SI 510 - Special Topics: Data Security and Privacy: Legal, Policy and Enterprise Issues, Winter 2010

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How Did This Mess Arise?

A brief history of computers and the Internet

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University of Michigan School of Information
Week 11

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Roots

- The abacus?
- The telegraph – 1840s
  - Electronic signal standard still used in network interface cards
More to the Point

- Hollerith machines – 1886
  - Punch cards
  - Used for census
  - Still best systems into 1930s and 1940s
- ENIAC – unveiled 1946
  - First digital computer
  - From military World War II research effort
- IBM 360 – 1964
  - Mainframes took hold
- PCs – 1970
  - Datapoint 2200
  - 1977 – Apple II, Commodore PET, TRS-80
Roots II

- Sputnik – 1957
- Advanced Research Projects Agency (ARPA) created within DoD – 1958
  - Computer system development, strong communications and command/control were among mandates
  - Later became Defense ARPA (DARPA)
- Packet-switched network concept formalized – 1962-1964
Internet System Evolution

- A global network of networks
  - to share information and see how communications might be continued in the event of nuclear war
- Begins as DoD network in 1969
  - First packet switched network
- Splits into two networks (civilian and military) in 1975
- National Science Foundation takes over in 1986 - NSFNet
ARPAnet

- First packet-switched *network*
- DARPA (Defense Advanced Research Projects Agency) contracted with BBN (Bolt, Beranek & Newman) to create ARPAnet – 1968
- Online - 1969
- All of first five nodes up - 1970
  - UCLA
  - Stanford
  - UC Santa Barbara
  - U of Utah, and
  - BBN (later BBN Planet, an early ISP)
- First public demonstration - 1972
Backbone

- Series of high capacity links that carry large volumes of network traffic
Mid 1980’s- U.S. National Science Foundation (NSF) provided funding for individual and regional networks throughout the US (for research and academic use)
1986- NSF began linking networks using TCP/IP protocol developed for ARPANET = NSFNET
Late 1980’s/early 1990’s – privatization of the backbone led to end of NSFNET (April 30, 1995)

AOL, MCI and others have since taken over the backbone

Now there are multiple backbones

Source: http://www.caida.org/tools/visualization/mapnet/Backbones/
Critical Core Elements Added

- TCP/IP
  - Specification published – 1973-74
  - Became core protocol when system, with approximately 1000 hosts, converted to using it for messaging – 1983-1984
- DNS introduced - 1983
TCP – Transmission Control Protocol
Breaks down and reassembles packets of information

IP – Internet Protocol
Responsible for making sure packets reach the correct destination
Management History

- ARPANET in the DoD days
- 1986 - NSF takes over
- 1990s – NSF gradually spins system off to US
  Department of Commerce. Network Solutions
  managed under contract
- 1998 – ICANN/new IANA
Evolution to Modern Internet

- 1989 – Tim Berners-Lee creates WWW
  - to allow physicists all over the world to share graphical AND text based information
- Spelled end for command line tools
  - Gopher – distributed document system
  - WAIS – Wide Area Information Server - search
  - Finger
    - Security issues also part of its disappearance
The ‘Net Mushrooms

- 1990 – First commercial services appear
- 1991 – Commercialization restrictions removed
- 1992 – WWW released by CERN
- 1992 – Mosaic, first graphical browser, introduced
- 1994 – Netscape incorporates
Arpanet - 1971
The Internet-Academic 1984
The Internet - 2008
Early Ethos

- Segue to the “mess” part
- Messaging and exchange of information
- Open
- Small; everybody knew everybody
  - Whois database for reporting problems
- Hacking was a challenge/sport
  - Led to jobs
Issues with Openness

- Published standards
- Non-proprietary
- Led to security problems and other nuisances
E-Mail

- SMTP
  - dblumenthal@ftc.gov

- X.400
  - s=blumenthal
  - g=don
  - c=us
  - a=telemail
  - p=gov+ftc
  - o=wpo
  - dda.wpmail=HQ01(dblumenthal)
  - s=blumenthal;g=don;c=us;a=telemail;p=gov+ftc;o=wpo;dda.wpmail=HQ01(dblumenthal)