
Witness to the Evolution: IP from has-been to is-all to ??

Scott Bradner
IPTCOMM
8/1/11

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Agenda

- ◆ future & history
- ◆ death of the Internet predicted (film at 11?)
- ◆ now
- ◆ future?

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Pre-IP: Networks

IBM SNA

exclusive use circuits

operator controlled network



AT&T

IN

operator determined QoS requirements

regulated monopolies

revenue from communications

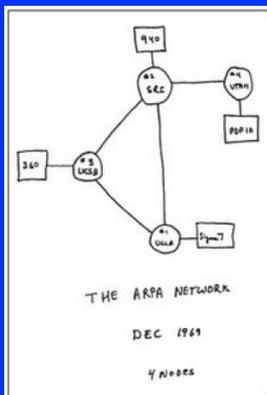


common carrier

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Packets & IP



packets

Internet in 1983

overlay network

common bearer service

e2e & “stupid network”

~~QoS~~

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What Did Teleco Think?

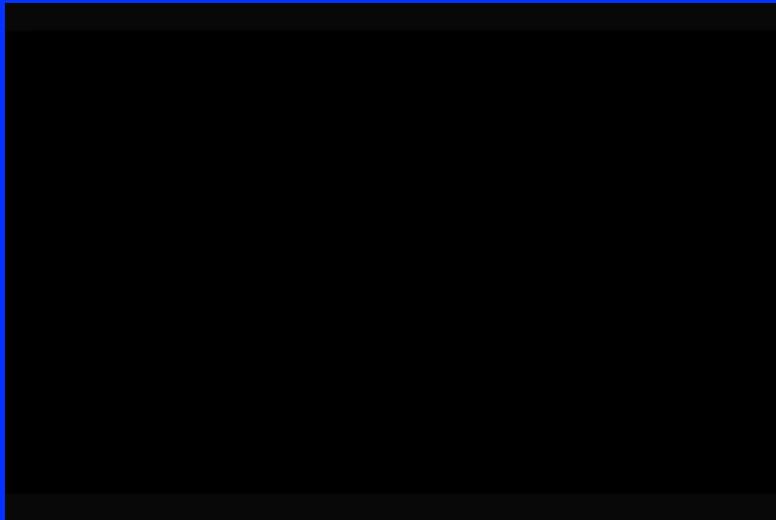


by definition

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Teleco Vision of the Internet's Future



Touch of Evil - 1958

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IP Must be a Dead End

IBM no-bid on IMP solicitation



X.25 - reliable teleco data transport

AT&T at 1972 ARPANET demo & 1999 gigalapse

OSI - protocol suit & GOSIP

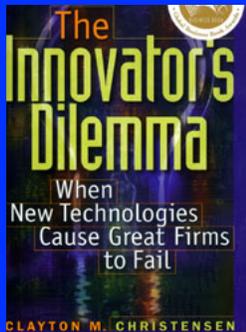
IBM “you can not build a corporate data network with TCP/IP” - ca 1992



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Good Enough?



what is the Internet good for?
- a good tussle question

remember MCI's frame relay service

fight in IETF psudeowire
use Internet for what it can do
or “fix it” to do specific new function
e.g., QoS

cede low end



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A Common Predicted Cause of Death

~~QoS~~
WIRED



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A Second Predicted Cause

\$

“we do not know how to route money”

Dave Clark



i.e., carrier is not in value path

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But The Internet Did Not Die

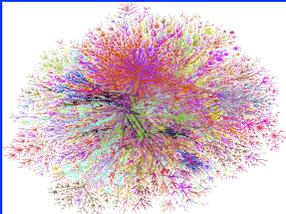


Peter Steiner
The New Yorker,
5 July, 1993

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But The Net Did not Die



the Internet matters
1.8 B people
700 M hosts
200 M web sites

replacing all of old telecommunications
infrastructure

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What Did the Internet Give Us?

Google

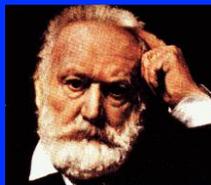


generative

unrestrained communication
bypass government controls

unrestrained innovation
disrupt old business models
enable new ones

e.g., newspapers



the Internet is a
“parent revolution” chaos?



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Chaos

What achieved success was the very chaos that the Internet is. The strength of the Internet is that chaos. It's the ability to have the forum to innovate.

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the strength of our liberty depends upon the chaos and cacophony of the unfettered speech

Judge Stewart Dalzell

the fear of chaos is an enemy of the future

V. Postrel

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Today, What is the Internet?

WWW

just the web?

Google

just google?

*“The Internet does
not work”*

transparent packet delivery?

what does “work” mean?
what is in a SLA?

just a database of user actions?

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Not Just Google



*On the Internet, Google knows whose
tail you have sniffed.*

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Strains



money

privacy

Anonymity vs attribution

security

governance



Basic Questions

in 1994 I said there were two basic questions:

“Who says who makes the rules?”

“Who pays for what?”

these questions are still unanswered

Complication: Content Fixation



some 2008 numbers

| | |
|---------------------------------|-----------|
| US telecommunications services: | \$297B |
| Hollywood: | ~\$10 B |
| B-B ecommerce: | \$3,482 B |
| B-C ecommerce: | \$292 B |

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Future Feature: Regulation



what can the regulators see?

<\$300 B telecommunications

>\$3.5 T e-commerce

Internet too important to leave to the geeks

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Future Feature: Governance



the Internet operates with *"the total absence of rules"* it is a *"moral imperative"* to fix

French President N. Sarkozy

make sure that the Internet does not erode the *"culture, values & traditions"* of the people

Malaysia at the ITU

worried about social disruption

worried about IPR

worried about users

what is the law court for the Internet?

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Future Feature: attribution



"we need to reengineer the Internet to make attribution, geolocation, intelligence analysis and impact assessment -- who did it, from where, why and what was the result -- more manageable."

ex-NSA director Mike McConnell



planning for military or cyber response to cyber attack

Wall Street Journal 5/31/11

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Future #1: E2E Internet



dynamic innovation
creating wide spread wealth

challenging the social order
challenging ISP business models

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Future #2: Unregulated Carriers



enriching carriers
carrier driven “innovation”
inhibit unapproved content &
applications

(benign) dictatorship?

partnering with traditional businesses
merging with content owners
coddling the social order
chasing dreams of participating in value
chain

few new entrants
at any level

the old AT&T without a balancing force

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Future #2: Unregulated Carriers

ACLU vision of a bad future

INTERNET PACKAGES

BROADBAND INTERNET SERVICES INC.
"Your connection to the world"

Internet packages
Depending on where you live,
you can choose from up to 2,000 web sites!
More surfing choices than ever before!

Basic \$69.99 per month

- Access to 200 shopping sites
- Over 100 entertainment, sports and movie sites
- Top 6 news sites
- Top 30 blogs
- Gaming, file sharing, VPN traffic not permitted

Premium \$99.99 per month

- Access to 400 shopping sites.
- Over 200 entertainment, sports and movie sites
- Top 20 news sites
- Top 40 blogs
- 15 hours of gaming per month
- 10 Gigabytes of file sharing and VPN traffic

Super-premium \$149.99 per month

- Access to 1,000 shopping sites
- 400 entertainment, sports and movie sites
- Top 60 news sites
- Top 1,000 blogs
- Unlimited gaming, file sharing, VPN usage
- FreeSurf® - access to most non-partner sites*

* access speed and availability not guaranteed

TERMS: Broadband Internet Services Inc. reserves the right to alter available partner sites at any time. All included sites have been certified by FamilyShield as free of obscene or controversial material, and come with ChannelBlocker® for additional protection. ChannelBlocker® filtering can be turned off for an additional monthly fee of \$3.99. Transmission of encrypted materials not permitted. Complete terms online.

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Future #3: Regulated Carriers



depends on the forbearance - worst case
carrier driven "innovation"
partnering with traditional businesses
coddling the social order
few new entrants
regulations to 'protect the consumer'
many new taxes

i.e., the old AT&T with the force of law



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Future #4: International Regulation



steering technology
protecting traditional businesses
 who are players in the traditional SDOs
protecting the social order
 driven by the most conservative countries



interconnection regulations
settlement/cost sharing
defining services



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Future #5: Reengineered Network(s)



to meet attribution requirements
to meet wiretapping requirements
to meet filtering requirements
to meet IPR tracking requirements
to meet QoS requirements
to meet billing requirements
to optimize for particular applications



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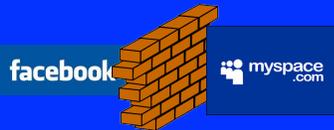
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Future #6: Multiple Internets



per-government govtnets
per country networks
protected by filters
per carrier networks
per company networks

cross network communications limited
and billed for



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Future #7: Transparent Users



governments watch everything
in real time or after the fact
companies watch everything
in real time

the bad guys can easily hide bad stuff
from governments
only the good guys are exposed
harder to hide activities from companies

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Internet in 2020



there will be an “Internet” in 2020
at least as a brand name

likely to be a mix rather than pure anything

what it will actually be is up to us

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Thank You

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