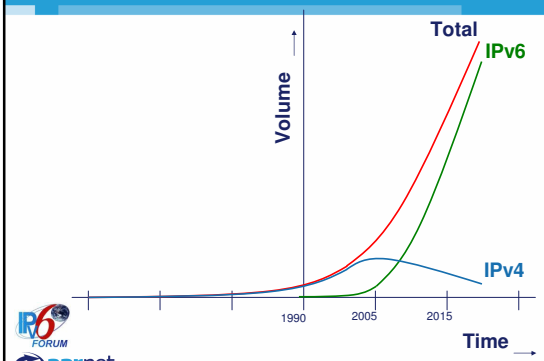
IPv6 Position



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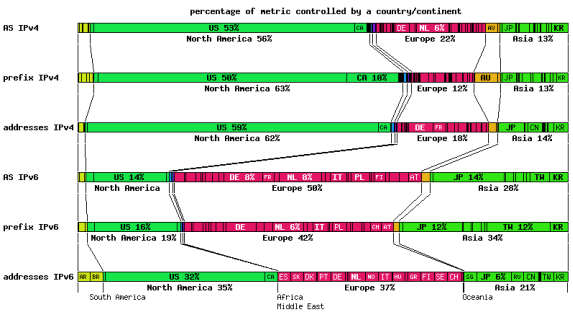
CAIDA 09/03
Distribution of announced IPv4 and IPv6 Prefixes/ASs



IPv4 :129,673 prefixes, 15,361 ASs IPv6 : 612 prefixes, 324 ASs)

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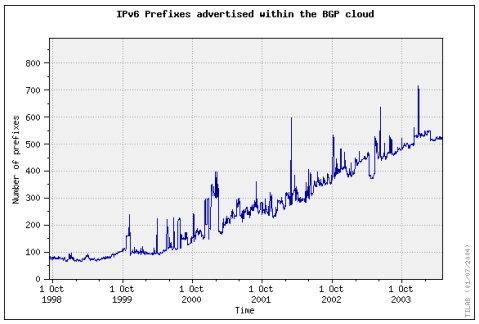
IPv6 BGP routing table size growth



Source: http://net-stats.ipv6.tilab.com/bgp/history/index.html

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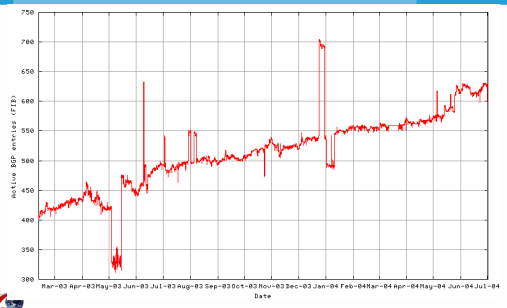
AS1221 IPv6 BGP Table Data (Currently 627)



Source: http://bgp.potaroo.net/v6/as1221/index.html

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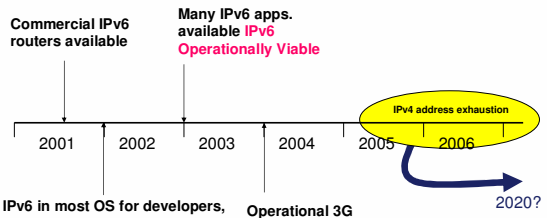
Traditional IPv6 Timeline



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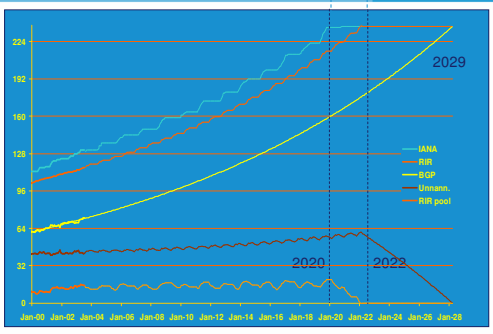
IPv4 Address Exhaustion - exponential



Source: http://www.potaroo.net/ispcolumn/2003-07-v4-address-lifetime/ale.pdf

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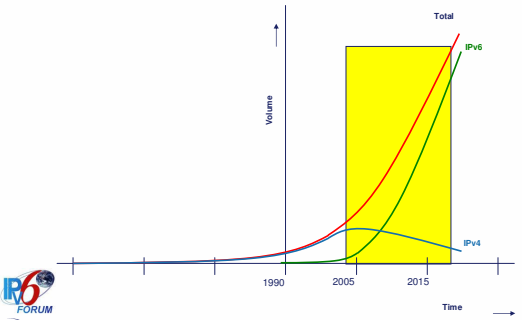
Interworking Required



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Australia Status

- 6Bone operations through Trumpet etc. 1996
- UeCOMM deployed IPv6 with Ericsson core in 2000
- Connect.com registered as TLA, begins to allocate IPv6 Addresses - 2001
- NTT announces trial launch 18/9/2002
  - Trial operated from 1/10/2002 to 30/6/2003
- Telstra is offering an IPv6 Experimental v6 exchange [TID]: http://vee-six.telstra.net
- GrangeNet, fully IPv6 NOW.

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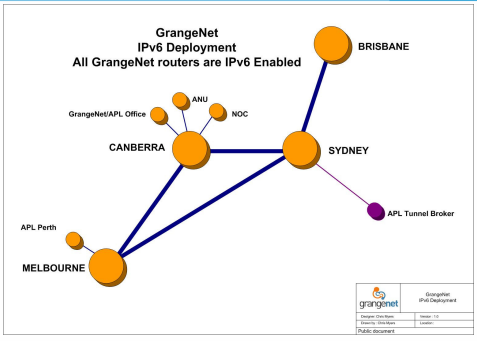
GrangeNet



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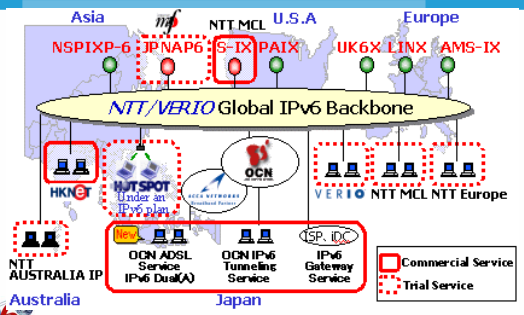
Australia Status

- Hitachi 1st vendor to offer IPv6 Router in Oz
- IPv6 Web Sites -http$_{v6}$

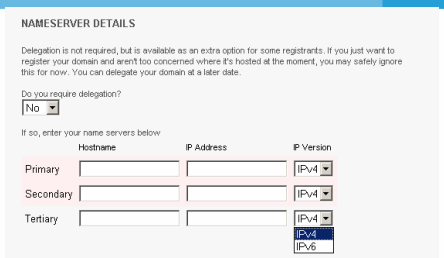
  (not Web sites about IPv6):
  - http://shag.ipv6.bl.echidna.id.au/
    - Experimental private IPv6 Router
  - http://www.sharks.org.au/
    - Ice Hockey Club web page
  - http://vortex.ipv6.intercode.com.au/
    - This site has some links to other sites and a traceroute server
- IPv6 in most OS now
  - CISCO IOS, WindowsXP, FreeBSD, Linux, MACOS, PS2 etc.

NTT in Australia



Source: http://www.v6.ntt.net/globe/index_e.html

IPv6 Going Mainstream?



- Melbourne IT domain registration page now includes nameserver delegation over IPv6

Contact Information: IPv6 Forum Australia

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Burwood NSW 1805 Australia
Ph: +61 2 9706 4335 Fx: +61 2 9475 0673
Mb: 0412 058 808
Em: mbiber@ipv6forum.org.au
W3: http://www.ipforum.org.au

IPv6 Working Group Contact Info

- IPv6 Working Group web site
  http://www.aarnet.edu.au/engineering/wgs/ipv6/
- Inform the Steering Committee about any activities that you would like the group to investigate.
- Share your own experiences, including problems and solutions, with the group.
- Get involved with this and other AARNet Working Groups.
  http://www.aarnet.edu.au/engineering/wgs/

  IP Telephony
  Multicast
  QoS
  Video over IP
- Subscribe to the mailing lists of AARNet Working Groups.
  http://lists.aarnet.edu.au/mailman/listinfo/
- Contact the Working Group Support Officer.
  ann.pettigrew@aarnet.edu.au

Thanks for your attention. Any questions?

Stick around for the IPv6 BoF

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