

# 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

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## 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  
<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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## But! - e2e Means

no QoS!

no ISP business model!

no network security!

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## 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

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## 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

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## Thus



Internet & IP networks

by definition - to telephone folk & regulators

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## 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”

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## 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

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## 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)

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## 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

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## 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

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## 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

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## 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*

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## 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

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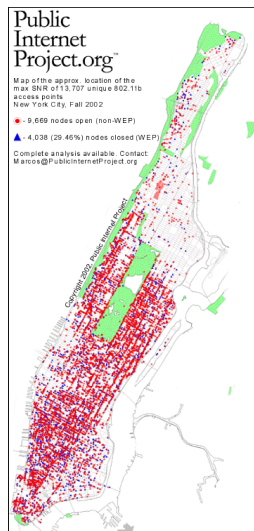


## Tomorrow's Internet?

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

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