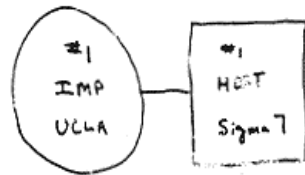


In the Beginning

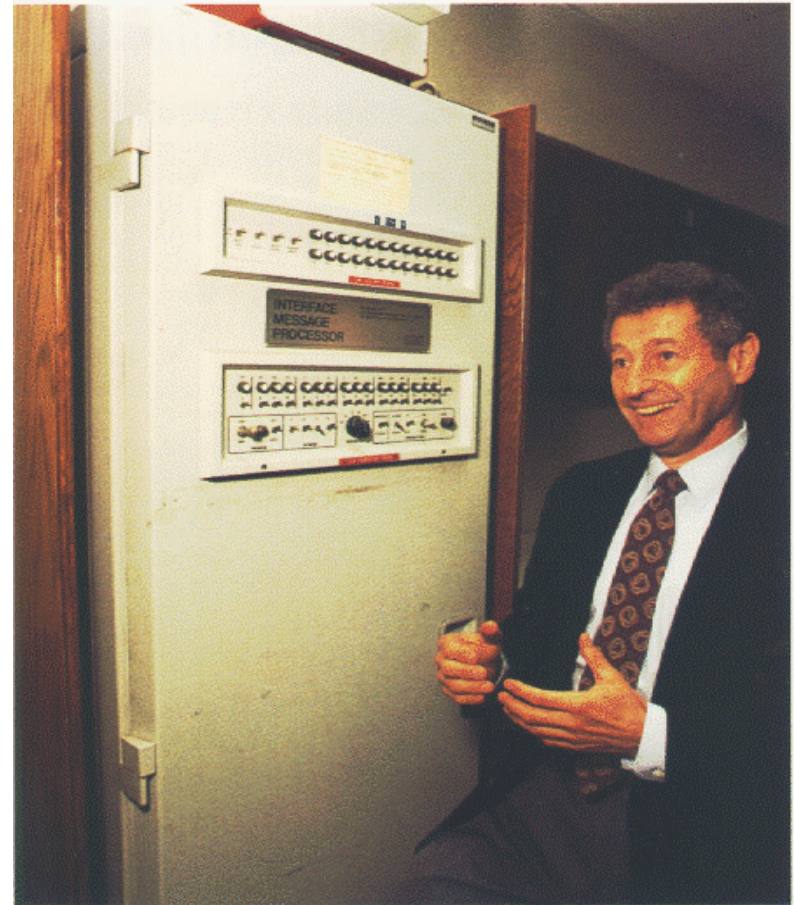


THE ARPA NETWORK

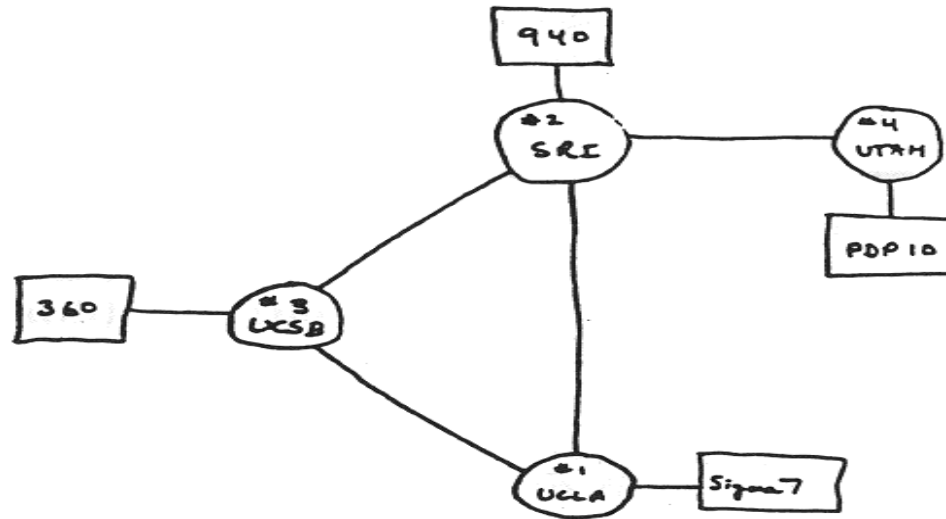
SEPT. 1969

1 NODE

FIGURE 6.1 Drawing of September 1969
(Courtesy of Alex McKenzie)



A bit Later



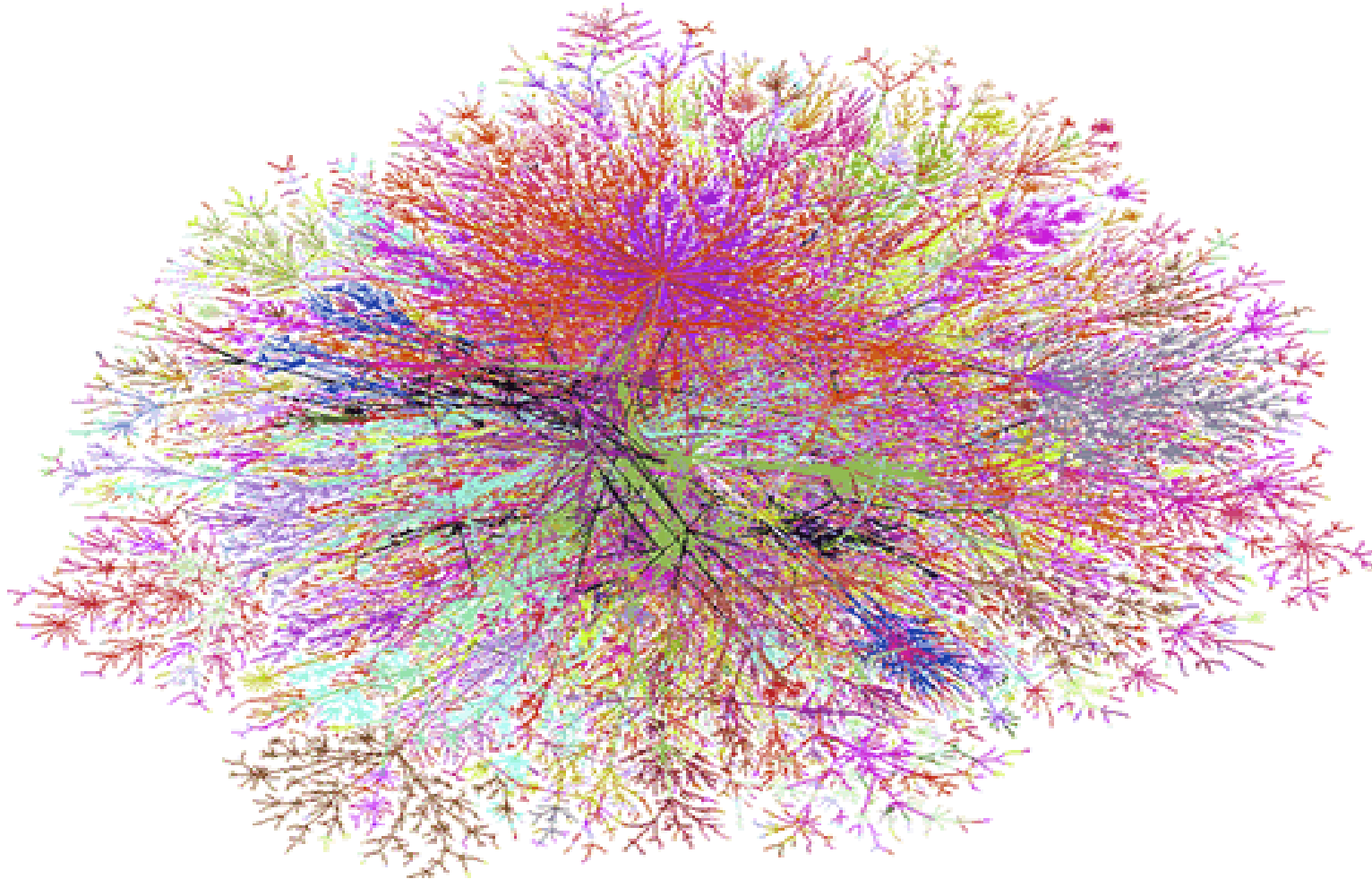
THE ARPANET

DEC 1969

4 NODES

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

35 Years Later





International Management of Internet Resources

Rob Blokzijl

RIPE Chairman

K13@NIKHEF.nl

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:

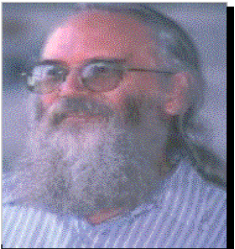
192.16.199.99

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**

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



2005





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 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)**

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



www.ripe.net