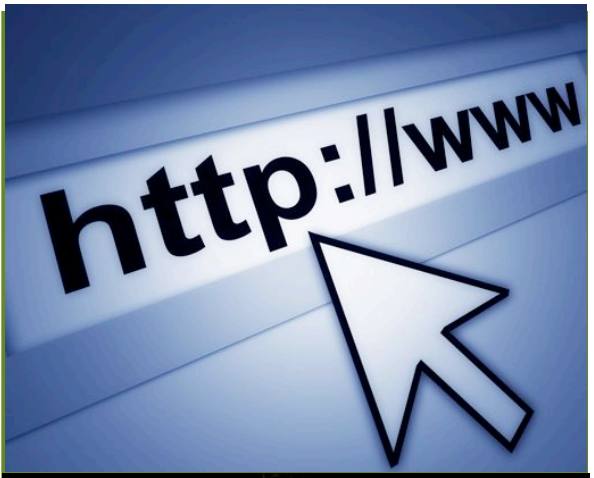
UC Berkeley School of Information



Advent of the Internets

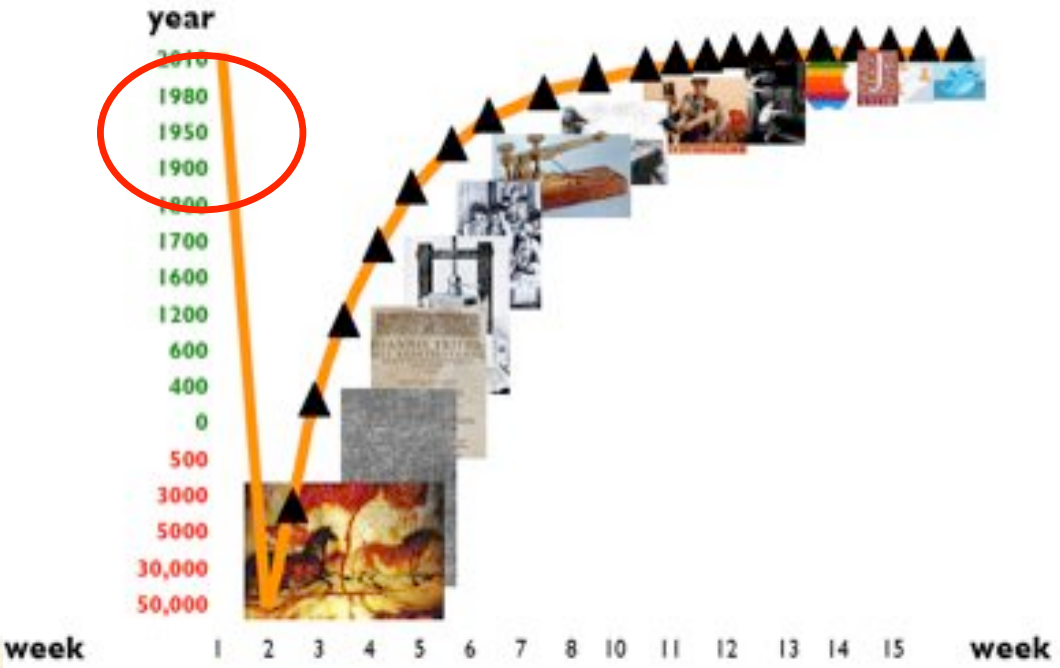
Geoff Nunberg

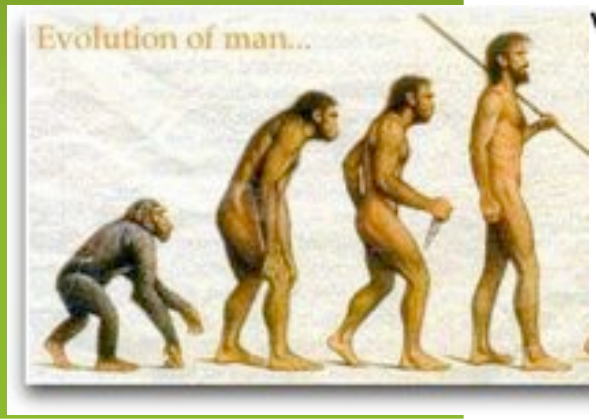
i103 History of Information

April 18, 2013

Where We Are

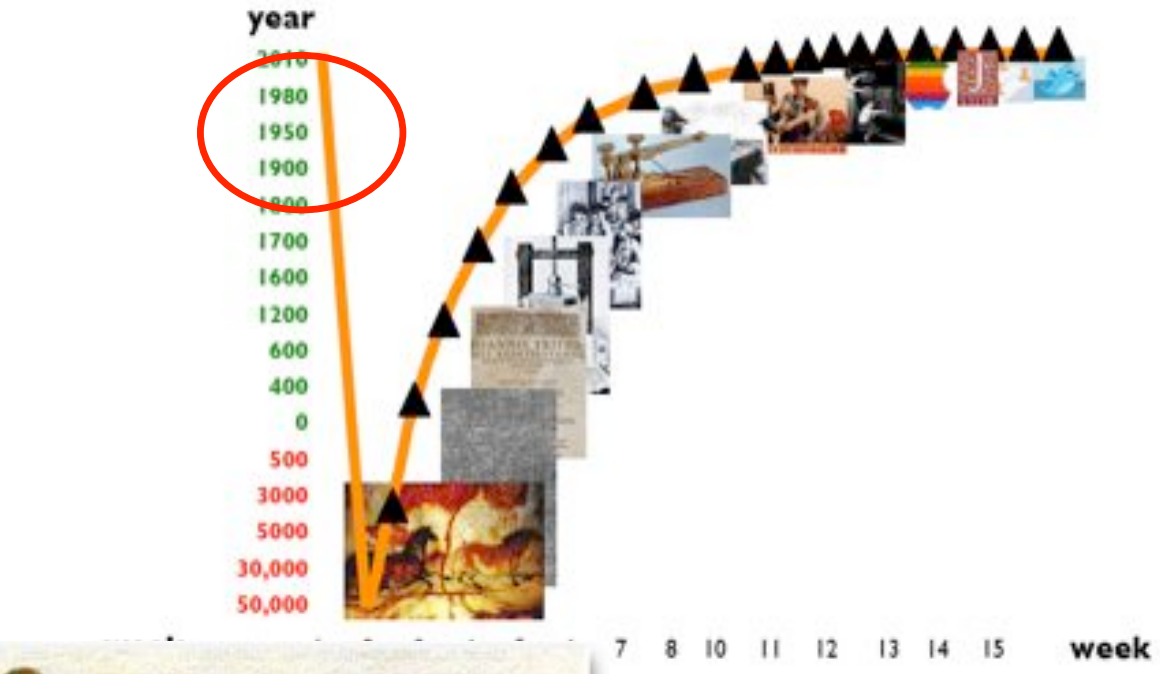
The march of progress...

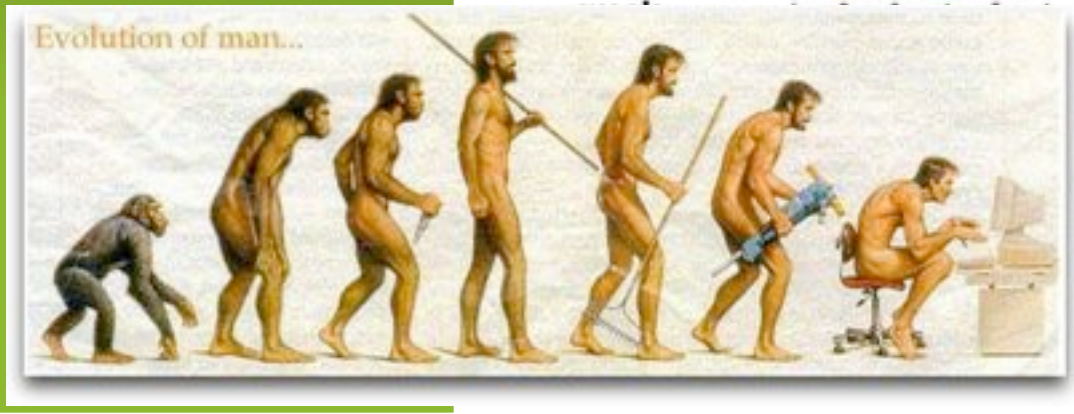




Where We Are

The march of progress...(?)





Where is the Internet? Where is the Web?


A Billion-Dollar Turning Point for Mobile Apps

The path for Internet start-ups used to be quite clear: establish a presence on the Web first, then come up with a version of your service for mobile devices. Now, at a time when the mobile start-up Instagram can command $1 billion in a sale to Facebook, some start-ups are asking: Who needs the Web?

Smartphones are everywhere now, allowing apps like Foursquare and Path to be self-contained social worlds, existing almost entirely on mobile devices…

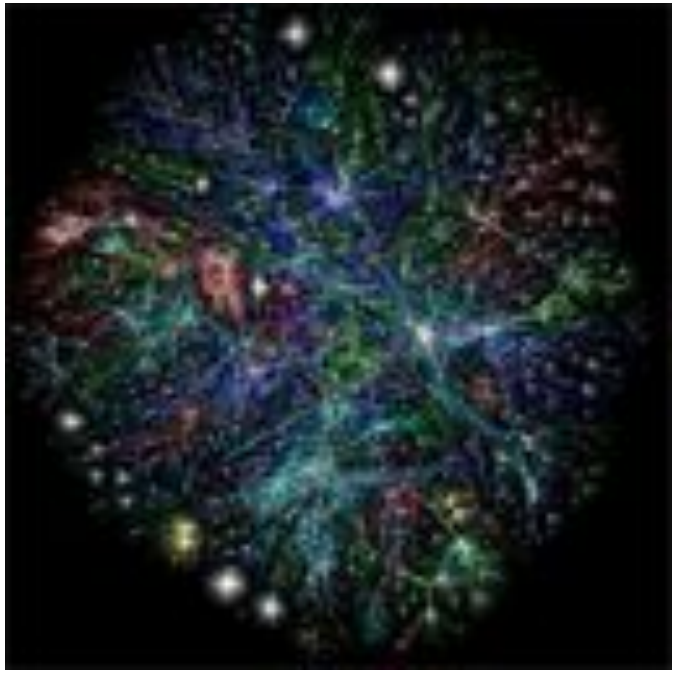
In that context, the Instagram deal looks like something of a turning point, as even the Web giant Facebook tries to get a better grasp on a market that requires a rethinking of old rules.

"For decades, the center of computing has been the desktop, and software was modeled after the experience of using a typewriter," said Georg Petschnigg, a former Microsoft employee who is one of the creators of Paper, a new sketchbook app for the iPad. …

What makes a "technology"?

The **Internet** is a global system of interconnected computer networks that use the standard Internet protocol suite … to serve billions of users worldwide. It is a *network of networks* that consists of millions of private, public, academic, business, and government networks…that are linked by a broad array of electronic, wireless and optical networking technologies.

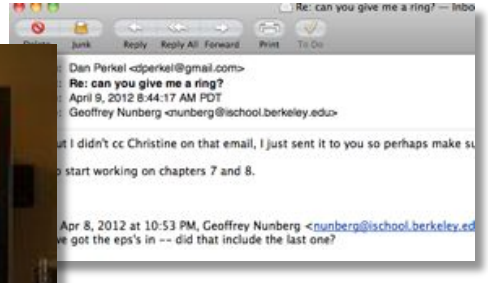
--a well-known infallible source of conventional wisdom



Visualization from Opte Project
Asia Europe/Africa
Latin America
North America
Private Networks (RFC1918)

What makes a "technology": Devices

What makes for a "technology"?: Content



Looking for the Internet: W was right!

The "internet": a technology, a channel, a medium, a "place," a set of applications…?

Contrast "radio," "television" etc.

a technology?

a network?

a set of applications?

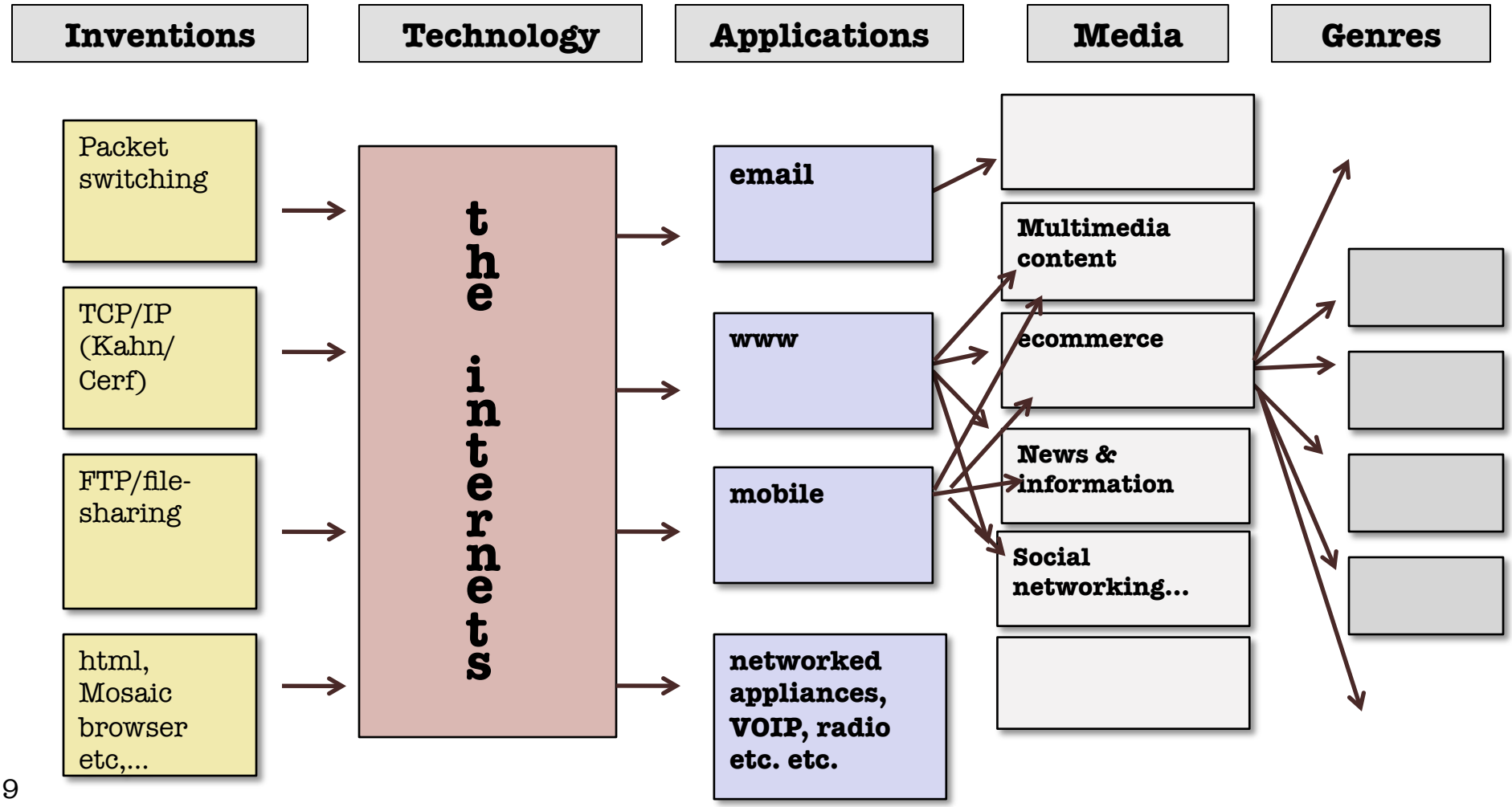
a communications channel?

media?

a place?

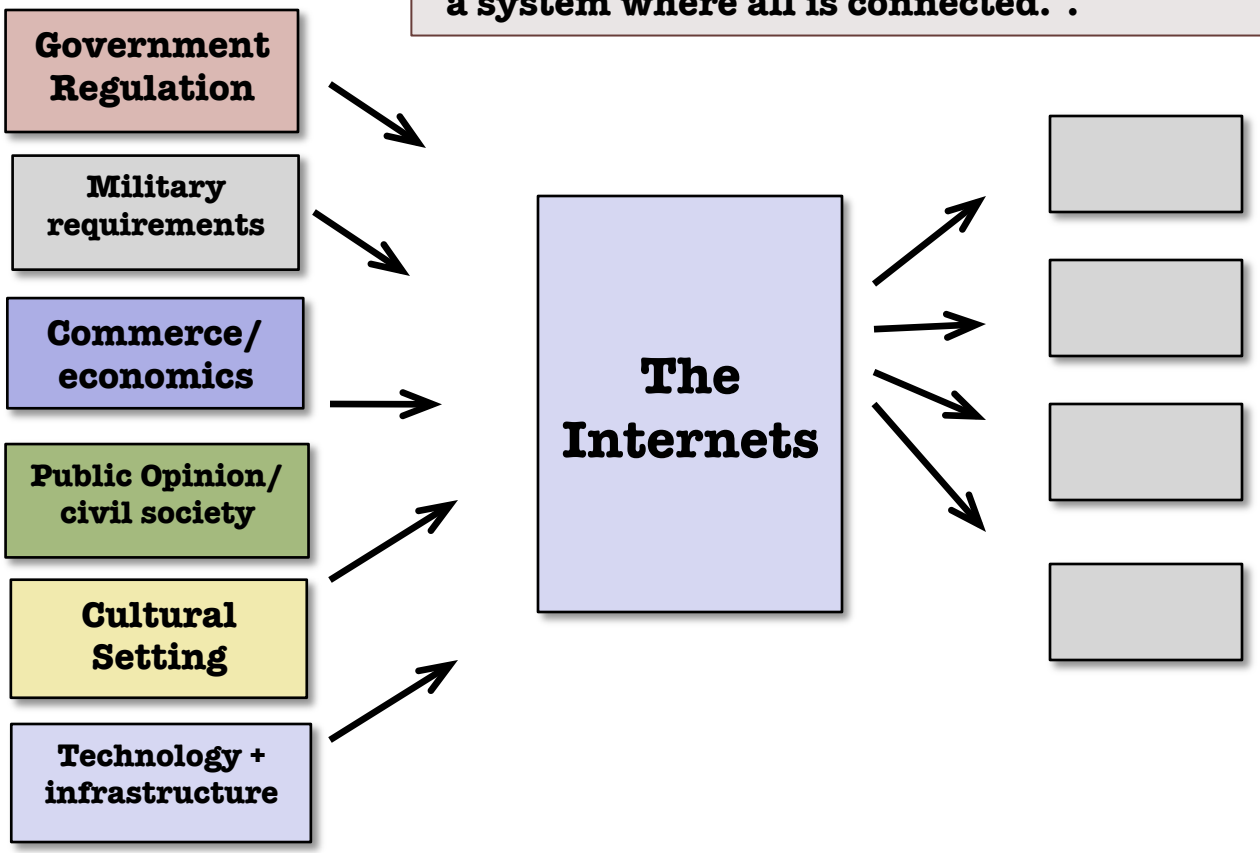
"a vast unintended consequence"

Inventions, Technologies, Applications, Media: not an easy story to tell



Multiple Influences

"un système ou tout se tient"
"a system where all is connected.".



Technological Bases of the Web

Communications protocols/Packet switching

Physical Networks

Addressing system

Hypertext transfer protocols

Browsers/ Graphical browsers

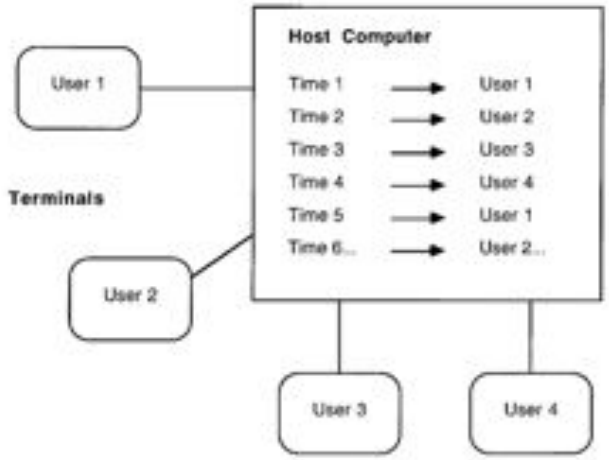
Indexing & search

Broadband

Communicating

intra-machine

time-sharing



Communicating

Hughes' telegraph, 1855

Edison Stock Ticker, 1869

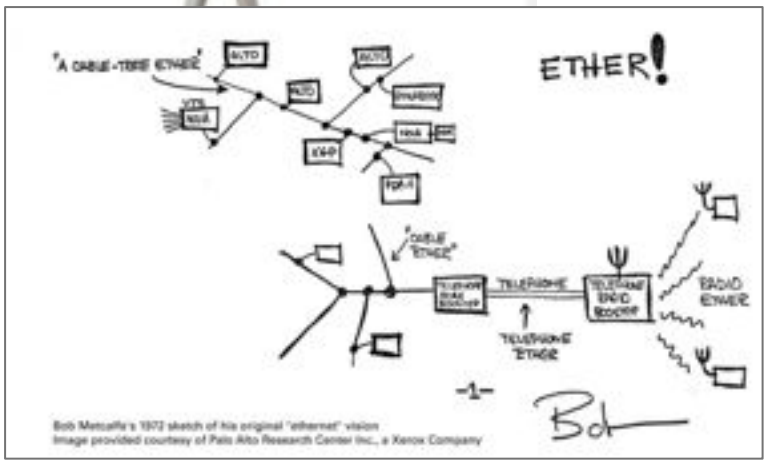
Bob Metcalfe at Xerox PARC in 1973

different machines

computer to printer

[the stock ticker]

Ethernet: computer to printer



The Sixties Setting

1962

1961

1960

Doctor Strangelove (Stanley Kubrick), 1964

1957

Technological Beginnings: Packet Switching

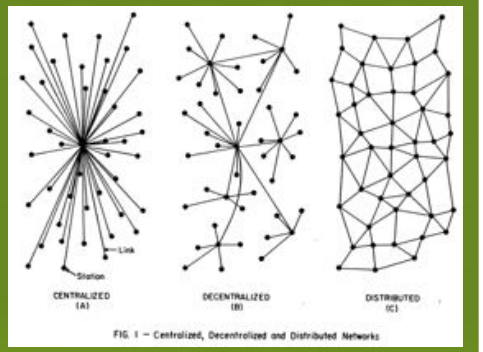
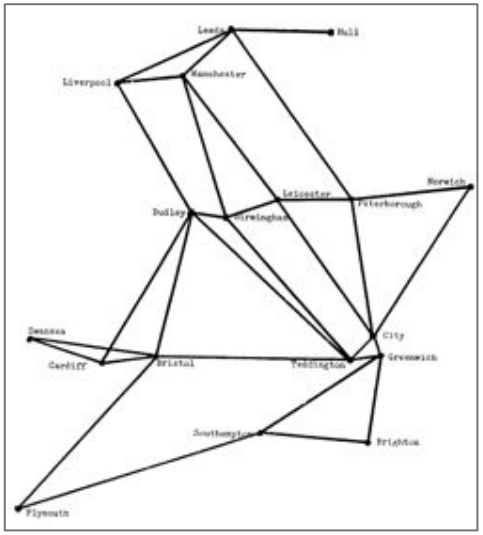


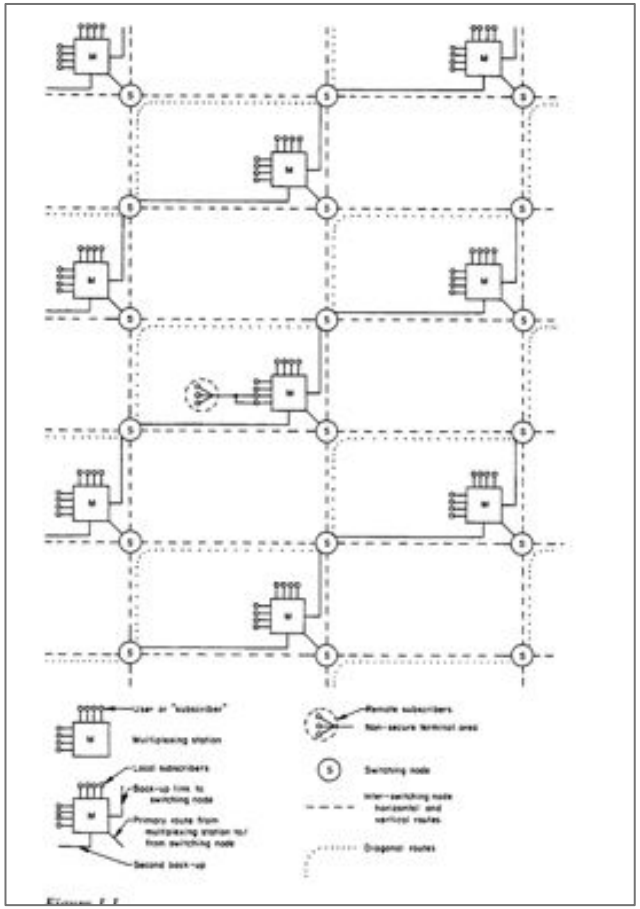
FIG. 1 — Centralized, Decentralized and Distributed Networks

Paul Baran, "On Distributed Communications,
1964 RAND report

Switching also maximizes network efficiency…

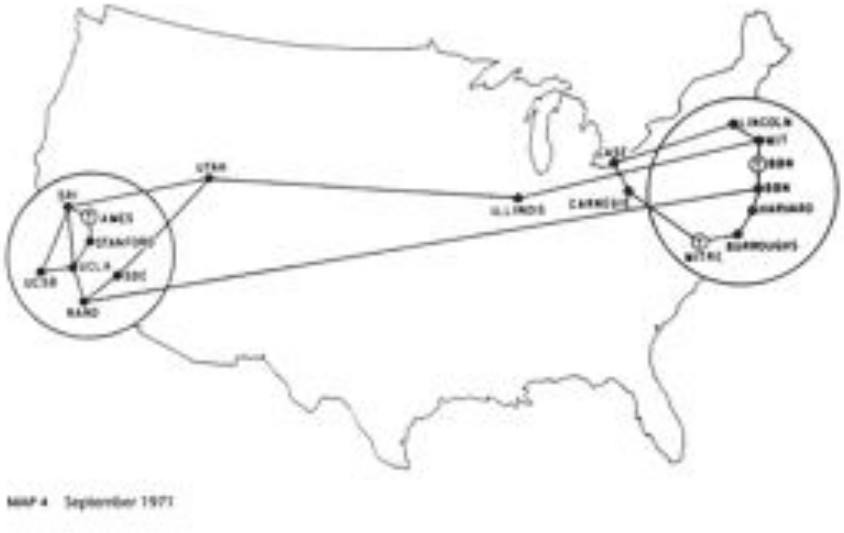


Donald Davies proposed
UK network 1967



Technological Beginnings: The Arpanet

1969: ARPA (Advanced Research Projects Agency of DOD) (later DARPA) creates Arpanet, linking time-sharing computers at four (later 20) research sites by telephone lines.



Arpanet 1971

Technological Beginnings: 60s & 70s

1971: File Transfer Protocol (FTP) permits easy exchange of files between sites.

1974 Bob Kahn and Vin Cerf ("Father of the Internet") demonstrate Transfer Control Protocol (TCP), which enables machines to route & assemble data packets.)

Internet Development:80s

1980's: NSF funds national backbone to connect computer research centers. Other gov't-funded networks (BITNET, CSNET) emerge.

1980 Usenet established at UNC Chapel Hill as "the poor man's ARPANET." User groups classified as comp., news., rec., talk., etc.

1980's: Commercial networks begin to emerge.

1983: Domain Name System (DNS) introduced to keep up with growing number of hosts, introduces domain names .com, .gov, .mil, .edu, etc./ name servers translate into IP numbers…

Late 1980's: First Internet Service Providers emerge

1989: Australia, UK, Germany, Italy, etc. join Internet

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1980's: Comm

1983: Domain

number of ho

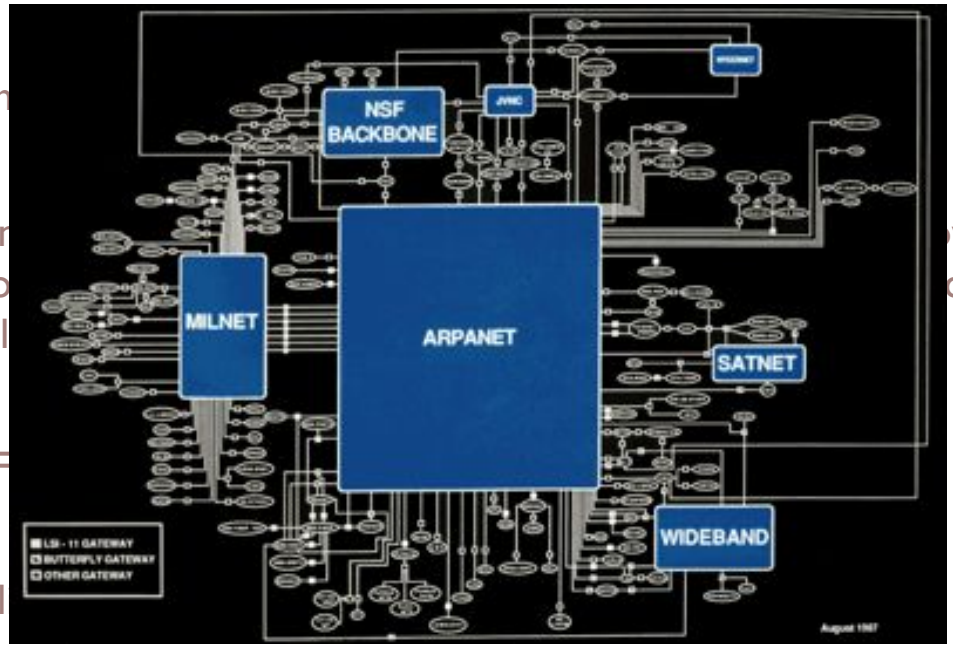
servers transl

Late 1980's: F

1989: Austral

wing

c./ name



Internet 1987

Internet Development:90s

1990: ARPANET shuts down

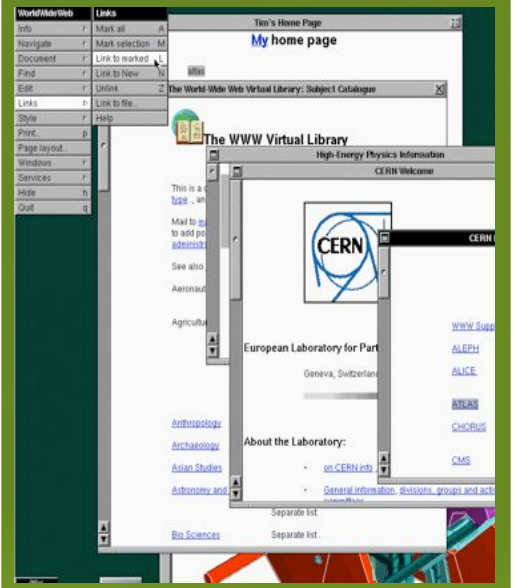
1991: NSF removes all restrictions on commercial use of Internet

1998: Internet Corporaation for Assigned Names and Numbers (ICANN) established to oversee assignment of domain names and IP addresses, formerly under control of US government.

The Origins of Email

1971: First network email program created by Ray Tomlinson at Bolt, Beranek & Newman (BBN), with "USER@hostname.domain" addressing system.

- But public access to email doesn't begin until 1988, when MCI mail is linked to the Internet
- 1975: 1st email client MSG (permits "forward," "reply")
- Email becomes ARPANET's most popular service ("unplanned, unanticipated, and mostly unsupported"—Admin. Report)



The Emergence of the WWW

1945: Vannevar Bush writes "As We May Think" in *The Atlantic*; envisions Memex machine to follow links between documents on microfiche

1965: Ted Nelson coins the term "hypertext" to describe "compound documents" formed by links among documents

1990: Tim Berners-Lee of CERN coins the term "World Wide Web"; develops HTTP protocol for transmitting hypertext documents between clients and servers and and first Web browser making use of hypertext links.

Sir Tim

World Wide Web

The WorldWideWeb (W3) is a wide-area hypermedia information retrieval initiative aiming to give universal access to a la

Everything there is online about W3 is linked directly or indirectly to this document, including an executive summary of th Asked Questions .

What's out there?
Pointers to the world's online information, subjects , W3 servers, etc.
Help
on the browser you are using
Software Products
A list of W3 project components and their current state. (e.g. Line Mode ,X11 Viola , NeXTStep , Servers , Tools ,
Technical
Details of protocols, formats, program internals etc
Bibliography
Paper documentation on W3 and references.
People
A list of some people involved in the project.
History
A summary of the history of the project.
How can I help ?
If you would like to support the web..
Getting code
Getting the code by anonymous FTP , etc.

The First Web Page

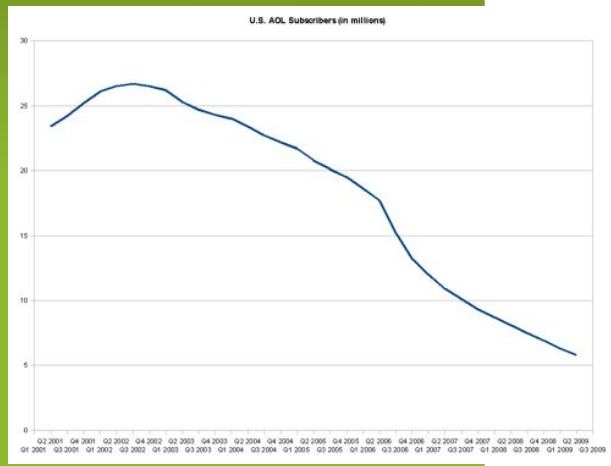
The Emergence of the WWW

Gated communities:

ca 1990-: Pay-based online services like AOL, Compuserve, and Prodigy market connectivity + proprietary content (games, chat rooms, e-commerce, instant messaging etc.) to users unfamiliar with computers.

By 1998, AOL has 15m. members.

AOL subscribers, 2001-2009



Hayes Smartmodem 1981

2000: AOL merges w/ Time-Warner

2005: gives away free email acc'ts

2009 spun off by Time-Warner

2010 eliminates chat rooms

2011 acquires Huffington post

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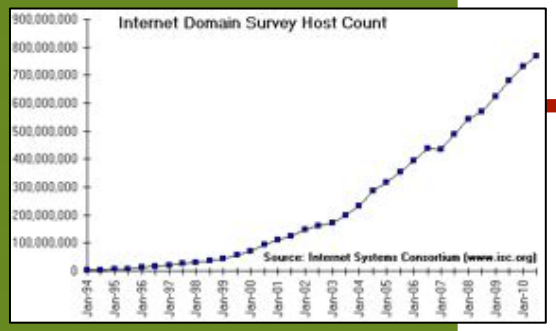
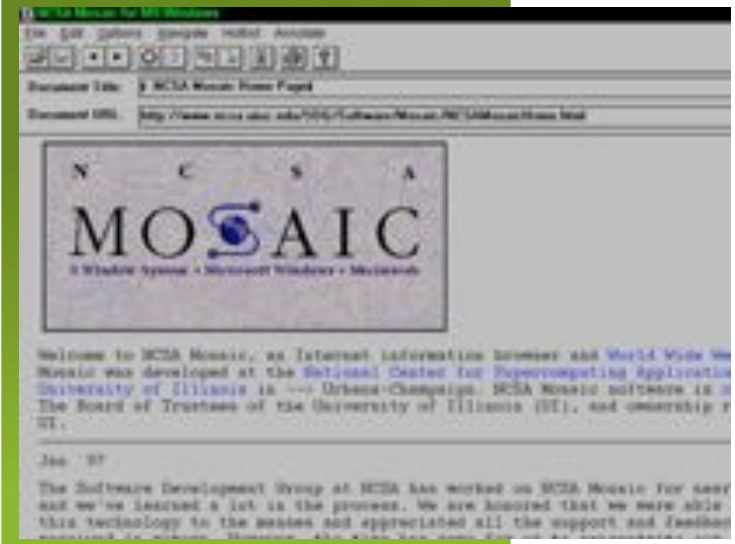
The Growth of the WWW





1993: Mark Andreessen's Mosaic browser released by NCSA, which runs on Windows and permits easy integration of graphics in Web pages.

CERN announces that W3 technology will be available free to everyone.

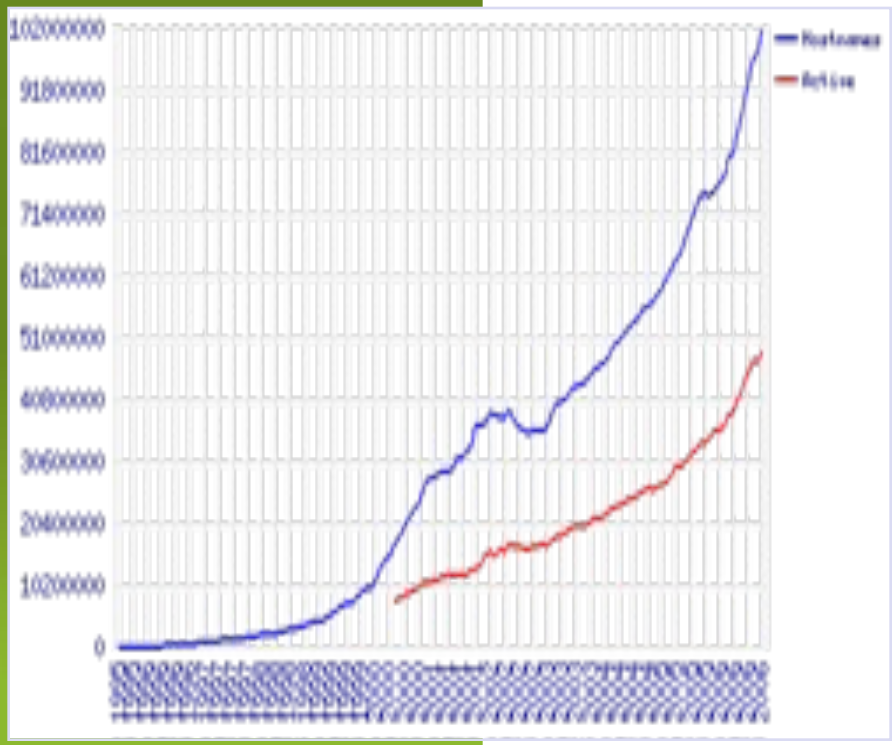
1994: Over 200 HTTP servers; traffic on CERN server has grown 1000-fold since first launched. From the mid-90s on, Internet use roughly doubles every year.

1994: Andressen, now in private sector, releases Netscape Navigator browser.

1995: Microsoft releases Internet Explorer bundled with Windows 95 to compete with Netscape.

1995 AOL makes Internet available to all subscribers

The Web Takes Off

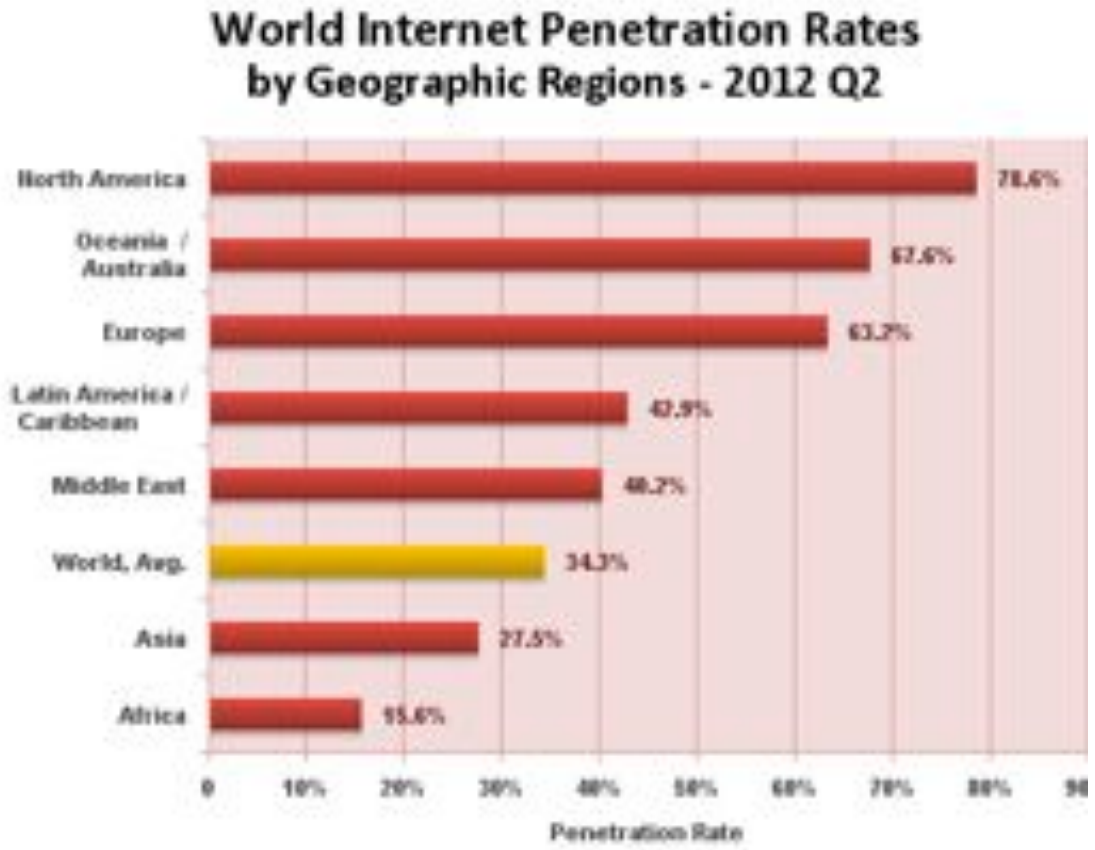


1994-2005: Internet use increases rapidly, driven by email, E-commerce, news & information, pornography & gambling. By 2005 there are an estimated 100m Web sites.

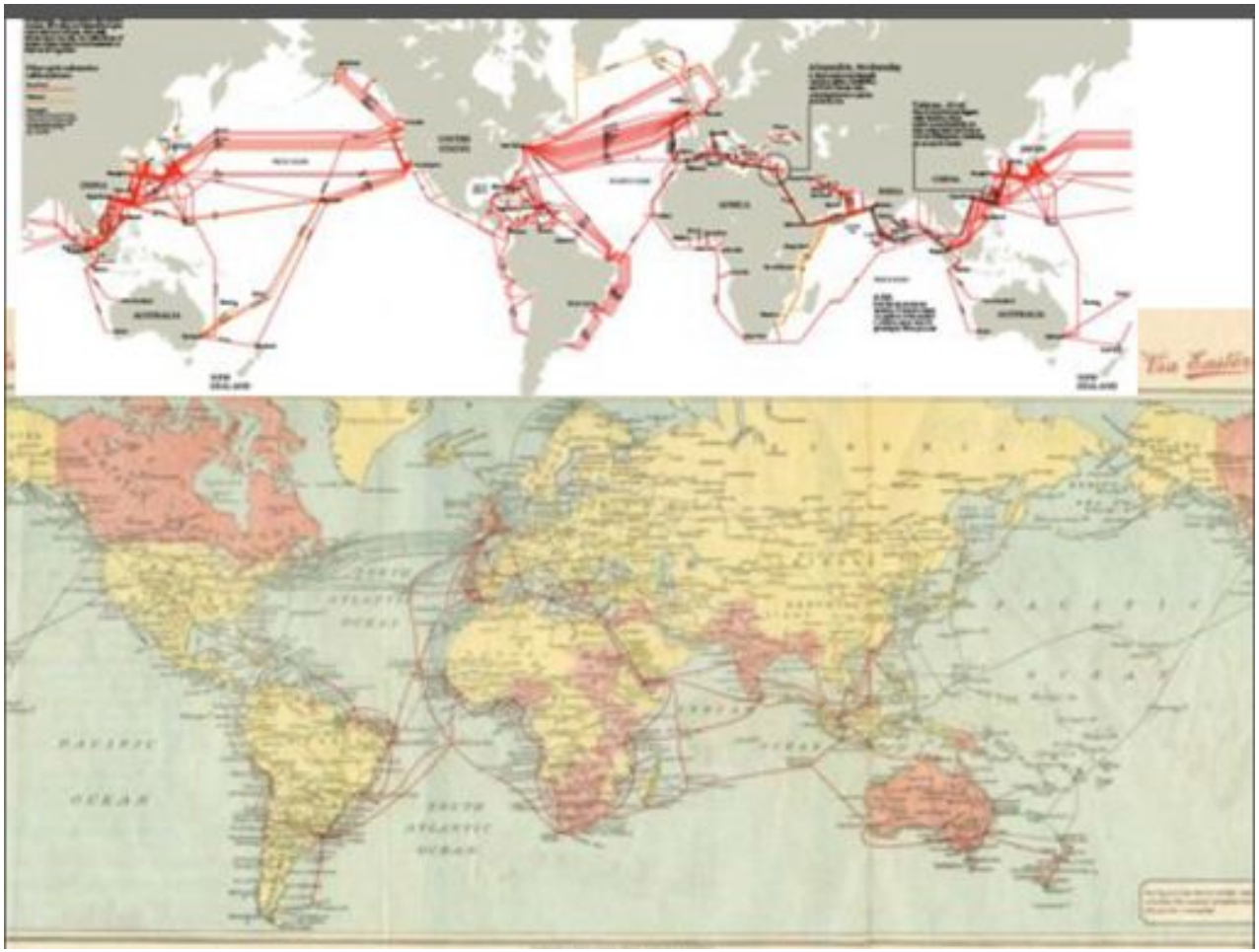
~2000- Growth of broadband enables exchange of audio & video content; blogs and social networking sites proliferate, etc.

2005: 68 percent of American adults and 90 percent of American teenagers have used the Internet.

Disparaties



The Wired World



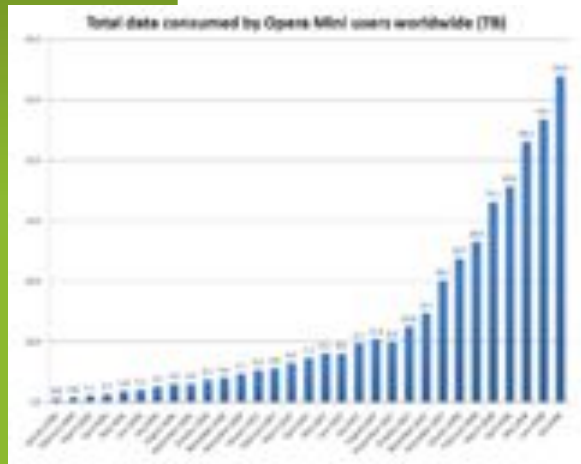
Faster than we expected

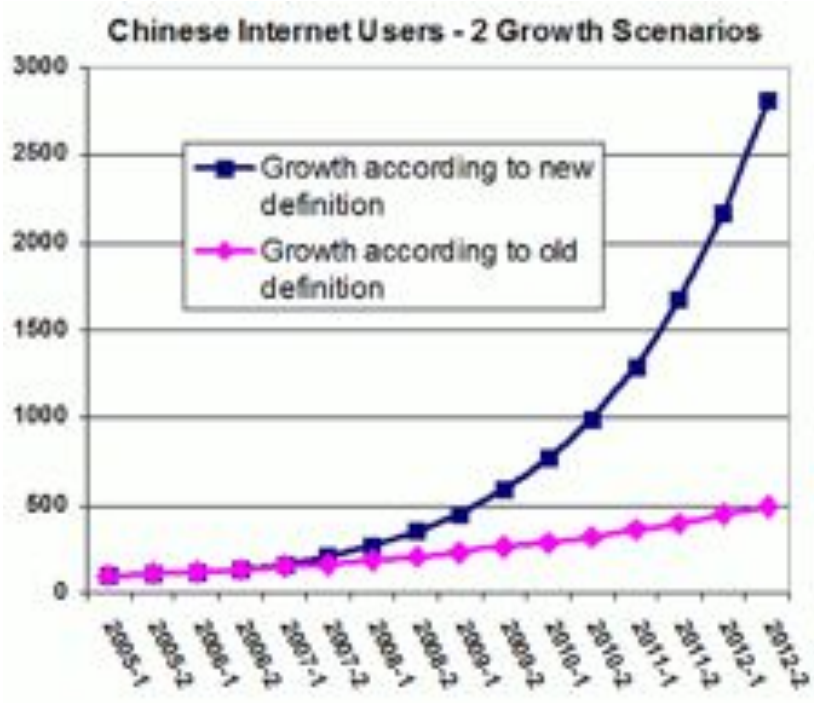
Cisco: mobile connections to hit 10 billion by 2016

By: Dan Graziano | Feb 15th, 2012 at 12:30AM

0 Comments

Filed Under: Mobile





AMD: By 2015 half of world will have an Internet connection

…but not so fast

But in much of world, desire for connectivity creates preference for fixed connections

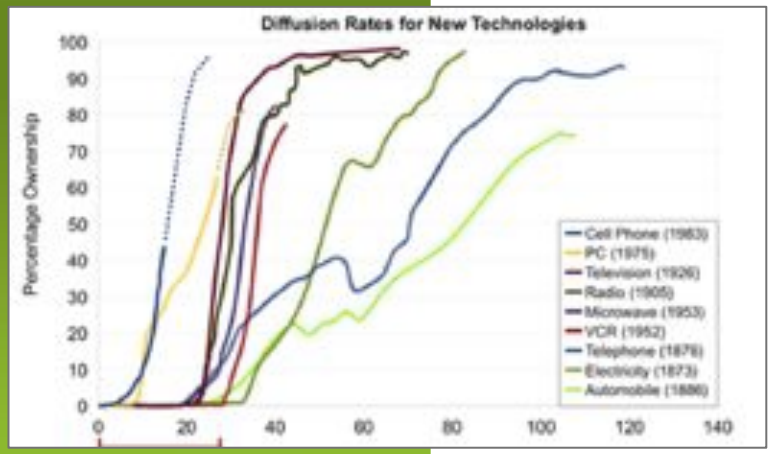
Internet Café,
Accra, Ghana

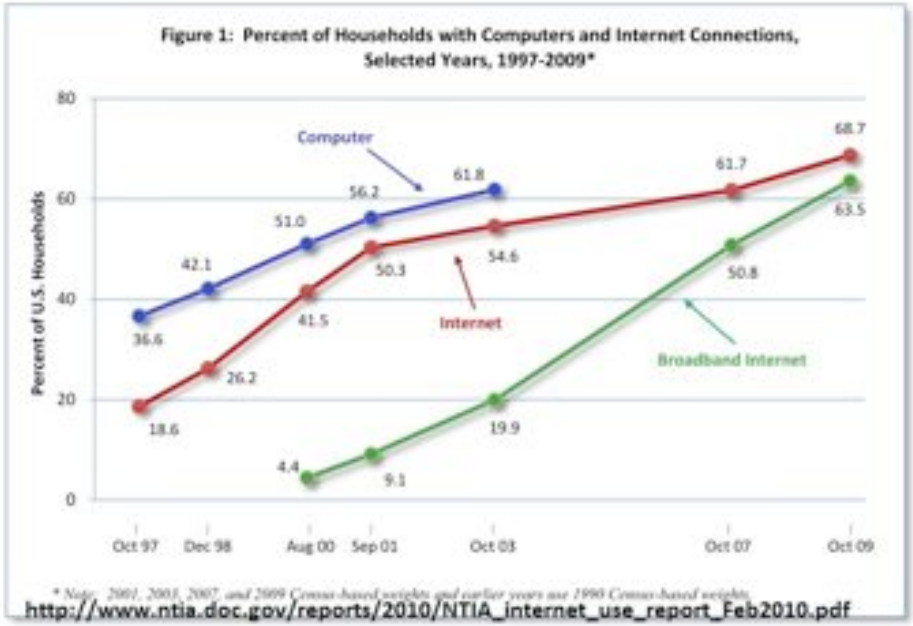
The growth of broadband

US population w/ broadband access:

2000: 3%

2010: 66%



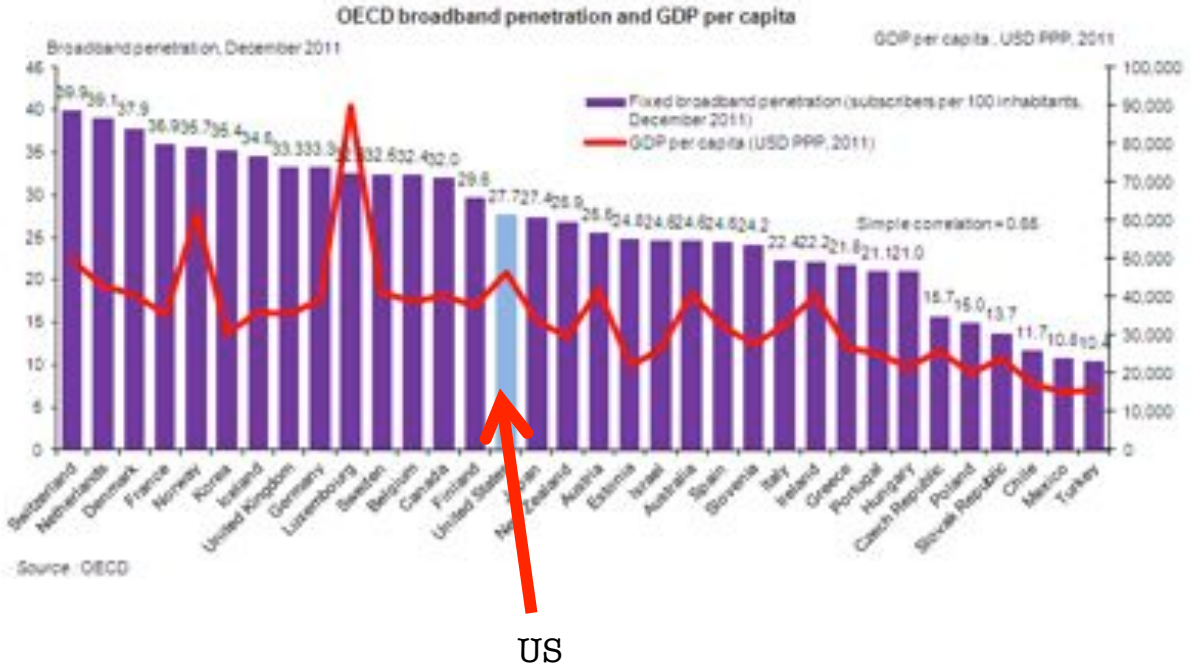


The growth of broadband

But US lags other developed nations…

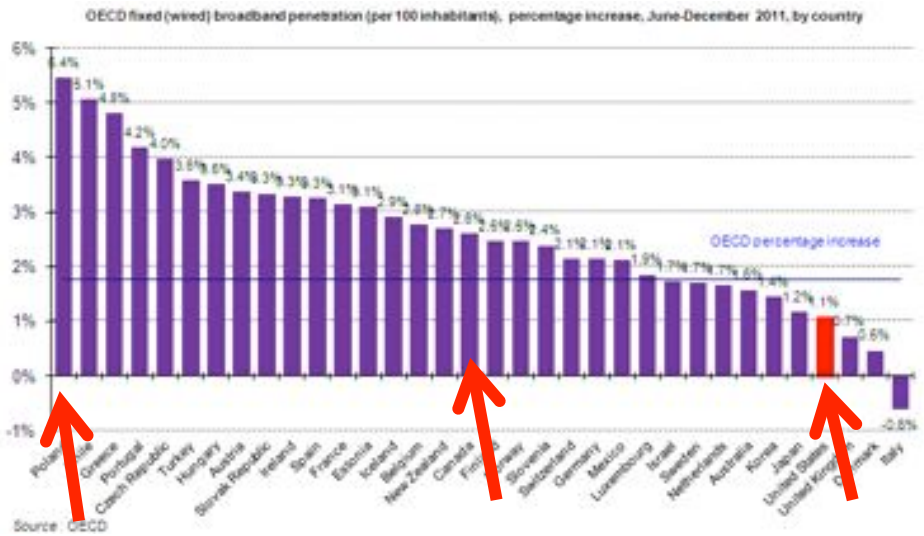
	Country	Q1 '12 Avg. Mbps	QoQ Change	YoY Change
–	Global	2.6	14%	25%
1	South Korea	15.7	-1.5%	9.4%
2	Japan	10.9	21%	35%
3	Hong Kong	9.3	5.4%	1.3%
4	Netherlands	8.8	6.5%	18%
5	Latvia	8.8	18%	38%
6	Switzerland	8.1	11%	30%
7	Ireland	7.3	3.4%	30%
8	Czech Republic	7.1	6.2%	9.1%
9	Belgium	7.1	13%	16%
10	Finland	6.9	16%	39%
...				
12	United States	6.7	12%	28%

Figure 7: Average Measured Connection Speed by Country



Slowing broadband growth

Rate of growth in broadband



Poland

Canada

US

att / comcast / verizon

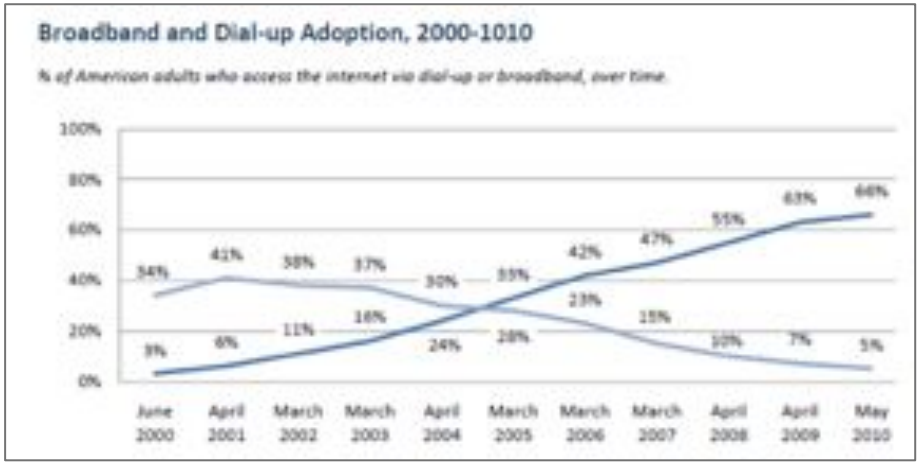
US broadband growth slows to a trickle with only 260,000 new connections

by Om Malik AUG. 14, 2012 - 8:11 AM PDT

CNET › News › Internet & Media › Broadband growth slows in U.S.

Broadband growth slows in U.S.

Following years of double-digit gains, broadband adoption has slowed with 66 percent of Americans using a high-speed connection at home, says Pew Internet.



Assignment for April 20

The *Economist* insists that the "revolution" began "at last" in 1995 and came about in good part because death of distance had arrived. It acknowledges (and we have seen) that similar claims about distance has often been made before but were wrong. Assess the *Economist*'s claim by asking whether it can account for the arguments that Marshall (a very important economist), writing more than 100 years before (the first edition of *Principles of Economics* was in 1890) makes for "localization." Using evidence from both pieces, argue for one against the other, or try to reconcile the two.

Marshall, Alfred. 1920. "Industrial Organization, Continued. The Concentration of Industries in Particular Localities," book IV chapter X (section iv.x.1-15), in *Principles of Economics*. London, Macmillan & Co.

"The Revolution Begins at Last," *Economist*,1995, Sept 30.