History of the Internet

http://netvalley.com/archives/mirrors/davemarsh-timeline-1.htm

This section is a summary of some of the material contained in Hobbes' Internet Timeline and also contains sources from Pros Online - Internet History, What is the Internet? and History of Internet and WWW : View from NetValley and a variety of text books. Consult these source for more detailed information.

1836

-- **Telegraph**. Cooke and Wheatstone patent it. Why is this relevant?

- Revolutionised human (tele)communications.
- Morse Code a series of dots and dashes used to communicate between humans. This is not a million miles away from how computers communicate via (binary 0/1) data today. Although it is much slower!!

1858-1866

-- **Transatlantic cable**. Allowed direct instantaneous communication across the atlantic. Why is this relevant?

- Today, cables connect all continents and are still a main hub of telecommunications.

1876

-- **Telephone**. Alexander Graham Bell Exhibits.

Why is this relevant?

- Telephones exchanges provide the backbone of Internet connections today.
- Modems provide Digital to Audio conversions to allow computers to connect over the telephone network.

1957

-- **USSR launches Sputnik**, first artificial earth satellite. Why is this relevant?

- The start of global telecommunications. Satellites play an important role in transmitting all sorts of data today.
- In response, US forms the Advanced Research Projects Agency (ARPA) within the Department of Defense (DoD) to establish US lead in science and technology applicable to the military.

1962 - 1968

-- **Packet-switching (PS) networks developed** Why is this relevant?

- As we will see later the Internet relies on packets to transfer data.
- The origin is military : for utmost security in transferring information of networks (*no single outage point*).
- Data is split into tiny packets that may take different routes to a destination.
- Hard to eavesdrop on messages.
- More than one route available -- if one route goes down another may be followed.
- Networks can withstand large scale destruction (Nuclear attack - This was the time of the Cold War).

1969

-- **Birth of Internet**

ARPANET commissioned by DoD for research into networking

Why is this relevant?

- First node at UCLA (Los Angeles) closely followed by nodes at Stanford Research Institute, UCSB (Santa Barbara) and U of Utah (4 Nodes).

1971

-- **People communicate over a network**

- 15 nodes (23 hosts) on ARPANET.
- E-mail invented -- a program to send messages across a distributed network. Why is this relevant?

  - E-mail is still the main way of inter-person communication on the Internet today.
  - We will study how to use and send E-mail shortly in this course.
  - You will make extensive use of E-mail for the rest of your life.

1972

-- **Computers can connect more freely and easily**

- First public demonstration of ARPANET between 40 machines.
- Internetworking Working Group (INWG) created to address need for establishing agreed upon protocols.

  Why is this relevant?

  - Telnet specification
  - Telnet is still a relevant means of inter-machine connection today.

1973

-- **Global Networking becomes a reality**

- First international connections to the ARPANET: University College of London (England) and Royal Radar Establishment (Norway)
- Ethernet outlined -- this how local networks are basically connected today.
- Internet ideas started.
- Gateway architecture sketched on back of envelope in hotel lobby in San Francisco. Gateways define how large networks (maybe of different architecture) can be connected together.
- File Transfer protocol specified -- how computers send and receive data.

1974

-- Packets become mode of transfer

- Transmission Control Program (TCP) specified. Packet network Intercommunication -- the basis of Internet Communication.
- Telenet, a commercial version of ARPANET, opened -- the first public packet data service.

1976
-- Networking comes to many

- Queen Elizabeth sends out an e-mail.
- UUCP (Unix-to-Unix CoPy) developed at AT&T Bell Labs and distributed with UNIX.

  Why is this relevant?

  - o UNIX was and still is the main operating system used by universities and research establishments.
  - o These machines could now ``talk" over a network.
  - o Networking exposed to many users worldwide.

1977
-- E-mail takes off, Internet becomes a reality

- Number of hosts breaks 100.
- THEORYNET provides electronic mail to over 100 researchers in computer science (using a locally developed E-mail system and TELENET for access to server).
- Mail specification
- First demonstration of ARPANET/Packet Radio Net/SATNET operation of Internet protocols over gateways.

1979
-- News Groups born

- Computer Science Department research computer network established in USA.
- USENET established using UUCP.

  Why is this relevant?

- USENET still thrives today.
- A collection of discussions groups, *news groups*.
- 3 news groups established by the end of the year
- Almost any topic now has a discussion group.

1979 (Cont)

- First MUD (Multiuser Dungeon) -- interactive multiuser sites. Interactive adventure games, board games, rich and detailed databases.
- ARPA establishes the Internet Configuration Control Board (ICCB).
- Packet Radio Network (PRNET) experiment starts with ARPA funding. Most communications take place between mobile vans.

1981
-- **Things start to come together**

- BITNET, the "Because It's Time NETwork" Started as a cooperative network at the City University of New York, with the first connection to Yale

  - Provides electronic mail and listserv servers to distribute information, as well as file transfers
- CSNET (Computer Science NETwork) established to provide networking services (specially E-mail) to university scientists with no access to ARPANET. CSNET later becomes known as the Computer and Science Network.

1982
-- **TCP/IP defines future communication**

- DCA and ARPA establishes the Transmission Control Protocol (TCP) and Internet Protocol (IP), as the protocol suite, commonly known as TCP/IP, for ARPANET.

  Why is this relevant?

- Leads to one of the first definitions of an *internet* as a connected set of networks, specifically those using TCP/IP, and *Internet* as connected TCP/IP internets.

1982 (Cont)

- EUnet (European UNIX Network) is created by EUUG to provide E-mail and USENET services. Original connections between the Netherlands, Denmark, Sweden, and UK
- External Gateway Protocol specification -- EGP is used for gateways between (different architecture) networks.

1983
-- **Internet gets bigger**

- Name server developed.

  Why is this relevant?

    - Large number of nodes.
    - Hard to remember exact paths
    - Use meaningful names instead.

- Desktop workstations come into being.

  Why is this relevant?

    - Many with Berkeley UNIX which includes IP networking software.
    - Need switches from having a single, large time sharing computer connected to Internet per site, to connection of an entire local network.

1983 (Cont)

- Internet Activities Board (IAB) established, replacing ICCB
- Berkeley releases new version of UNIX 4.2BSD incorporating TCP/IP.
- EARN (European Academic and Research Network) established on similar lines to BITNET

1984
-- **Growth of Internet Continues**

- Number of hosts breaks 1,000.
- Domain Name Server (DNS) introduced.

  - instead of 123.456.789.10
  - it is easier to remember something like

    www.myuniversity.mydept.mynetwork.mycountry

    (*e.g.* www.cs.cf.ac.uk).

- JANET (Joint Academic Network) established in the UK
- Moderated newsgroups introduced on USENET.

1986
-- **Power of Internet Realised**

- 5, 000 Hosts. 241 News groups.
- NSFNET created (backbone speed of 56 Kbps)
- NSF establishes 5 super-computing centers to provide high-computing power for all -- This allows an explosion of connections, especially from universities.
- Network News Transfer Protocol (NNTP) designed to enhance Usenet news performance over TCP/IP.

1987
-- **Commercialisation of Internet Born**

- Number of hosts 28,000.
- UUNET is founded with Usenix funds to provide commercial UUCP and Usenet access.

1988

- NSFNET backbone upgraded to T1 (1.544 Mbps)
- Internet Relay Chat (IRC) developed

1989
-- **Large growth in Internet**

- Number of hosts breaks 100,000
- First relays between a commercial electronic mail carrier and the Internet
- Internet Engineering Task Force (IETF) and Internet Research Task Force (IRTF) comes into existence under the IAB

1990
-- **Expansion of Internet continues**

- 300,000 Hosts. 1,000 News groups
- ARPANET ceases to exist
- Archie released files can be searched and retrieved (FTP) by name.
- The World comes on-line (world.std.com), becoming the first commercial provider of Internet dial-up access.

1991
-- **Modernisation Begins**

- Commercial Internet eXchange (CIX) Association, Inc. formed after NSF lifts restrictions on the commercial use of the Net.
- Wide Area Information Servers (WAIS) Why is relevant?

- o Provides a mechanism for indexing and accessing information on the Internet.
- o Large bodies of knowledge available: E-mail messages, text, electronic books, Usenet articles, computer code, image, graphics, sound files, databases *etc.*.
- o These form the basis of the index of information we see on WWW today.
- o Powerful search techniques implemented. Keyword search.

1991 (cont)
-- **Friendly User Interface to WWW established**

- Gopher released by Paul Lindner and Mark P. McCahill from the U of Minnesota. Why is relevant?

  - o Text based, menu-driven interface to access internet resources.
  - o No need to remember or even know complex computer command. User Friendly Interface (?).
  - o Largely superseded by WWW, these days.

1991 (cont)
-- **Most Important development to date**

- World-Wide Web (WWW) released by CERN; Tim Berners-Lee developer. Why is relevant?

  - o Originally developed to provide a distributed hypermedia system.
  - o Easy access to any form of information anywhere in the world.
  - o Initially non-graphic (this came later, MOSAIC, 1993).
  - o Revolutionised modern communications and even our, way of life (?).
- NSFNET backbone upgraded to T3 (44.736 Mbps). NSFNET traffic passes 1 trillion bytes/month and 10 billion packets/month

- Start of JANET IP Service (JIPS) using TCP/IP within the UK academic network.

1992

-- Multimedia changes the face of the Internet

- Number of hosts breaks 1 Million. News groups 4,000
- Internet Society (ISOC) is chartered.
- First MBONE audio multicast (March) and video multicast (November).
- The term "Surfing the Internet" is coined by Jean Armour Polly.

1993

-- The WWW Revolution truly begins

- Number of Hosts 2 Million. 600 WWW sites.
- InterNIC created by NSF to provide specific Internet services
  - directory and database services
  - registration services
  - information services
- Business and Media really take notice of the Internet.
- US White House and United Nations (UN) comes on-line.
- Mosaic takes the Internet by storm. Why is this relevant?

  - User Friendly Graphical Front End to the World Wide Web.
  - Develops into Netscape -- most popular WWW browser to date.
  - WWW proliferates at a 341,634

1994

-- Commercialisation begins

- Number of Hosts 3 Million. 10,000 WWW sites. 10,000 News groups.
- ARPANET/Internet celebrates 25th anniversary
- Local communities begin to be wired up directly to the Internet (Lexington and Cambridge, Mass., USA)
- US Senate and House provide information servers
- Shopping malls, banks arrive on the Internet

- o A new way of life
- o You can now order pizza from the Hut online in the US.
- o First Virtual, the first cyberbank, open up for business
- NSFNET traffic passes 10 trillion bytes/month
- WWW edges out telnet to become 2nd most popular service on the Net (behind ftp-data) based on % of packets and bytes traffic distribution on NSFNET
- UK's HM Treasury on-line (http://www.hm-treasury.gov.uk/)

1995

-- **Commercialisation continues apace**

- 6.5 Million Hosts, 100,000 WWW Sites.
- NSFNET reverts back to a research network. Main US backbone traffic now routed through interconnected network providers
- WWW surpasses ftp-data in March as the service with greatest traffic on NSFNet based on packet count, and in April based on byte count
- Traditional online dial-up systems (Compuserve, America Online, Prodigy) begin to provide Internet access
- A number of Net related companies go public, with Netscape leading the pack.
- Registration of domain names is no longer free.
- Technologies of the Year: WWW, Search engines (WAIS development).
- New WWW technologies Emerge Technologies

- o Mobile code (JAVA, JAVAscript, ActiveX),
- o Virtual environments (VRML),
- o Collaborative tools (CU-SeeMe)

1996

-- **Microsoft enter**

- 12.8 Million Hosts, 0.5 Million WWW Sites.
- Internet phones catch the attention of US telecommunication companies who ask the US Congress to ban the technology (which has been around for years)
- The WWW browser war begins , fought primarily between Netscape and Microsoft, has rushed in a new age in software development, whereby new releases are made quarterly with

the help of Internet users eager to test upcoming (beta) versions.

1997

-- **What Next?**

- 19.5 Million Hosts, 1 Million WWW sites, 71,618 Newsgroups.