Internet Governance:
Not Just Dealing with a Uniqueness Requirement

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Unique Values

- data packets include fields used to say what the payload is & detail options
  - a.k.a. “protocol parameters”
- field contains a value (e.g. 25)
- different values indicate different applications or features
- you & I have to agree to use same values or I will not know what you mean
  - e.g., 25 = SMTP (email)

Assigning Values

- for Internet protocols values originally assigned & maintained by Jon Postel
  - started in Aug 1971: asked for reports of sockets in use
  - acting as the “Internet Assigned Numbers Authority” (IANA) under US government contract
- filled blanks in standards documents with unique values and maintained a database of values and associated uses
- actual value not important, just must be unique (within application) and used consistently

Uniqueness Range

- values must be unique within scope of use to avoid confusion
  - e.g. “Bill” is not globally unique
  - most of the time “Bill” is unique within a family
- protocol parameters must be unique within group of nodes that will use that protocol
  - e.g., the value “15” can mean one thing in the protocol field in the IP header and a different thing in the port field of the TCP header

More Values #1: Names

1st RFC list of names: Nov 1971

non-hierarchical names (e.g., MIT-MULTICS)

thus name had to be unique on ARPANET

later (Nov 1983) domain name system (DNS)

- hierarchical names
  - e.g. newdev.eecs.harvard.edu
  - "newdev" only needs to be unique within "eecs.harvard.edu"

Names, contd.

IANA (Jon) assigned top level domains (TLD)

- assign = enter name server IP address in "root zone file" (the database for "13" root servers) for a TLD

TLD types established in RFC 920 (Oct 1984)

- also includes basic requirements to register a subdomain
  - e.g., need to have at least 2 nameservers & at least 50 hosts

initial subdomain registration done by SRI-NIC

- under US government contract
  - no registration fees

Names, contd.

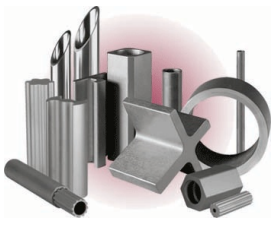
two types of TLDs (names of types came later)

- generic TLD (gTLD)
  - e.g., .com, .edu, .net, .mil, .arpa
- country code TLDs (ccTLD)
  - e.g., .us, .fr, .uk
  - list from ISO list of “names of countries, territories or areas of geographical interest”
    - has caused issues: e.g. French Polynesia ccTLD = .pf
    - but France says that French Polynesia is not a separate country

Names, contd.

sample domain names

- www.Plymouth.com
- www.Harvard.com
- WhiteHouse.com



Questions

what is the basic purpose of trademark law?

in what ways are domain names
not like trademarks?

note: trademark people blocked introduction
of new TLDs for many years

More Values #2: Addresses

- network nodes are identified by network addresses
  - e.g., MAC addresses on Ethernet
  - e.g., IP addresses on IP networks
- address must (generally) be unique within scope of network
  - special case: “anycast” address
    - find “closest” (in routing terms) instance

IP Addresses

- IP addresses 32-bit value
  - combined network location and identifier
  - early format: 8-bits network, 24-bit node on network
  - current format: no specific dividing point
- can have “private” IP addresses (aka RFC 1918)
  - ranges of addresses for use on private networks
    - addresses must be translated in packets if connected to Internet - use network address translator (NAT)
  - many wireless access points & cable modems use private addresses and NATs

IP Addresses, contd.

- IANA (Jon) made early IP address assignments
  - 1st assignments Nov 1977 (RFC 739)

1	BBN Packet Radio Network
2	SF Bay Area Packet Radio Network (1)
3	BBN RCC Network
4	Atlantic Satellite Network
5	Washington D.C. Packet Radio Network
6	SF Bay Area Packet Radio Network (2)
7-9	Not assigned
10	ARPANET
11	University College London Network
12	CYCLADES
13	National Physical Laboratory
14	TELENET
15	British Post Office EPSS
16	DATAPAC
17	TRANSPAC
18	LCS Network
19	TYMNET

Address Distribution 3/1987

class A (8-bits network, 24-bits node)

27 assigned (1 non US, 5 corp, 4 univ, rest mill

Class B (16-bits network, 16-bits node)

205 assigned (10 non US, 36 corp, 115 univ, ...)

Class C (24-bits network, 8-bits node)

7,395 assigned

Question

why so few non-US assignments?

Transition 1: Sep 1991

too much work for Jon (and Joyce)

IP address assignments & root zone editing moved to Government Systems Inc (GSI)

under US government contract (with NSF)

services “free” to users

GSI subcontracted operations to Network Solutions, Inc. (NSI)

IANA (Jon) kept policy process for new TLDs and block IP address assignments

Transition 2: Jan 1993

NSF rebid management function and NSI won the IP address, domain name and protocol values registration/coordination function

part of bid was to establish a European IP address registry at RIPE and call for an asia/pacific one to be established

~7,500 DNS registrations at this point

Nuclear Events

1/ early 1990s - www protocol and browsers
   mom could surf
domain registrations passed 2,000/mo by 1995 and were on a upward trend
NSI was under fixed $4.2M/year budget
   something had to give
2/ sep 1995 - NSI started to charge $50/year (2-year minimum) per domain name in .com, .net and .org
   (.edu registration was still government funded)

Question

what were the main issues people had with NSI charging for domain name registrations?

DNS Side Issue

DNS protocol only supports 13 root name servers

most current servers are run by US companies or US government agencies (10)

- but Internet is international

lots of countries want their own root server

- >13 countries in the world

also, with only 13 - easy DoS targets

5 roots are now anycast

- lots of actual servers all over the world
- does not satisfy some politicians

Rise of the RIRs

Regional Internet Registries

RIPE-NCC (Europe)1993

APNIC (Asia / Pacific) 1993

ARIN (North America etc) 1997

- spun out of NSI

LACNIC (Latin America etc) 2001

AfriNIC (Africa) 2005

RIR

- allocate IP addresses to ISPs & some large sites
  - note: not “sell” - IP addresses are not property
- exclusive territories
- do not guarantee addresses will be routed
- membership organizations
  - mostly ISPs
- public policy processes
  - not restricted to members

Questions

Why are addresses not property?

How can RIRs have exclusive territories?
What about anti-trust?

IANA, Inc.

- Jon Postel decided in 1994 that the IANA should not be a US-funded function
  - needed an independent legal home
- Internet Society set up an international ad-hoc committee to discuss issue in 1996
  - produced proposal
- US government got interested in 1997
  - produced Green Paper (1998) similar proposal
  - produced White Paper (1998) proposal still similar
  - LOTS of 3rd party complaints

Gold in them Names

- 1M names registered in 1st half of 1998
  - $100M
- big push for new TLDs
  - seen as a way to print money
- these forces did not like White Paper plan
- but US Department of Commerce went ahead
  - chartered Postel proposal for Internet Corporation for Assigned Names and Numbers (ICANN) - Feb 1999
- Jon Postel died October 16, 1998

Question

if 10 new TLDs were created, how much would each be worth?

what about 100 new TLDs?

ICANN

non-government but contract with US DoC to manage technical aspects of Internet
- i.e., root DNS zone & servers, IP addresses & DNS TLDs
- DoC must approve important actions

from start seen as able to address other issues
- e.g., settlements, porn, spam, commerce ...

current budget $23M
- most revenue from DNS fees
- some from RIRs

ICANN, contd.

- "performs IANA function"
  - "As a private-public partnership, ICANN is dedicated to preserving the operational stability of the Internet; to promoting competition; to achieving broad representation of global Internet communities; and to developing policy appropriate to its mission through bottom-up, consensus-based processes."
- two "supporting organizations"
  - DNS
  - IP Addresses
  - plus Government Advisory Committee (GAC)
- global policy from supporting organizations
  - OKed by ICANN board

Rest of the World

- International Telecommunications Union (ITU)
  - traditional home of telecommunications standards
    - phone technologies, settlements, phone #s ...
  - UN treaty agency, **governments** do final standards approval
- Internet Engineering Task Force
  - "traditional" home of Internet (and IP network) stds
  - consensus of geeks & others on standards
- 100s of focused standards bodies & forums

Regulations

- all of telecommunications has heavy regulation
  - governments say what can be done & how
    - e.g., quality requirements, fees, deployment scope
  - and heavy taxes
  - e.g., universal service fee
- none of Internet (in US) has any regulations
  - some in other countries
  - some starting in US (e911 for VoIP)
- telcom without regulations is a strange concept
  - to governments & carriers (e.g., guaranteed return)

Convergence

- the Internet is the answer
  - (what was your question?)
- traditional phone and video moving to IP networks
- IETF technology dominating tecom future
  - SIP (voice over IP), MPLS (switched circuits under IP), BGP (Internet routing), ...
- where does that leave the ITU?
- and the regulators?

Question

what would you do if you were the ITU?

or a regulator?

WSIS

World Summit on the Information Society proposed by the ITU, OKed by the UN

- 'convinced of the need, at the highest political level, to marshal the global consensus and commitment required to promote the urgently needed access of all countries to information, knowledge and communication technologies for development so as to reap the full benefits of the information and communication technologies revolution.'

lots of issues that could be looked at including:

- should ICANN exist or who should control it if ICANN should exist
- who should define standards for next gen Internet

Undercurrents

US control of ICANN
- e.g., OK on changes to root zone
- if France wants to change IP address of DNS server for .fr the DoC has to OK the change

have/have not split in the world
- who should pay to bring Internet to 3rd world
- & cost split

content control
- many countries want to control access to content
  - including the US

WSIS

1st meeting a loss
- bogged down on have/have not issue
- kicked WSIS future to UN
  - created Working Group on Internet Governance (WGIG)
  - produced non-specific input to 2nd meeting

prep meeting for 2nd WSIS meeting
- US vs everybody
  - near unanimous view that US had to let go
  - US said ‘we will not relinquish traditional role’ (i.e., “no”)

2nd WSIS meeting said nice things
- & created Internet Governance Forum (IGF)

Meanwhile, International

World Trade Organization (WTO)

- ruled in favor of Antigua and against the US
- relating to Internet gambling
  - tells US that it cannot block US Internet users access to Internet gambling sites
- US has mostly ignored ruling (so far)

Question

what should US do about WTO ruling?

Meanwhile, Back in the USA

congress is debating “network neutrality”

carrier view - it’s my wire

- Edward E. Whitacre - CEO AT&T
  - ‘Google, Vonage & Skype are using **my** network for **free’**
- William L. Smith - CTO Bell South
  - ‘we should be able to charge Yahoo to let their web page load faster than Google’

“Internet” view (e.g. Vint Cerf)

- how does the next Google get started if the carriers demand an up-front fee
- destroy innovation engine

Network Neutrality

specific network neutrality provision voted down in House committee last week

separate network neutrality bill in Senate

might still happen

House draft blesses FCC “principles”

FCC Principles

*consumers are entitled to access the **lawful** Internet content of their choice*

*consumers are entitled to run applications and use services of their choice, **subject to the needs of law enforcement***

*consumers are entitled to connect their choice of **legal** devices that **do not harm the network***

consumers are entitled to competition among network providers, application and service providers, and content providers

Unanswered Questions

Who says who makes the rules?

Who says who pays for what?

Answers

ITU tried to answer
WSIS tried to answer
who next?

there will be answers

one way or another

Last Question

what will your children's Internet look like
(policy wise, not technology wise)

have fun finding out if you are right