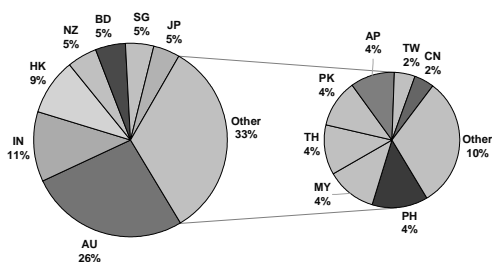# APNIC Update

JPOPM
Naha, Okinawa
24 Jan 2007

Miwa Fujii
Training Officer

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About APNIC

- Regional Internet Registry (RIR)
  - Asia Pacific region
  - Core activity delegation of Internet number resources (IPv4, IPv6 & ASNs)
  - Manages reverse DNS
- Organisational structure
  - Membership based, non-profit
  - Self-regulatory body governed by members & Internet community
  - Bottom up policy & decision making processes
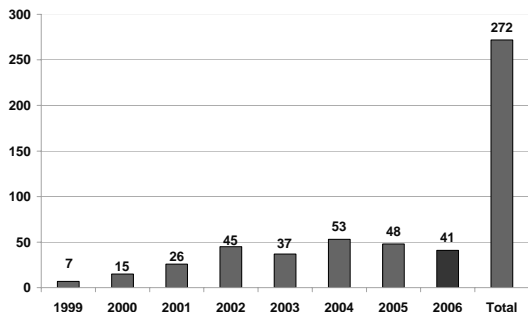

APNIC membership

Source: APNIC statistics data – last update Dec 2006

APNIC IPv4 address distribution
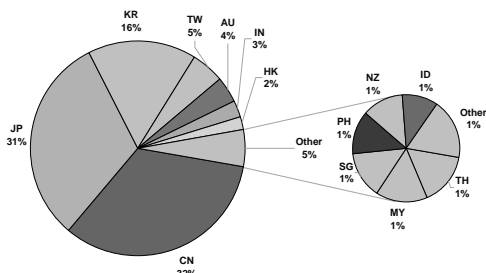
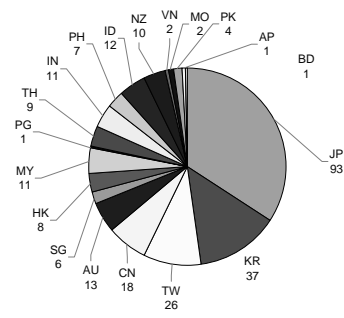

Source: APNIC statistics data – last update Dec 2006
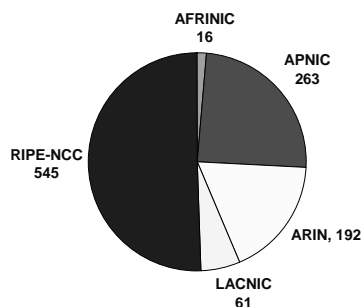

APNIC IPv6 allocation by year

Source: APNIC statistics data – last update Dec 2006

APNIC IPv6 allocation by country

Source: APNIC statistics data – last update Dec 2006

IPv6 allocation by RIRs

AFRINIC
16

APNIC
263

RIPE-NCC
545

ARIN, 192

LACNIC
61

Recent policy implementation

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4 byte ASN - background

- Current 2 byte ASN (16 bits)
  - Possibly run into the exhaustion by 2010
  - 4 byte ASN (32 bits) is developed by IETF
- 4 byte ASN distribution policy
  - Reached consensus in APNIC in 2006
- Timeline
  - APNIC started allocating 4 byte ASN upon specific request Jan 2007, default 2 byte ASN
  - Jan 2009: Default 4 byte ASN, 2 byte ASN on request
  - Jan 2010: 4 byte ASN only

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4 byte ASN references

- prop-032-v002: 4-byte AS number policy proposal
  - http://www.apnic.net/docs/policy/proposals/prop-032-v002.html
- Canonical Textual Representation of 4-byte AS Numbers draft-michaelson-4byte-as-representation-02
  - http://www.ietf.org/internet-drafts/draft-michaelson-4byte-as-representation-02.txt
- BGP Support for Four-octet AS Number Space draft-ietf-idr-as4bytes-12.txt
  - http://www.ietf.org/internet-drafts/draft-ietf-idr-as4bytes-12.txt
- Technical reading
  - Exploring Autonomous System Numbers
    - http://www.potaroo.net/ispcol/2005-08/as.html
  - 32-bit AS numbers – The view from the old BGP World
  - http://www.potaroo.net/ispcol/2007-01/asn32.html

new!

Current testing

- APNIC (Geoff Huston and George Michaelson) and Randy Bush (IIJ) conducted several tests on 4 byte ASNs in Jan 2007
- Test environments:
  - In a lab environment and in the public network
- The BGP implementations they tested:
  - The open source implementations Quagga and OpenBGPD
- Three types of test are conducted:
  1. Interoperability of the BGP implementations with each other and with 2 byte BGP (including Cisco BGP) – successful
  2. Tunneling of the NEW_AS_PATH attribute across old BGP speakers - so far the tests have all been successful
  3. Loop detection - successful
- Continuing to test
  - Happy to work with the JP community
  - More details about potential tests can be obtained from Geoff Huston (gih@apnic.net).

Available patches

- Code releases of BGP implementations with 4 byte AS number supported (http://www.potaroo.net/tools/bgpd/):
  - OpenBGPD 3.9
  - FreeBSD-patched OpenBGPD 3.9
  - OpenBGPD 4.0
- Quagga patch
  - http://quagga.ncc.eurodata.de/

Vendor implementation

- Cisco
  - IOS XR 3.4 (27/11/2006)
  - http://www.cisco.com/univercd/cc/td/doc/product/ioxsoft/iox34/reln_34.htm
  - IOS
    - 4 byte ASN will be available in IOS in the future but no fixed dates yet
- Juniper
  - JUNOSe 4-1-0 and later
    - BGP support for 4 byte ASNs
    - http://www.juniper.net/techpubs/software/erx/erx410/bookpdfs/sw-rn-erx410.pdf

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End site assignment policy for IPv6

- The current end site assignment a uniformed size of /48
  - Concerns raised regarding address utilisation efficiency
    - Expecting diversified IPv6 deployment scenarios
- This will be soon changed (March 2007): any size longer than /48
  - Decision is up to LIRs or ISPs
    - Implication: any size between /64 - /48
  - Global coordination is required
  - Achieve more efficient address utilisation
    - useful lifetime of IPv6 to encompass a period in excess of 100 years
  - See also prop-031, "Amend IPv6 assignment and utilisation requirement"
- Current status
  - To be implemented on 09/03/2007

prop-033

Amend IPv6 assignment and utilisation requirement

prop-031

- IPv6 assignment and utilisation requirement policy
  - HD ratio: 0.8 => 0.94
  - Measurement unit: /48 => /56
- The HD ratio threshold for /32 is
  - HD=log(/56 units assigned) / log (16,777,216)
  - 0.94 = 6,183,533 x /56 units
- Calculation of the HD ratio
  - Convert the assignment size into equivalent /56 units
    - Each /48 end site = 256 x /56 units
    - Each /52 end site = 16 x /56 units
    - Each /56 end site = 1 x /56 units
    - Each /60 end site = 1/16 x /56 units
    - Each /64 end site = 1/256 x /56 units
- Current status
  - To be implemented on 09/03/2007 in conjunction with change of end site assignment size

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IPv6 utilisation (HD = 0.94)

- The ratio 0.94 will be implemented soon (March 2007)
- Percentage utilisation calculation

IPv6 Prefix	Site Address Bits	Total site address in /56s	Threshold (HD ratio 0.8)	Utilisation %
/42	14	16,384	9,153	55.9%
/36	20	1,048,576	456,419	43.5%
/35	21	2,097,152	875,653	41.8 %
/32	24	16,777,216	6,185,533	36.9%
/29	27	134,217,728	43,665,787	32.5 %
/24	32	4,294,967,296	1,134,964,479	26.4 %
/16	40	1,099,511,627,776	208,318,498,661	18.9 %

RFC 3194

"In a hierarchical address plan, as the size of the allocation increases, the density of assignments will decrease."

IPv6 portable assignment for multihoming

prop-035

- The current policy does not allow IPv6 portable assignment to end-sites
  - Obstructs setting redundancy connectivity for stable network operation
  - Size: /48, or a shorter prefix if the end site can justify it
  - To be multihomed within 3 months
  - Assignment from a specified block separately from portable allocations address space
- Current status
  - To be implemented on 09/03/2007

Other implementations

- Prop-038: Amending APNIC's lame DNS reverse delegation policy
  - Adopting a definition of lameness that is consistent with generally-accepted best practice and other RIRs
    - A delegated nameserver for a domain provides a valid answer for the SOA record
    - The answer returned is authoritative (AA bit set)
  - Implemented in Jan 2007
- Prop-041: IPv6 assignment to critical infrastructure
  - Clarification of a /32 assignment
    - "The maximum assignment made under these terms is /32 per operator."
  - Implemented in Dec 2006

Next meetings

- APRICOT 2007, APNIC 23
  - Bali, Indonesia
  - 27 Feb-2 Mar, 2007

- SANOG 10, APNIC 24
  - India
  - 24 Aug – 7 Sept 2007
  - Fellowship will be available

- Participate remotely!
  - Webcast, podcasts, jabber chat, live transcripts
- Everyone is welcome
  - http://www.apnic.net/meetings

Thank You

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