Networks Origin and History
Internet Protocols
Intellectual Property

NBA 6120
Lecture #9
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History Of The Internet

ARPA Team

First connections to the internet

- UCLA – Leonard Kleinrock
- Stanford Research Institute
- UC Santa Barbara
- University of Utah
- Bolt Beranek and Newman, Inc. (Boston)

Internet - History & Growth Chronology

1973 - Vinton Cerf & Robert Kahn - designed Internet architecture based on TCP/IP

1979 - Configuration Control Board - contracted parts of infrastructure

1980 - U.S. Department of Defense - adopted TCP/IP, MILNET designed to withstand atomic attack - becomes ARPANET

Early 1980's - ARPANET becomes known as Internet researchers enticed to use CSNet (paid by NSF)

Internet Protocols

- Communication Protocols (TCP/IP) – used to link computers and other communicating devices together
- Computer Languages (HTML) – used to encode the format of web pages
- Communication Protocols (HTTP) – used to retrieve web pages from elsewhere on the network
- Protocols of the World Wide Web (www)
- Graphically oriented Web browsers (Mosaic)

All of this is FREE!

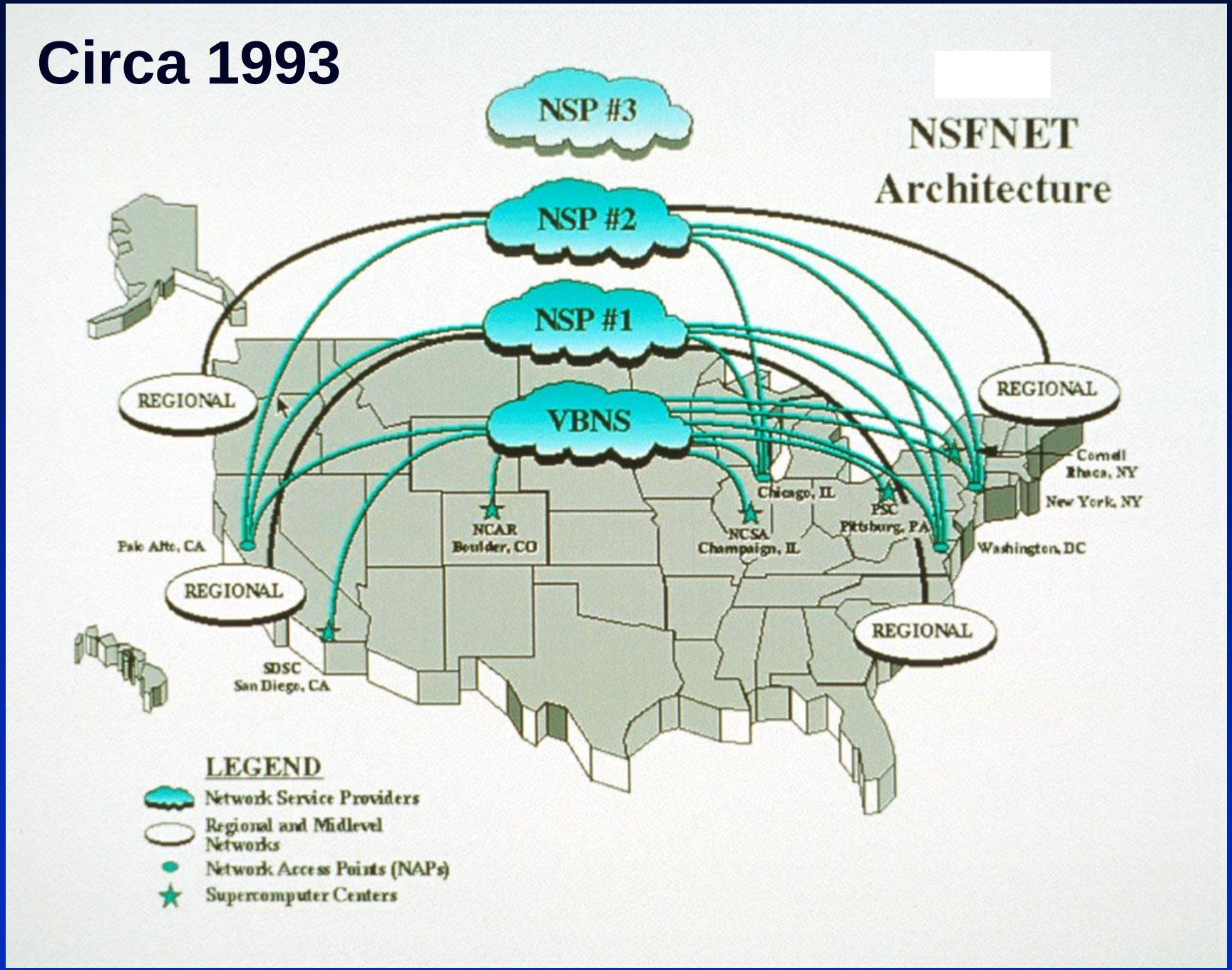
Internet - History & Growth Chronology cont'd

1983 - TCP/IP - becomes standard

1990 - ARPANET - decommissioned and replaced by NSFNet backbone
NSF -expands network to other research communities

1993 - NSF -no longer provides funding for NSFNet backbone
NAP's (network access points) established in four cities

Circa 1993


NSFNET
Architecture
NSP #3
NSP #2
NSP #1
VBNS
REGIONAL
REGIONAL
REGIONAL
REGIONAL
Cornell
Ithaca, NY
New York, NY
Chicago, IL
PSC
Pittsburg, PA
NCAR
Boulder, CO
NCSA
Champaign, IL
Washington, DC
Palo Alto, CA
SDSC
San Diego, CA
LEGEND
Network Service Providers
Regional and Midlevel Networks
Network Access Points (NAPs)
Supercomputer Centers

Internet - History & Growth Chronology cont'd

1993 - Mosaic - Introduced by University of Illinois (Marc Andreesen)

1994 - NSF -links four national supercomputer centers at 155 Mbs (bandwidth to approach 2.5 Gbs) contracts MCI to link other sites

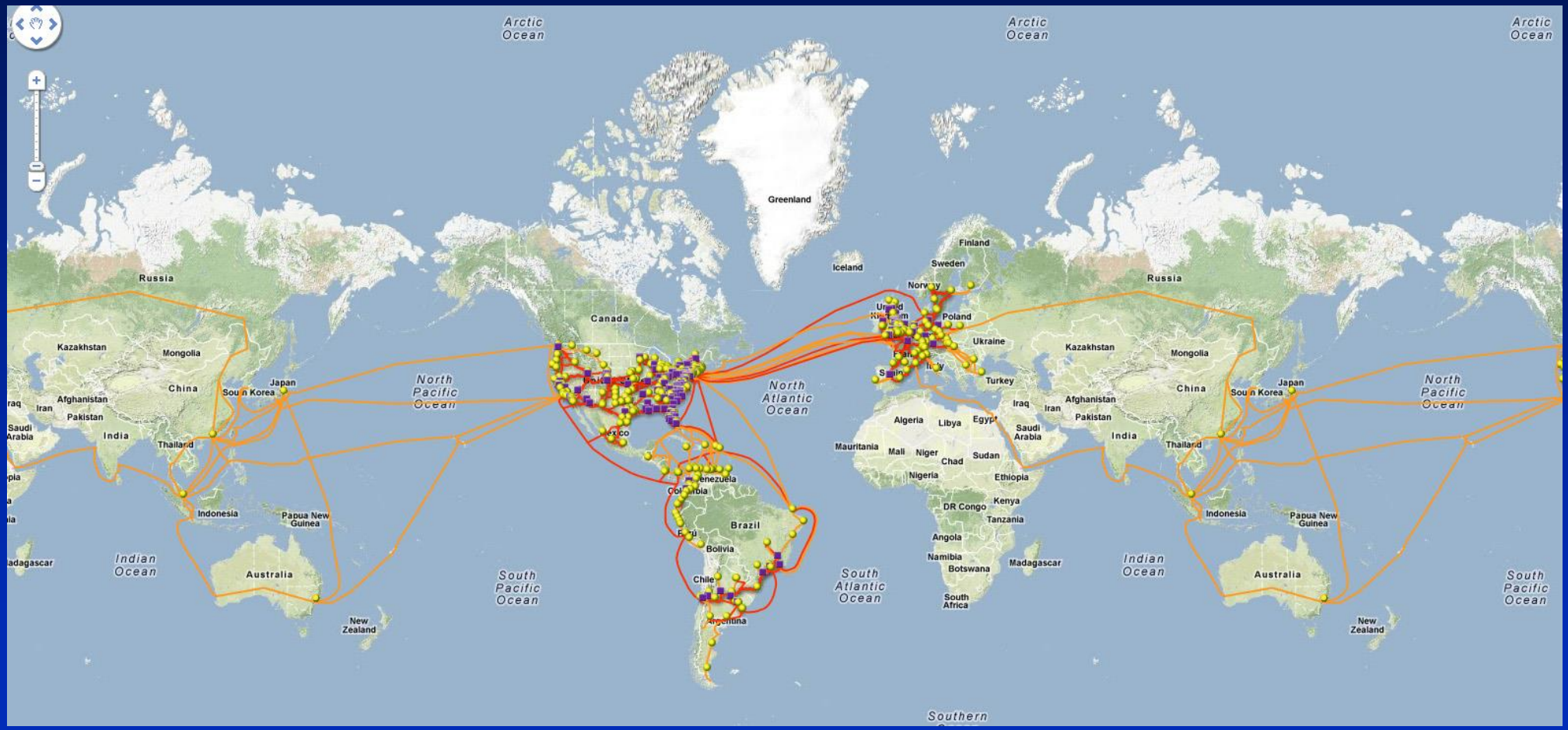
Internet - opens to commercial usage

1994 - Netscape - formed by Jim Clark

Level 3 Communications Network

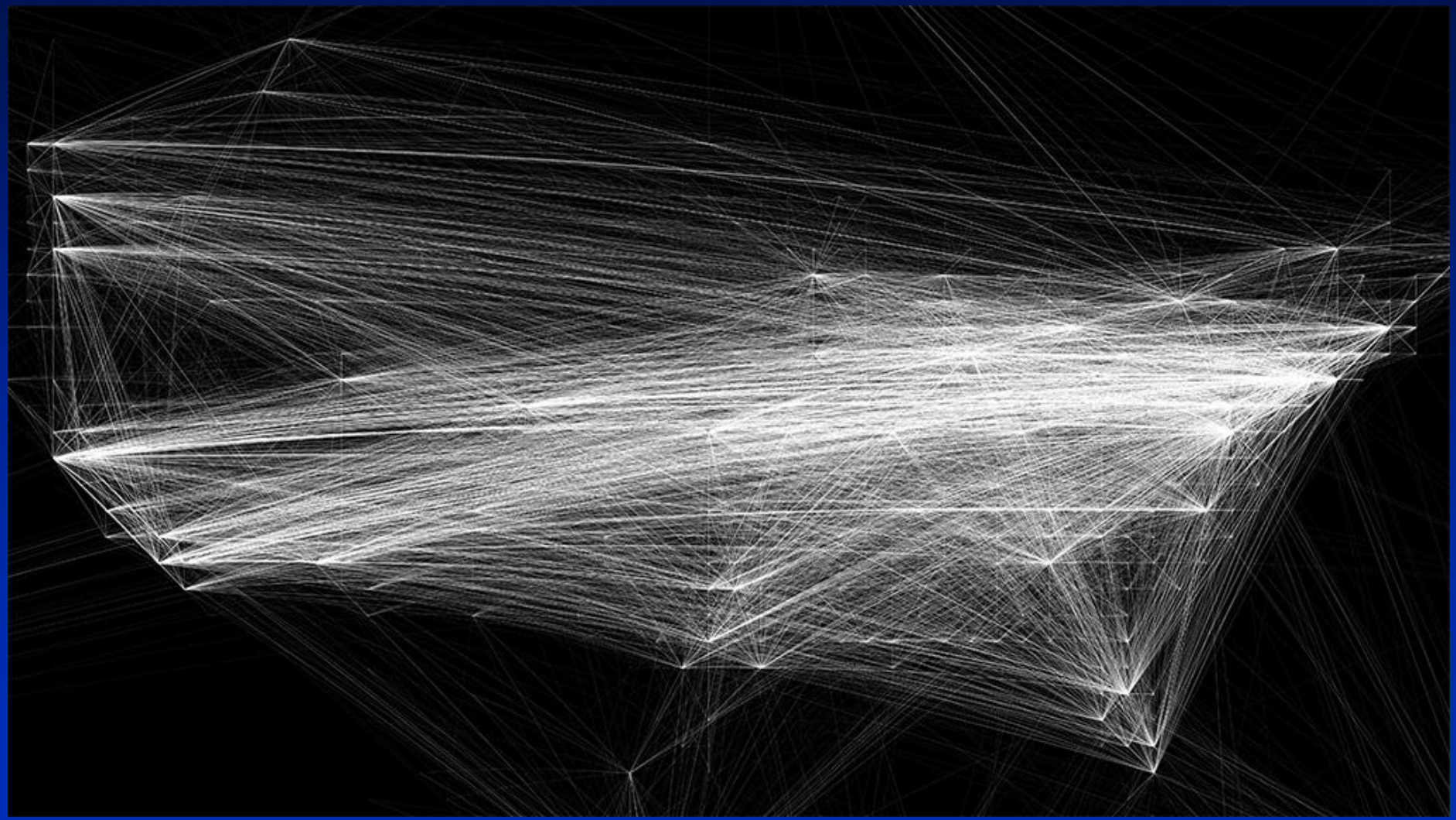
- Level 3 operates one of the largest backbone networks of any internet service provider in the U.S. and Europe. It maintains over 200Gbit/s of transatlantic bandwidth
- Level 3 owns a large amount of dark fiber and leases this fiber to other providers who wish to operate their own backbone between two cities
- When Level 3 built it's network it laid 10-16 empty conduits alongside its fiber
- Largest telecoms and 10 largest ISP's use Level 3

Level 3 Map 2012



Level 3 Map 2012

North American City to City Connections



http://chrisharrison.net/projects/InternetMap/, September 2010

Uncle Sam, Ma Bell And Her Babies: A Timeline

1982 AT & T and the Department of Justice signed consent decree.

- AT & T divests its 22 local Telco's
- AT & T can enter previously restricted arenas
- Baby Bell's prohibited from manufacturing equipment and offering long distance services. They cannot provide content

Uncle Sam, Ma Bell And Her Babies: A Timeline

1984 The AT & T divestiture takes effect.

1987 The F.C.C. scraps rules that limit phone company profits.

1988 Judge Greene agrees to let the Bells offer voice mail and E-mail services, and transmit electronic publishing for others, but not provide content.

Con't: Uncle Sam, Ma Bell And Her Babies: A Timeline

1989 A seven-year ban on AT & T's entry into electronic publishing is allowed to lapse.

1991 Judge Greene removes the information services restriction from the Bells, but leaves in place the rules against manufacturing and long-distance service.

1993 A Federal court in Virginia lifts for Bell Atlantic the video programming ban contained in the Cable Television Act of 1984.

Con't: Uncle Sam, Ma Bell And Her Babies: A Timeline

1994 The House overwhelmingly approves legislation's that would let the Bells make equipment and enter the cable and long-distance business in return for accepting competition in their local telephone markets.

- A comparable Senate bill collapses - too much competition for the cable and long-distance companies.

1995 The Senate passes a bill to overhaul communications regulation.

- The House passes a communications bill that is similar to the Senate version.

1996 New Telecommunication bill passed February 1, 1996

The Telecommunication Bill of 1996

What The Telecommunication Bill Will Do

LONG-DISTANCE PHONE SERVICE

Seven regional Bell's can enter into the long-distance phone business, must open their local phone networks

LOCAL PHONE SERVICE

Local phone markets open to new competitors (AT & T, MCI and cable TV companies) without specifying how much they pay

What The Telecommunication Bill Will Do

BROADCAST

Raises the national TV-station ownership cap. Requires TV sets to block violent or sexual programs.

CABLE

Lifts all rate regulations in three years for big cable systems.

What The Telecommunication Bill Will Do

INTERNET

Transmission of indecent material is a crime without restricting minor's access.

SPECTRUM

TV Stations get valuable new broadcast spectrum for advanced TV free of charge. (To be revisited)

Original Goals of the Internet

- The goals of the original Internet were to provide:
  - Permission-less innovation
  - Open access
  - Collaboration

Original Rules of the Internet

- Free
- First come, first serve
- Anyone can say anything (Legal)

Intellectual Property

Patents

Article 1, Section 8 – U.S. Constitution

The Congress shall have power . . .

"To promote the Progress of Science and Useful Arts by securing for Limited Times to Authors and Inventors the exclusive Right to their respected Writings & Discoveries"

Purpose of Patent

- The content of the patent system is to encourage innovation by granting the innovator exclusive rights to a discovery for a limited period of time
- Thus, it is really a “defensive” right
- It is not a right to practice or use the invention but provides the right *“to exclude others from making, using, selling. . .”*

Patent Criteria

According to patent law, an invention must be *"novel, non-obvious, and have utility"*

- *Novelty*

  No one can patent something that is known (e.g. – prior publication, already being sold)

- *Non-obvious*

  The invention could not have been conceived by someone "having ordinary skill in the art"

- *Utility*

  Must perform some function, be operable and beneficial to society

Length of Patents

- Type of Patent
  - Utility . . . . . 20 yrs.
  - Plant . . . . . 20 yrs.
  - Design . . . . . .14 yrs.

  - Note: This includes the time required (usually 2 or 3 years) from application to acceptance, and thus shortens the time.

Tragedy of the Commons

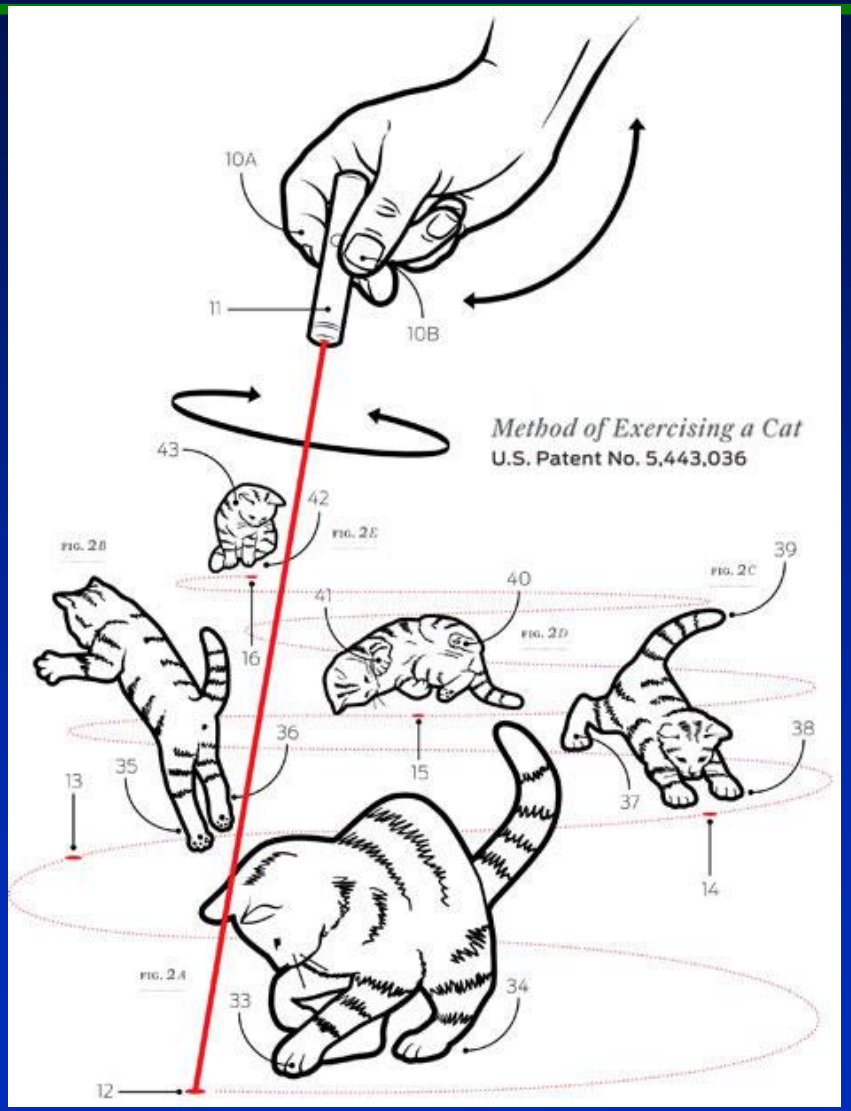
- Initially described by Garrett Hardin in the journal Science in 1968.
- The article describes a situation in which multiple individuals, acting independently with their own self interest, ultimately deplete a shared limited resource, even when it is clear that no one benefits.
- Examples: overuse of water in the Southwest U.S.A., exhaustion of oil supplies, overfishing of the Grand Banks, destruction of salmon runs in Pacific Northeast

Wikipedia: Tragedy of the commons, http://en.wikipedia.org/wiki/Tragedy_of_the_commons

Controversial Patents

Method of exercising a cat

US Patent 5,443,036 (1995)



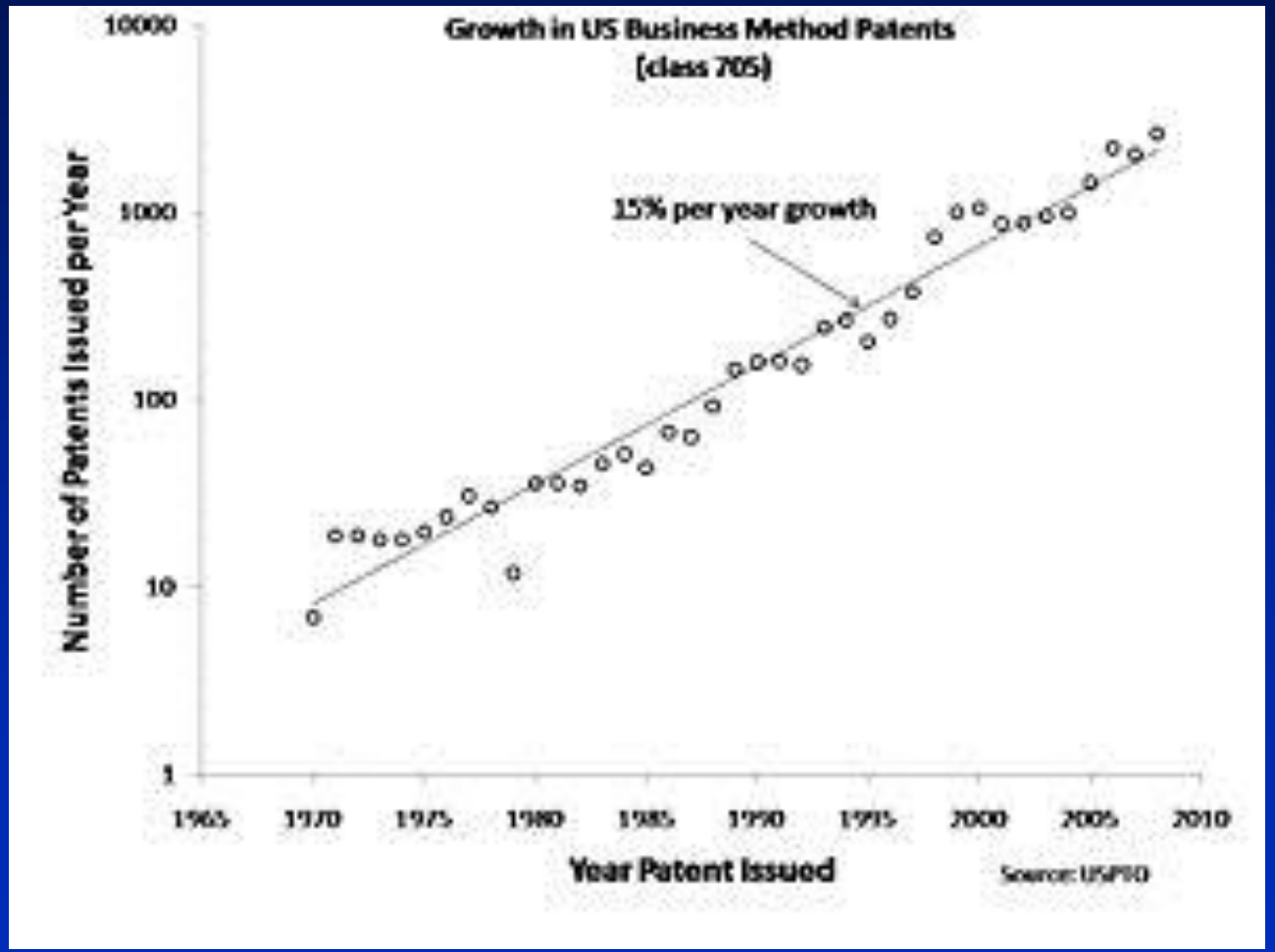
Steven J. Frank. "The Death of Business-Method Patents, IEEE Spectrum, March 2009.

Method of swinging on a swing

U.S. Patent 6368227 (2002)

Steven J. Frank. "The Death of Business-Method Patents, IEEE Spectrum, March 2009.

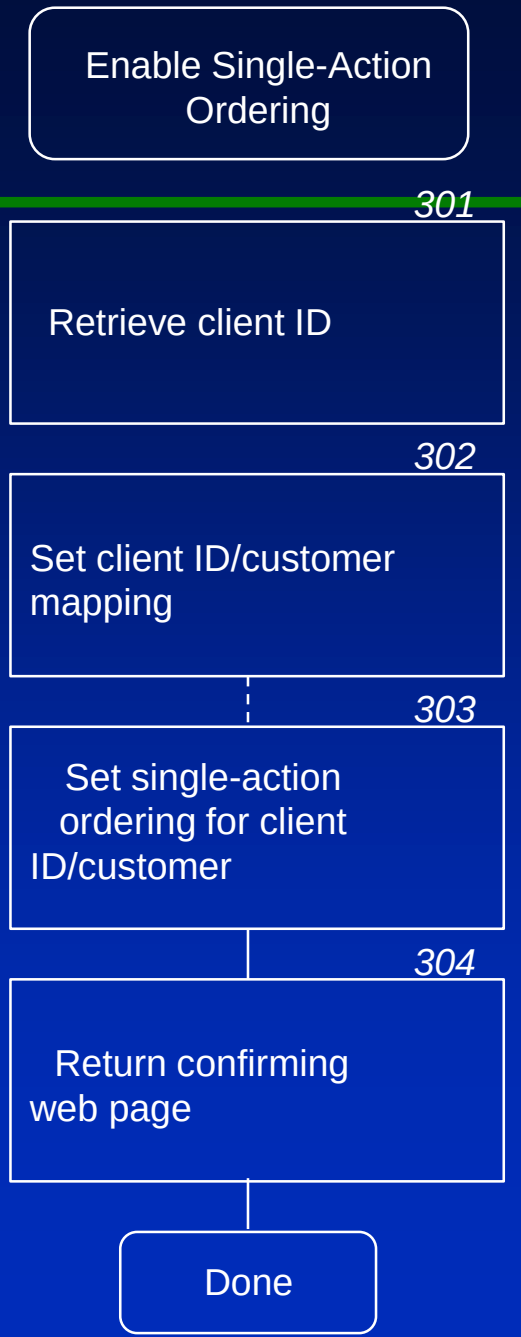
Growth in US Business Method Patents



One-click Shopping Amazon

- A method and system for purchasing an item via the Internet with one click

- Reconsidered and rejected October, 2007



Intellectual Ventures

- Nathan Myhrvold, former Microsoft executive (CTO) (Ph.D., Princeton, post doc with Stephen Hawkins) formed Intellectual Ventures in 2000
- The $5B investment firm has “scooped up” 30,000 patents and is trying to build an efficient market for “invention capital”
- They are ready to fight large technology companies, many who have ignored the patent rights of others.

Steve Lohr. “Turning Patents Into ‘Invention Capital’, The New York Times, 2/18/10.

Intellectual Ventures

- Business model is to extract licensing fees and return funding to investors.
- They have collected and returned more than $1B.
- Clients must sign strict non-disclosure agreements but supposedly include Verizon, Intel, Nokia and Sony. Investors include Microsoft.

Steve Lohr. “Turning Patents Into ‘Invention Capital’, The New York Times, 2/18/10.

Patent Trolls June 2013

- In 2011, more than half of the 4,000 patent infringements suits came from "patent trolls."
- The surge is partly explained by the "America Invents Act," designed to protect individuals and outlawing suits against multiple parties
- Examples: Wi-fi networks for coffee shops customers at 8,000 coffee shops attaching a document scanner to an office computer system, royalties from anyone producing a podcast.
- Now Obama has issued Executive Orders "to protect innovators from frivolous litigation" by patent trolls.

Have Patent, Will Sue July 2013

- IPNav in the last 5 years has sued 1,638 companies.
- Patent infringement suits have doubled from 2,304 in 2009 to 4,731 in 2012.
- Approximately $29B on patent assertion cases in 2011 ($6B to inventors)

Apple vs. Samsung June 2013

- Can a “look and feel,” e.g., rounded corners, be patented?
- U.S. International Trade Commission ruled in June 2013 that sales of some older iPhones and iPads should be banned because Apple infringed a Samsung patent.
- Obama Administration vetoed the decision.
- Tech industry is split as companies fear injunctions stemming from patents on tiny features.

Defensive IP 2011

- Google bought part of Motorola to obtain their intellectual property on wireless telephony as a defensive measure against IP infringement

Accounting for IP

- Intellectual property is considered an intangible asset and is not included on the balance sheet
- Estimates claim that a high percentage of a company's value (IBM, MSFT) may be their intellectual property

Patent Acquisition 2014

- Google and Apple spend more money in acquiring patents (and litigation) than spending for R&D
- The rate at which ne businesses have formed in the United States has slowed markedly since the late 1970s.

End