



International Management of Internet Resources

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Outline

- **Introduction**
- **Internet Resources**
- **Addresses**
- **Autonomous System Numbers**
- **Domain Names**
- **Standards**
- **Other Organisations**
- **Conclusions**

Internet Resources

- **Internet Protocol **addresses****
 - IPv4 and IPv6
- **Autonomous System Numbers **ASN****
- **Domain Name System **names****
- **Internet Protocol **Standards****

Internet Resources

- **In general: finite**
 - not scarce
- **Often: hierarchical**
 - not top down
- **Often: unique**
 - not semantical
- **Always: managed**
 - not dictated

IP Addresses

- **A number**
 - IPv4: 32 bits (4.2 billion)
 - IPv6: 128 bits (a lot more)
- **Belongs to a network interface**
 - Not to a person
- **Globally Unique**
- **Used for routing**
 - aggregation



What is an IP Address? (1)

Example:

My email address:

k13@nikhef.nl

will be translated into Internet destination:

192.16.199.99

k13@[192.16.199.99] will also work



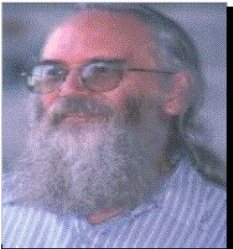
What is an IP Address? (2)

- A number used for Routing
- Not dependent on Domain Name System
- IP does **Not** mean “Intellectual Property”
- How Many:
 - IPv4: $4.2 \times 10^{**9}$ (4.2 billion)
 - IPv6: $3.4 \times 10^{**38}$ (340 undecillion)

IP Addresses

- **Uniqueness, Aggregation and Conservation**
 - need rules: **Policy**
- **Rules are agreed among Internet Service Providers on a regional basis**
- **Regional Internet Registry: RIR**
- **RIRs ⁽⁴⁾ together with IANA co-ordinate globally**

Pre 1992



RFC 790
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.**”

1992



2003



Address Management Policy

Conservation

- Efficient Use of Resources
- Allocation Based on Need

Aggregation

- Limit Routing Table Growth
- Support Provider-Based Routing Policies

Registration

- Ensure Uniqueness
- Trouble Shooting



Autonomous System Numbers

- **16 bit number**
- **Globally unique**
- **Parameter of BGP4**
- **Used for routing**
- **Distributed to ISP by RIR**
- **No hierarchy or other systematics**
- **Global co-ordination by RIRs and IANA**

Domain Name System

- In the beginning there were only a few numbers – 5 of them 😊
- Then came `hosts.txt`
- **Finally: the DNS**
 - First for `.com`, `.edu`, `.org`, `.net`, etc.
 - Country codes added later, such as `.ir`, `.ue`, `.sa`, `.nl`, etc.

Domain Name System

- **The DNS is 2 things:**
 - protocol
 - **distributed** and **delegated** database
- **The DNS is not:**
 - search engine
 - directory service
 - whatever else you may want it to be

Domain Name System

- Translate IP address into name
- Translate name into IP address
- That's all 😊

However... 😞



Domain Name System

- **Names look like words**
- **Words have meaning:**
 - Language
 - Culture
 - Ownership
 - Spelling
 - . . .



Domain Name System

- **Rules are needed**
 - First come first served, or
 - Highly regulated regime
- **Rules are set by national community:**
 - Users
 - Industry
 - Government
 -
- **Rules are governed by national law**
- **And nobody else!**

Internet Standards

- **Electronic mail**
- **World Wide Web**
- **File Transfer Protocol**
- **Internet Protocol IP**
- **Transmission Control Protocol TCP**
- **User Datagram Protocol UDP**
- **and 100's more. . .**

Internet Standards

- **Internet Engineering Task Force IETF**
 - Individual volunteers
 - Working Groups
 - Documents
 - Consensus
 - Standards RFC

Internet Standards

- **IETF**
- **Internet Engineering Steering Group IESG**
 - Co-ordinate working groups
- **Internet Architecture Board IAB**
 - Oversees Internet Assigned Numbers Authority **IANA**
 - Oversees Internet Standards publication **RFC-Editor**
- **Internet Society ISOC**
 - Provides legal protection
- **RFC3160: The Tao of IETF (www.ietf.org/tao.html)**

Other Organisations

- **ICANN**
 - Currently home of IANA
 - Regulates gTLDs (.com, .org, etc.)
- **ISO**
 - ISO 3166-1 for ccTLD codes
- **UNICODE**
 - National characters
- **IEEE**
 - Ethernet standard + addresses
- **And more, I am sure 😊**

Other Other Organisations

- **ITU-T**
- **United Nations**
- **WIPO**
- **National Governments**
- **European Union**
- **WSIS**
- **And more, I am afraid** 😞

Other Other Organisations

“The co-ordination **responsibility** for root servers, domain names, and Internet Protocol (IP) address assignment should rest with a **suitable international, intergovernmental organisation**”.

Conclusions

- **Self-regulation works well**
- **If it works why change it?**
- **No “international, inter-governmental organisation” needed**
- **More participation needed!!!**

PARTICIPATE!

- **RIPE 49**
 - Manchester, United Kingdom, 20-24 September 2004
- **APNIC 18**
 - Nadi, Fiji, 31 August – 3 September 2004
- **LACNIC VII**
 - San Jose, Costa Rica, 26-28 October 2004
- **ARIN XIV**
 - Reston VA, United States, 20-22 October 2004
- **IETF 60**
 - San Diego CA, United States, 1-6 August 2004

Questions



www.ripe.net