Will the Internet be permitted to grow up?

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Agenda

what the Internet was
what the Internet is
what the Internet might become
What Was the Internet?

e2e

let the ends do it
(or control it)
let the user decide
(a.k.a., The Stupid Network)

End-to-End Arguments in System Design - Saltzer, Reed & Clark

But! - e2e Means

no QoS!

no ISP business model!

no network security!
### QoS

**can you sell better QoS at a higher price?**
- multiple levels per customer
- multiple levels per application service provider

*“the Internet is not reliably crappy enough”*
  - S. Bradner

*“It fails to fail often enough so it looks like it works.”*
  - Mike O’Dell

maybe video will make a difference

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### ISP Business Model

service can be provided by 3rd parties - not just by carriers

a quote from an IETF mailing list

Hi Roy,

I still don’t understand why it is a "users" choice where the "services" are executed - I would have thought that this would be networks choice

and ISP does not profit from applications using network - i.e., Internet is a commodity

*“We do not know how to route money”*
  - Dave Clark
Network Security

e2e means security is an end system responsibility
end systems under relentless attack
  worms, versus, spyware, ...
Internet infrastructure under occasional attack
  DNS root servers, routers, management systems, ...
Internet does not protect end system
  makes sure the worm is delivered promptly

Thus

Internet & IP networks
by definition - to telephone folk & regulators
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”

Yesterday’s Internet (~2000 in US)
pure ISPs (i.e., not telco carriers)
companies that just brought you the Internet
some offered other services
excess bandwidth in core
bottleneck in last mile
ISPs were e2e (and thus neutral)
innovation platform
Today’s Internet (in US)

- few pure ISPs
  - mostly telephone carriers
- excess bandwidth in core
- less bottleneck in last mile
- ISPs are mostly e2e (and thus neutral)
  - end sites generally not e2e - NATs & firewalls
- harder to innovate to residences
- still innovation platform for enterprises (b2b)

Wire-Line Telco Future

- regulators have a reason to worry
- wire-line carriers are in trouble
  - move to cell phones
  - no extra value from ISP business
  - hi-value fixed phone business moving to VoIP
  - must-serve requirements
- move to IP-TV will not help
  - cable infrastructure exists and is cheap
  - no way for telco to compete on price and make a profit
States

telco carriers protected by state governments
  fear of what would happen if they failed
  e.g., laws against municipal networks
  e.g., attempts to regulate VoIP

Washington

FCC & congress generally act in the interests of the telco carriers
  e.g., FCC removed most regulations on DSL and new fiber & imposed unbalanced e-911 rules
major “network neutrality” debate
debate over-simplified to be:
  a neutral network means no new deployment
  vs.
  a non-neutral network means no innovation
FCC - 4 “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

Wiretapping

FCC extend CALEA to Internet & enterprises

new FBI proposal that would require reengineering ISPs and might require ISPs to control what applications run over their nets
Tomorrow’s Internet?

- a net designed to block traffic that the carriers do not get paid 3 times for
  - already I pay my ISP, Google pays their ISP
- a net designed to support wiretapping
- a net where you have to get FBI approval before you can deploy a new application
- little or no real competition
- little or no innovation (must depend on carriers)

i.e. a traditional telephone network

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Tomorrow’s Internet?

community nets & ad-hoc wireless nets