



Names, Numbers and Standards – Technical and Policy Aspects

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Names, Numbers, and Standards

- This presentation will focus on Numbers: IPv4 and IPv6 addresses, and Autonomous System Numbers (ASNs)
 - Domain name governance is through ICANN, and individual countries
 - Standards are defined by the IETF, W3C, IEEE, and other bodies
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Where do numbers come from?

- The IETF defines standards
 - IPv4 address is 32 bits, written with dots (e.g. 192.168.0.1); some addresses are reserved for special purposes; about 7/8 is for general use
 - IPv6 address is 128 bits, written with colons (e.g. 2001:db8:12ab:1:1); 1/8 of the total space is for general use (“global unicast” from 2000:: to 3fff::)
 - ASN was 16 bits; later increased to 32 bits; written in decimal (e.g. 64497)
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How are numbers distributed?

- IETF – defines the protocols and the number space
 - IANA – allocates large blocks of numbers to RIRs
 - RIRs – allocate smaller blocks to their members (e.g. ISPs, businesses, government departments)
 - ISPs – assign to customers
 - Businesses – assign to their own infrastructure
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IANA

- IANA = Internet Assigned Numbers Authority
 - now we talk about the “IANA functions” as services offered under contract
 - IANA numbers function is contracted to ICANN by the five RIRs; Subcontracted to PTI
 - IANA allocates large blocks of numbers to RIRs according to global policies
 - Agreed by all RIR communities
 - Ratified by ICANN Board
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RIRs

- Regional Internet Registries
 - Each serves a continental area (AFRINIC, ARIN, LACNIC, RIPE NCC, APNIC)
 - Allocation/assignment policies are set by the community in each region
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How are the policies defined?

- Each RIR has their own policy development process
 - Global policies (applying to IANA numbering service) must first be passed by all five RIRs
 - Open to all – bottom-up, multistakeholder
 - Mailing lists
 - Public meetings
 - Rough consensus
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More about AFRINIC policy development



- “rpd” mailing list (see lists.afrinic.net)
 - Two public meetings per year (usually May/June and November)
 - Anybody may propose a policy for discussion
 - Anybody may discuss a policy proposal
 - After rough consensus is reached, passed to Board for ratification
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Multistakeholder involvement

- “Anybody may propose/discuss a policy proposal” – it really does mean “anybody”
 - You don’t have to be an AFRINIC member
 - You don’t have to live in Africa
 - You can be an individual, or work for an ISP, or a government department, or none of the above
 - All you need is the time and energy to be involved – Mailing list is essential; remote participation is possible for meetings
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Technology Challenges

- IPv4 exhaustion
 - IPv6 deployment
 - IXPs (Internet exchange points)
 - Cross-border links
 - Data centres
 - Capacity building
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IPv4 exhaustion

- IPv4 has only 4 billion addresses; world population is 7 billion
 - Africa has about 100 million IPv4 addresses; 1.2 billion population
 - AFRINIC is in “Exhaustion phase 1”; 7.6 million addresses available
 - When we get to about 4 million, “Exhaustion phase 2” begins; IPv4 space becomes much harder to get
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IPv6 deployment

- IPv6 has enough space for millions of networks for every person; each network can have billions of devices
- Africa is behind the rest of the world in IPv6 deployment
- IPv6 is not the future; IPv6 should be NOW!

IPv6 deployment

- ISPs, please deploy!
 - Businesses, ask your ISP
 - All, make your web site and other public services available on IPv6
 - Governments, use policy measures to encourage deployment (e.g. write it as a requirement in RFPs, tenders)
 - End users, don't worry! Your phone, laptop, or PC will use IPv6 when it's available
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IXPs (Internet exchange points)

- When traffic between ISPs in the same country takes a detour through another country, it costs more and is slower
 - “Keep local traffic local” – build exchange points where ISPs can connect to each other
 - They do not need to be expensive
 - 44 active IXPs located in 40 cities in 32 countries in Africa; see www.af-ix.net
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Cross-border links

- When traffic between neighbouring countries takes a detour through a distant country, it costs more and is slower
- Improve performance and reduce costs by creating a regulatory environment that encourages ISPs to build cross-border links where it makes economic sense

Data centres

- Do businesses and government departments choose to host their content in another country?
 - Perhaps you need more data centres and IXPs in your country
 - Co-locate IXPs at the data centres
 - Attract the large global content providers to data centres in your country to improve performance
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Capacity building

- AFRINIC offers training in IPv6; we have trained thousands of engineers in Africa; see learn.afrinic.net
 - We are working on e-learning
 - IPv6 certification; see certi6.io
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Thank you.

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