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IPv6 Addressing (and related matters...)

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Overview

- What is an IP address?
- IPv4 vs IPv6
- How are IP addresses managed?
- IP Addresses today
- IP Addresses tomorrow
- Conclusions

What is an IP Address?

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"On the Internet, nobody knows you're <u>a dog...</u>"



by Peter Steiner, from The New Yorker, (Vol.69 (LXIX) no. 20)

"On the Internet..." you are nothing but an IP Address!



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What is an IP address?

- Internet infrastructure address

 Globally unique*
- A finite common resource
 - IPv4: 32-bit number
 - •e.g. 192.131.13.3
 - 4 billion addresses available
 - IPv6: 128-bit number
 - e.g. 3ffe:1a00:ff00::
 - Potentially*, equal to (IPv4)⁴
- IP does not mean "Intellectual Property"



IPv4 vs IPv6

IPv4: 32 bits

- 2³² addresses
 - = 4,294,967,296 addresses
 - = 4 billion addresses

IPv6: 128 bits

• 2¹²⁸ addresses?

- = 340,282,366,920,938,463,463,374,607,431,770,000,000
- = 340 billion billion billion addresses?

• No, due to IPv6 address structure...

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How much IPv6?



2⁶⁴ "subnet" addresses

- = 18,446,744,073,709,551,616
- = 18 billion billion subnet addresses

2⁴⁸ site addresses

- = 281,474,976,710,656
- = 281 thousand billion site addresses





*AKA home router, ICS, firewall

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How are IP Addresses managed?

and how did we get here?





1981 - 1992

LAG

1981: RFC 790 1987: RFC 1020 1992: RFC 1366



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RFC 790

"The assignment of numbers is also handled by Jon. If you are developing a protocol or application that will require the use of a link, socket, port, protocol, or network number please contact Jon to receive a number assignment."

24 March 2003

RIR Meeting with the ICANN GAC

Rio de Janeiro





1993 - 1996

LAG



24 March 2003

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RIR Meeting with the ICANN GAC

Rio de Janeiro



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1997 - 2001

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What are RIRs?

• Representative of ISPs globally - Industry self-regulatory structures – Non-profit, open membership bodies First established in early 1990's - In response to call from IETF (RFC1366) - To satisfy emerging technical/admin needs – Voluntarily by consensus of community In the "Internet Tradition" - Consensus-based, open and transparent

What do RIRs do?

- Internet resource management
 - Primarily, IP addresses IPv4 and IPv6
 - Registration services ("whois")
- Policy development and coordination
 - Open Policy Meetings and processes
- Training, outreach and liaison
 - Training courses, seminars, conferences...
 - Liaison: IETF, ICANN, ITU, APT, PITA, APEC...
 - Newsletters, reports, web sites...
- Projects
 - Various operational services and support
- RIR collaboration
 - Represented by the NRO



IP Addresses Today

Where are all the addresses?

DINIC V 20



IPv4 Allocations – IANA total











IPv6 Allocations – RIRs





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IPv6 Allocations – RIRs





Centre



IP Addresses Tomorrow

What is the future?









IPv6 Address space lifetime



IPv6 – Summary

- The good news...
 - IPv6 is available
 - IPv6 addresses are very easy to get
- The bad news...
 - Complexity: significant cost and learning curve
 - Demand? Do users want it?
 - "Chicken and Egg" syndrome
- The reality: A long, hard, transition
 - "Changing engines mid-flight"
 - Long process 10+ years to complete
 - Critical message: Start now!



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Finally...

(some ads)

Next APNIC Open Policy Meeting

APNIC 18 Nadi, Fiji, 31 Aug- 3 Sep 2004



- Participate in policy development
- Attend workshops, tutorials & presentations
- Exchange knowledge and information with peers
- Stay abreast with developments in the Internet
- View multicast online
- Provide your input in matters important to you
- Fellowships Available

http://www.apnic.net/meetings/18

An Invitation...

APNIC CEOs' Meeting Nadi, Fiji, 30 Aug 2004

- First ever APNIC event for CEOs and Snr Executives
- APNIC business and operating model
- Global issues affecting IP addressing
- Provide input into APNIC strategy and policy
- Networking with peers

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Thank You

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