



Internet Management - Past, Present, Future

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- A "Network of Networks"
 - Independent networks can join a single seamless global infrastructure
- Open standards
 - Anyone can implement standards
 - Nobody needs to pay license fees
- Minimal administration
 - No centralised operational control
 - Minimal centralised administration
 - Distribution of administrative functions







Example: The email address:

hostmaster@apnic.net

will be translated into Internet destination:

202.12.29.211

What is an IP address?



- A number used for routing
 - Not dependent on the DNS
- A finite common resource
 - IPv4: 32-bit number
 - 4 billion addresses available
 - IPv6: 128-bit number
 - 340 billion billion billion billion available
- Not "owned" by address users
- IP does not mean "Intellectual Property"

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Internet History

Brief history of the Internet ('61-'71)

- 1961
 - 1st paper on packet-switching theory
 - "Information Flow in Large Communication Nets" Leonard Kleinrock, MIT
- 1969
 - ARPANET created 4 initial nodes
- 1972
 - Ray Tomlinson (BBN) modifies email program for ARPANET - becomes a quick hit. The @ sign is chosen to symbolise "at"

Brief history of the Internet ('73-'84)

- 1973
 - First international connections to the ARPANET: University College of London (England) via <u>NORSAR</u> (Norway)
- 1974
 - Vint Cerf & Bob Kahn publishes "A protocol for Packet Network Interconnection" – Transmission Control Program (TCP)
- 1984
 - Domain Name System (DNS) introduced
 - Number of hosts breaks 1,000
 - The Internet converts en masse to use TCP/IP

Brief history of the Internet ('87-'92)



- 1987
 - 10,000 hosts connected to the Internet
- 1989
 - 100,000 hosts connected to the Internet
- 1991
 - The World Wide Web is released by CERN
- 1992
 - -1,000,000 hosts connect to the Internet



1981:

"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**." (RFC 790)







- Address space depletion
 - -Wasteful, classful allocation (A, B, C)
- Routing chaos
 - -Legacy routing structure, router overload
 - Lack of routing aggregation
- Inequitable management
 - Unstructured and wasteful address space distribution



The Internet in 1992

- Internet widely projected to fail
 - Growth would stop by mid-'90s
 - Urgent measures required
 - Action taken by IETF / Internet community

Important developments 1992-93

- 1992
 - RFC 1366: the "growth of the Internet and its increasing globalization"
 - Additional complexity of address management
 - Basis for a regionally distributed Internet registry system
 - The RIPE NCC is established
- 1993
 - Development of "CIDR"
 - addressed both Address depletion & Routing table overload
 - APNIC is established

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1992:

"It has become clear that ... these problems are likely to become critical within the next one to three years." (RFC1366)

"...it is [now] desirable to consider delegating the registration function to an organization in each of those geographic areas." (RFC 1338)

- 1996
 - 10M hosts connected to the Internet
 - Hotmail is born
- 1997
 - The American Registry for Internet Numbers (ARIN) is established
- 2001
 - The Code Red worm hits thousands of webservers and email accounts

WIC History of the Internet (2001-2006)

- 2002
 - LACNIC is established
- 2003
 - UN World Summit on the Information Society (WSIS) -1st phase
 - The NRO is established
- 2005
 - AfriNIC is established
 - Second phase of WSIS
- 2006

- Internet Governance Forum to be held

History of the Internet...

- Initially, research project (70-80s)
 - Open, cooperative, public domain
 - Highly collaborative environment
 - "Rough consensus and running code"
- Then, product of liberalisation (90s)
 - Also, catalyst for deregulation
 - Highly competitive environment
 - Still free to join and use
- Now, public utility & critical infrastructure (2000s)
 - Re-regulation (governance) is a recent afterthought

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Address management today

• Five RIRs in the world

- Service organisations
- Representative of ISPs globally
 - Industry self-regulatory structures
 - -Non-profit, neutral and independent
 - Open membership-based bodies
- First established in early 1990's
 - Voluntarily by consensus of community
 - To satisfy emerging technical/admin needs
- In the "Internet Tradition"
 - Consensus-based, open and transparent

- Internet resource allocation
 - Primarily, IP addresses IPv4 and IPv6
 - Receive resources from IANA/ICANN, and redistribute to ISPs on a regional basis
 - Registration services ("whois")
- Policy development and coordination
 - Open Policy Meetings and processes
- Training and outreach
 - Training courses, seminars, conferences...
 - Liaison: IETF, ITU, APT, PITA, APEC...
- Publications
 - Newsletters, reports, web site...

- Open and transparent processes
 - Decision-making
 - Policy development
- Open participation
 - Democratic, bottom-up processes
- Membership structure
 - 100% Self-funded through membership fees
 - National Internet Registries (APNIC)
- Community support (APNIC)
 - HRD training
 - R&D fund
 - Fellowships received and given
 - Open source software development

Internet Governance

- May include any aspect of the Internet which requires regulation, coordination or oversight
 - -Cybercrime, security, spam, phishing, hacking
 - -Content regulation
 - -Commerce, trade and taxation
 - -Intellectual property
 - Telecommunications regulation, competition policy
 - Development and facilitation, capacity building
 - -Equity of access
 - Technical standards and coordination
- None of these are entirely new areas

WSIS - World Summit on the Information Society

- Intergovernmental summit hosted by UN
 - Phase I: Geneva 2003 (complete)
 - Phase II: Tunis 2005
- WSIS scope covers all aspects of ICTs
 - Content, crime, digital divide, ecommerce, capacity building, financing...
 - Internet Governance: names and numbers, interconnection, security...
- Outcomes: "Declaration" and "Plan of Action"
 - Guidance to UN and Governments
 - Non-binding, but highly influential

WSIS outcomes

- Internet Governance Forum (IGF)
 - Special expert group on Internet Governance
 - Selected by Kofi Annan
 - Representative of all stakeholders, sectors, regions, etc
- Tasks
 - Define "Internet Governance"
 - Identify stakeholders and interests
- NRO representation
 - Raul Echeberria (LACNIC) and Adiel Akplogan (AfriNIC) to serve on Advisory board
 - Signifies the important contribution by the NRO

- Promote the need for continued stability in IP address distribution systems
- Dispel misconceptions and misunderstanding relating to the address community's policy process, the address distribution system and address distribution outcomes
- Promote a position of "do no harm", and be mindful of cross-impacts when proposing changes to infrastructure administrative functions

- ... The principle of these issues within the WSIS context is that of the independence and genuine internationalization of ICANN.
- Therefore the NRO calls on ICANN to continue its work in this area, not by building a multinational organization, but rather by including and gaining the genuine support of its significant base of core stakeholders, namely those in the DNS, IP address, and protocol communities.
- Furthermore, the NRO calls on ICANN to work with the US Government to demonstrate a genuine and unambiguous plan for its independence and to commit to this plan before the conclusion of the second phase of the WSIS.

• ICANN meeting, Rome, 24 March 2004

In conclusion

- Internet addressing has a 25-year history – RIR history is 12 years
 - Driven by the Internet industry
- Current management system has served the Internet well, for over 12 years
 - Massive expansion and the dot-com boom
 - Dynamic and changed by evolution
 - Open policy processes

- RIRs support "Internet Model" as well as "ICANN"
 - 1993: RIRs established
 - 1999: ICANN established
- RIR system is established and respected
 - Well understood, open and transparent
 - Multilateral, transparent, democratic, open
- RIRs have a very limited role in "Internet Governance"
 - Administrative coordination only
- NRO now represents RIRs globally

The Internet Model

- The Internet works
 - As some have said
 - "If it's not broken, don't fix it", "do no harm"
 - Improvement may be needed, of course
- What are the problems?
 - Many problems have different solutions
- Solution is "Evolution not Revolution"
 - Processes are constantly evolving
 - Anyone can participate
- What are your challenges?
 - Participate in the open processes
 - Be a part of the future!

Thank You

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