In the Beginning

FIGURE 6.1 Drawing of September 1969
(Courtesy of Alex McKenzie)
A bit Later

THE ARPA NETWORK

DEC 1969

4 NODES

FIGURE 6.2  Drawing of 4 Node Network
(Courtesy of Alex McKenzie)
35 Years Later
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

- 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
  - Like car number plate
- Used for routing
  - aggregation
What is an IP Address?

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
IP Addresses

- **Uniqueness, Aggregation and Conservation**
  - need rules: Policy
- **Rules are agreed among Internet Service Providers on a regional basis**
- **Regional Internet Registry: RIR** (RIPE NCC)
- **RIRs (4/5) together with IANA** co-ordinate globally
"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

RFC 1366
Geographic Allocations
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 where numbers – 5 of them 😊
• Then came hosts.txt
• Finally: the DNS (1984)
  – First for .com, .edu, .org, .net, etc.
  – Country codes added later, such as .uk, .de, .se, .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**
  - Architecture of the Internet
  - 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](http://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 😞
Conclusions

• Self-regulation works well

• If it works why change it?

• No “international, inter-governmental organisation” needed

• More participation needed!!!
Questions