IPv6: The New Internet
What and Why?

Rajnesh D. Singh

rajnesh@pacificit.org

President **- IPv6 Forum Pacific Islands**

Chairman **- APRALO**

(ICANN Asia Pacific Regional At-Large Organisation)

Chairman **- PICISOC**

(Pacific Islands Chapter, Internet Society)

- What is it?
- Why?
- What's New?
- Availability
- Deployment
- PacIP6

IPv6 = Internet Protocol version 6

- Network Layer Protocol for packet-switched networks

- Successor to IPv4 currently in general use

Packet Switching?

- a communications paradigm in which packets (units of information carriage) are routed between nodes over data links shared with other traffic. In each network node, packets are queued or buffered, resulting in variable delay

- contrasts with the other principal paradigm, C*ircuit Switching*, which sets up a constant bit rate and constant delay connection between the two nodes for their exclusive use for the duration of the communication

5 Layer TCP/IP Model

5. Application layer

DHCP • DNS • FTP • Gopher • HTTP • IMAP4 • IRC • NNTP • XMPP • MIME • POP3 • SIP • SMTP • SNMP • SSH • TELNET • RPC • RTP • RTCP • TLS/SSL • SDP • SOAP • VPN • PPTP • L2TP • GTP • STUN • NTP • …

4. Transport layer

TCP • UDP • DCCP • SCTP • …

3. Internet layer

IP (IPv4 • IPv6) • IGMP • ICMP • RSVP • BGP • RIP • OSPF • ISIS • IPsec • ARP • RARP • …

2. Data link layer

802.11 • ATM • DTM • Ethernet • FDDI • Frame Relay • GPRS • EVDO • HSPA • HDLC • PPP • …

1. Physical layer

Ethernet physical layer • ISDN • Modems • PLC • SONET/SDH • G.709 • WiMAX • …

TCP= Transmission Control Protocol
IP = Internet Protocol

IPv6 FORUM Pacific Islands

Why?

- Address Space the primary motivator
  IPv4 = 2^{32} (~ 4.3 billion)
  IPv6 = 2^{128} (~ 340 trillion trillion trillion)

: IPv4 has address exhaustion issue
: Use of Network Address Translation (NAT) breaks the end-to-end nature of the Internet
: Will make administration easier
-> logical segmentation instead of complex subnets

What does it look like?

IPv4 = 202.62.220.198

IPv6 = eight groups of four hexadecimal digits
e.g. 2001:0db8:85a3:08d3:1319:8a2e:0370:7334

URL

http://202.62.220.198

http://[2001:0db8:85a3:08d3:1319:8a2e:0370:7344]/

What else is new?

- Auto-configuration

Devices can be configured automatically when connected to an IPv6 network. When first connected to a network, the device sends a request for its configuration parameters. For networks configured to do this, a router will respond with network-layer configuration parameters

- Multicast

Source sends information only once to be received by many which helps with network efficiency

- Jumbograms

IPv4 has limit of 64kB payload. IPv6 can do upto 4GB

What else is new? (con't)

- Security

IPsec, the protocol for IP network-layer encryption and authentication, is an integral part of the IPv6 base protocol

- Mobility

Allows a file or data transfer to continue uninterrupted as a device “roams”

- Quality of Service (QoS)

Allowing better support for multimedia and other applications requiring quality of service -> priority, performance guarantee

- Better Routing Features

More efficient fragmentation reassembly, support for today's networks and routers

Methods to move from IPv4 to IPv6

- Will not happen overnight
- IPv6 has technique to embed IPv4 address within it

"Dual Stack" Devices: Routers and some other devices may be configured with both IPv4 and IPv6 so they can "talk" to both

IPv4/IPv6 Translation: *"Dual stack"* devices may be designed to take requests from IPv6 hosts, change them to IPv4, send to the IPv4 destination and then process the return information similarly

IPv4 Tunneling of IPv6: IPv6 devices that don't have a direct all-IPv6 path between them may be able to communicate by encapsulating IPv6 datagrams within IPv4

Availability

- Windows XP (SP1), Server 2003 and later generally have IPv6 available
- Linux has IPv6 support since 1996 (kernel 2.1.8). IPv6 in kernel 2.6.10 has *IPv6 Forum Ready Logo* approval
- Mac OS X v10.3 "Panther" (2003) supports IPv6 by default
- ICANN announced in 2004 that IPv6 records were visible in the DNS root zone file for .jp and .kr, .fr was added a short time later -> .nz earlier this year
- Most routers currently in use don't support IPv6
  -> too old and/or not designed for IPv6
  -> newer routers have “optional” support or native support or “pass-through” support

IPv6 FORUM Pacific Islands

Deployment

- Slow uptake
  -> accelerated exhaustion of IPv4 is wake-up call
- US Government has stated that all federal agencies must deploy IPv6 backbones by 2008
  -> likely to drive wider adoption
- China has 5 year plan for deployment called *China Next Generation Internet*
- Asian countries have lead in IPv6: Japan, Korea, Taiwan

- VoIP could be a key enabling application

IPv6 Forum Pacific Islands

- Established late 2006
- Chapter of global IPv6 Forum
  -> Honorary Chairman: Vint Cerf, Internet Pioneer
- Formed as an outcome of PacINET 2006 and need to highlight IPv6 issues
- Open to all, free to join: www.ipv6forumpacific.org

PacIP6 2007

IPv6 FORUM Pacific Islands

1st Pacific IPv6 Summit

- August 15-16, Honiara, Solomon Islands
  - -> Day 1: Business and Policy Summit
  - -> Day 2: IPv6 Tutorial/Training (APNIC)
- Co-located with PacINET 2007, region's premier ICT conference - over 100 presentations, tutorials, workshops covering SPAM, Security, ICT in Education, IPv6, DNS, Peering/Internet Exchange, Wireless, FOSS, GIS, Women in Technology, e-Government, Telecentres, IP over Satellite, OLPC
- International experts: Latif Ladid, Hiroshi Esaki, John Crain (ICANN CTO), Richard Cox (SPAMHAUS), David Marcus (McAfee), Tom Vest (OECD)
  Address by Vint Cerf, Keynote: Jimmie Rodgers (SPC)
- No registration fees!