Internet Concepts, History, Regulations & Governance

Scott Bradner

Harvard University
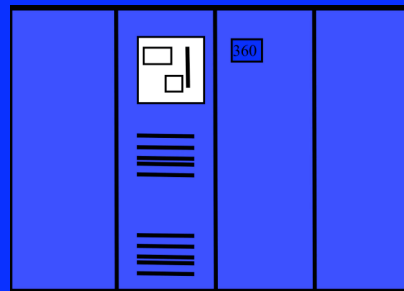
The Original Reason(s)
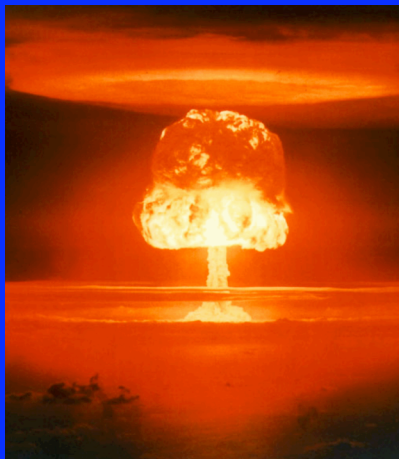
or

What to Do?

- ◆ use self-describing packets
- ◆ connect existing networks
- ◆ design for

Dest Addr	Src Addr	payload

survivability
to support multiple types of communications
over a variety of network types
with distributed management
cost effectiveness
low cost attachment
accounting for use of resources

!security

*The Design Philosophy of the DARPA
Internet Protocols* - Dave Clark nms.lcs.mit.edu/6829-papers/darpa-internet.pdf

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Architectural Principle

e2e

let the ends do it, keep net ignorant of uses
(or control it)
network not designed for a particular application
let the user decide
(a.k.a., The Stupid Network)

End-to-End Arguments in System Design - Saltzer, Reed & Clark
http://web.mit.edu/Saltzer/www/publications/endtoend/endtoend.txt
The Rise of the Stupid Network - David Isenberg http://www.isen.com/stupid.html

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Internet Security

◆ not an original design goal

◆ how important is that?

◆ what is the interaction between the e2e model & security?

Internet Security

◆ end systems under relentless attack

◆ Internet infrastructure under occasional attack

◆ firewalls are false security (as normally used)
   most meaningful attacks are from people inside a firewall

◆ other attacks from outside
   tourists & terrorists

◆ current biggest threat?
   steal info for ID theft
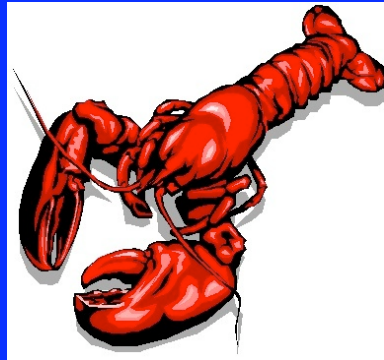
crustacean security

Trust on the Internet

◆ what does the e2e model do to trust in the Internet environment?

A Trust-Free net

◆ must mistrust IP address

   e.g., NAT, firewall

◆ must mistrust privacy

   e.g., wiretapping, hacking

◆ must mistrust identity of source

   e.g., spoof

◆ must mistrust identity of destination

   e.g., proxy, phish

◆ must mistrust own computer

   e.g., root kit, trusted computing

Now What?

◆ is there a solution to security ?

Security

◆ best security is close to (or in) end system
   e.g. firewalls very near servers
◆ depending on network means having to trust the network

Result of e2e model

◆ what has been the impact of the e2e model on Internet services?

What Did It Give Us

◆ e2e Internet, and open computer operating systems, are *generative*

 enable innovation by others

◆ impact society by moving or eliminating control points

The Internet is a "parent revolution"

What Did It Give Us, contd.

- ◆ the e2e model made the Internet into a platform for innovation
  - no longer had to wait for carrier to develop technology
- ◆ 3rd parties could use the net to develop technology
  - e.g. WWW, VoIP, email, IM, ...
- ◆ 3rd parties could use the net to deliver services
  - e.g. Google, eBay, Skype, Vonage, ... (porn)
- ◆ enterprise networks as well as Internet
  - did not have to wait for IBM/DEC

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Core Functions

- ◆ only three core controls needed (technically)
  - coordinate Internet protocol (IP) addresses
  - coordinate Internet names
  - coordinate Internet protocol values
- ◆ Internet technology requires these to be unique
  - IP addresses used to find computers on the Internet and thus must be unique
  - two different "www.ford.com" sites would not be good
  - need unique value in packet to mean "email"

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Internet Allocation Processes

◆ protocol values driven by standards process
  value assigned when standard developed
◆ IP addresses assigned by regional IP address registries
  currently 5, each with its own geographic area
  IP addresses currently scarce - new IP version will fix that
  (why does each registry have a geographic area?)
◆ some domain names assigned by name registrars
  .com, .net & new non-country TLDs
  record name in databases run by registries

Domain Names

◆ Internet domain names (e.g. ford.com) interact with trademarks
  note that use of trademarks is restricted where customer might be confused
◆ how does use of domain names differ from trademarks in the non-Internet world?

Domain Names, contd.

- ◆ hierarchical structure with single "root"
- ◆ top level domains (TLD)
    - e.g., .com, .net, .fr, .us ... (about 260)
- ◆ different rules within different TLDs
- ◆ conflicts resolved using WTO-based arbitration

Domain Names, contd.

- ◆ what should be guidelines for use of domain names relative to trademarks?

Domain Names, contd.

◆ general result has been to expand the restriction of use of similar domain names

◆ fords4all.com would be blocked

◆ but ford-sucks.com would be OK. why?

Controlling the Internet

◆ regulations & governance

◆ very different for the Internet than for the teclom world

   very few Internet regulations in the U.S.

   little governance over the Internet internationally

◆ but things are changing

Some Example Issues

◆ peering relationships

  telephone - peering requirements defined

  Internet - big ISPs refuse to peer with small ISPs

      local peering points voluntary

◆ international settlements

  telephone - line cost splitting

  Internet - non-US ISP pays full cost for link to US

◆ quality of service

  telephone - service must meet specific quality

  Internet - best effort service

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"Code is Law"

◆ the design of the Internet protocols have impacted the ability for the Internet to be regulated

◆ most protocols do not depend on net-based services

  thus most protocols do not have a control point

◆ carrier not involved in providing applications

  thus hard to regulate what applications can be used

◆ some exceptions

  DNS & a unique internetwork address

◆ "Code is Law" - Larry Lessig

  code: the underlying technology design

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Carrier View

◆ it's my wire, I'll do what I want with it

  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'

◆ ignore that the customer bought the service in order to access Google etc

  i.e., service is more valuable because of Google & etc

◆ pushing to charge services for "better service"

  small step to making payment required for any useful transport (i.e., a protection racket)

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Net Neutrality

◆ Vint Cerf at al vs. TIA et al

◆ Cerf

  described e2e concept & power of Internet

  asked Senators to not let carriers destroy it

◆ Walter McCormick, Jr for US Telecom Industry Association

  would never "block, impair, or degrade content, applications or services."

  but do not make any rules to stop us

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Net Neutrality

◆ why is network neutrality important to businesses?

◆ to carriers?

Internet Governance

◆ many issues that are gathered under "Internet Governance" - e.g.,

crime, property (e.g., copyright & patents), monetary authority, content (e.g., porn & counter-government information), legal jurisdictions, cost sharing, security, inter-state relationships, citizen-state relationships, people to people & business to business relationships, anonymity, political action, regulations & regulatory authority, technical & business standards, ...

One Governance Hot Spot

◆ how do national laws work in the Internet - some examples

◆ content

  e.g., Yahoo vs France on Nazi materials

  e.g., Australian (and other) libel verdict

◆ activities

  e.g., Internet gambling & WTO (**today's the day!**)

◆ privacy

  European privacy rules vs. US on Internet commerce

  US "safe harbor" program

Internet Governance, contd.

◆ push to control the Internet will continue

  nationally with regulations (e.g. House bill & FCC)

  Internationally (e.g. IGF)

◆ some efforts will succeed

◆ the Internet will become less un-regulated