

# Fundamentals of the Internet



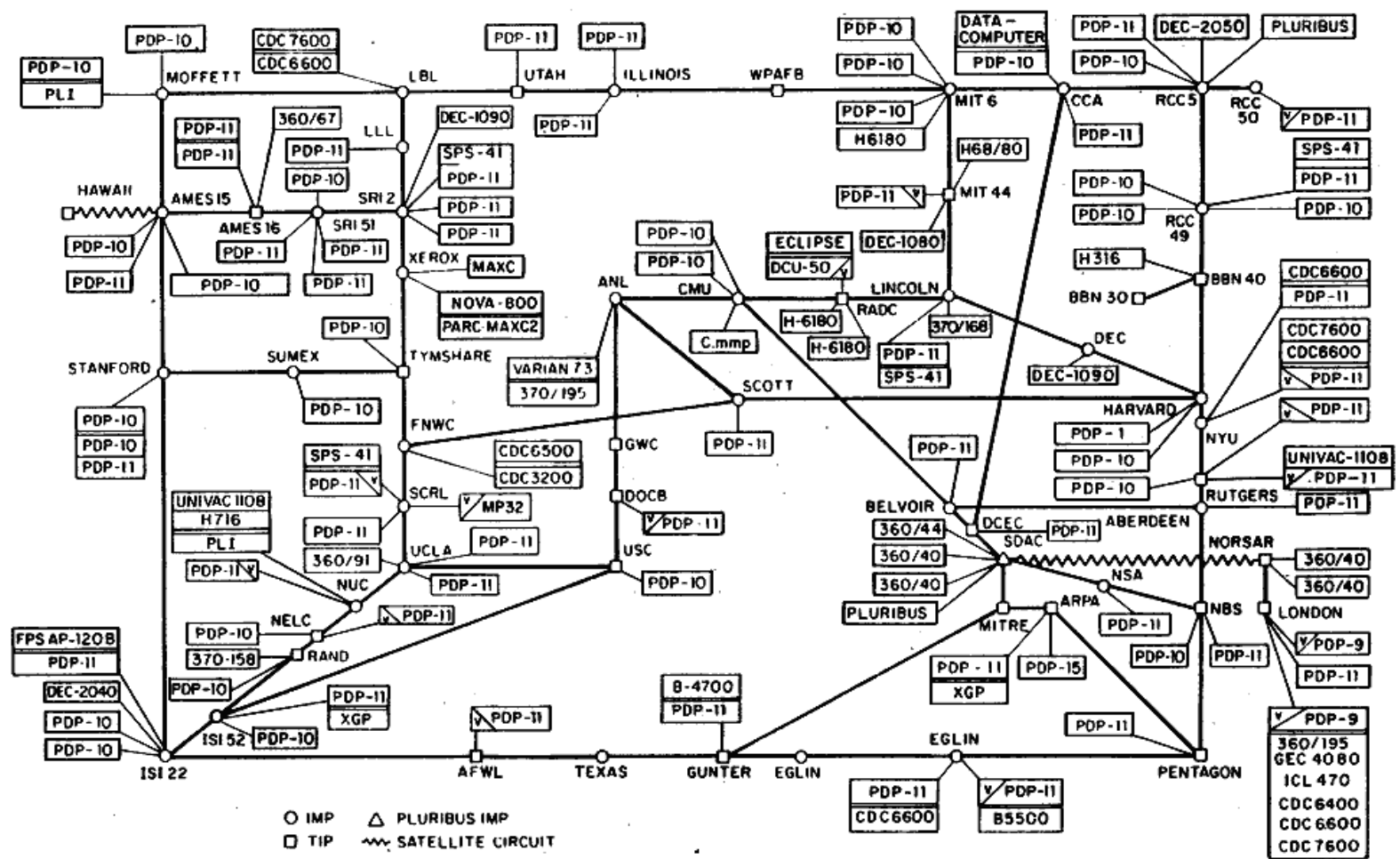
# ARPANET

- Funded by [Defense] Advanced Research Programs Agency
- Contract to build a packet switched network
- Awarded to BBN in 1969
- Initial sites: UCLA, Stanford, UCSB, Utah
- Each site had an Interface Message Processor (IMP)
  - Supported 4 local machines, connections to 6 other IMPs
  - Performed packet switching functions
- Developed Network and Transport protocols:
  - 1822 protocol: provided global addressing, reliability
  - Network Control Program (NCP): port numbers for applications
- Entire network converted to TCP/IP on January 1, 1983



# Map of ARPANET

ARPANET LOGICAL MAP, MARCH 1977



(PLEASE NOTE THAT WHILE THIS MAP SHOWS THE HOST POPULATION OF THE NETWORK ACCORDING TO THE BEST INFORMATION OBTAINABLE, NO CLAIM CAN BE MADE FOR ITS ACCURACY)

NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES



# NSFNET

- 1985: National Science Foundation (NSF) funded NSFNET
- Goal: connect supercomputer centers to other universities
  - Princeton, UCSD, UIUC, Cornell, Pittsburgh
- 1986: Came online, connected to ARPANET
- Grew exponentially
  - Started with 56 kbps modems
  - Upgraded to 1.5 Mbps T1 lines in 1988
  - Upgraded to 45 Mbps T3 lines in 1991



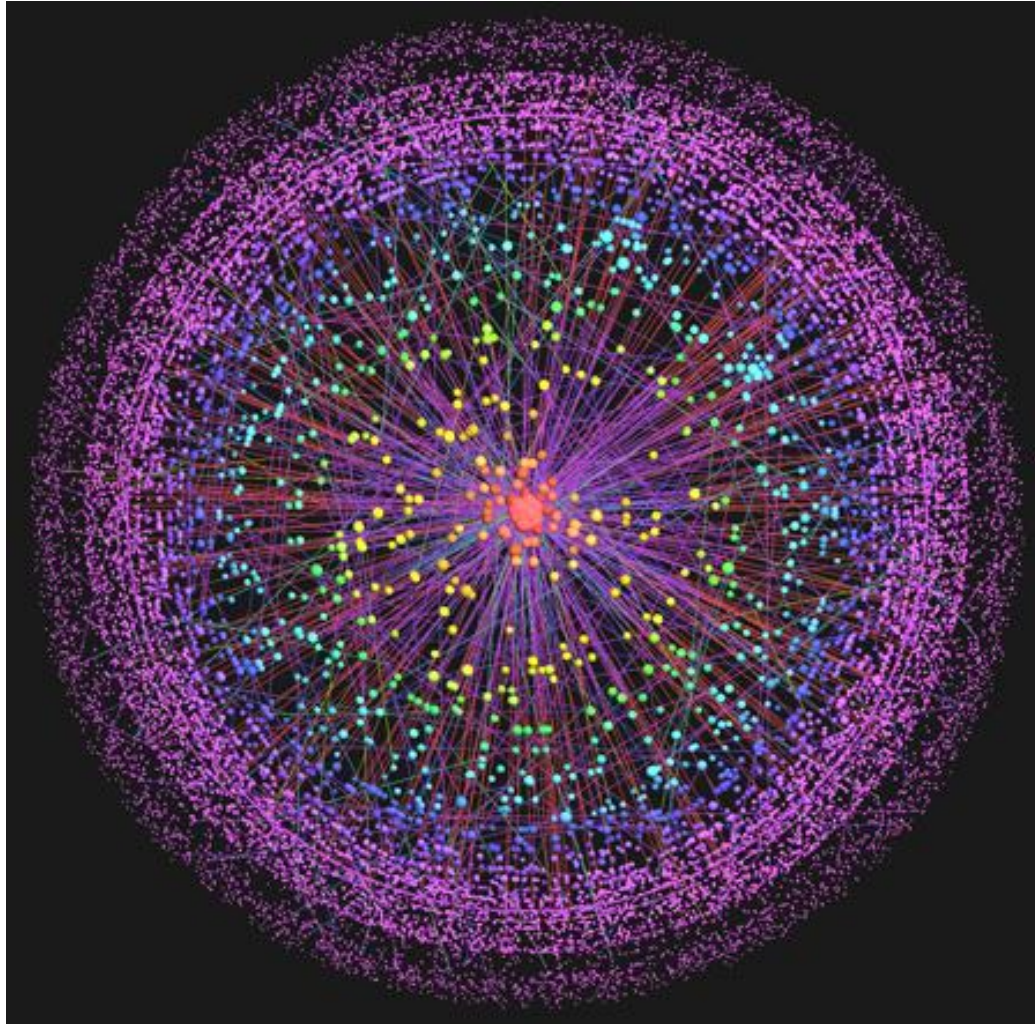
# Birth of the Internet

- 1989: NSFNET connected to MCI Mail
- 1989: Public Internet Service Providers (ISPs) come online
- 1990: CompuServe, Sprintnet, others connect (AOL phases in later, 1992-1995)
- 1991: CERN invents the World Wide Web
- 1993: NCSC Mosaic web browser released (foundation of both IE and Netscape), funded by “Gore Bill”
- Search Engines: directories, search page titles
  - 1993: Lycos
  - 1995: Yahoo! And Altivista
  - 1998: Google



# Map of the Internet

- From the DIMES project ([www.netdimes.org](http://www.netdimes.org))



# Governance of the Internet

- Internet built from many independent, interconnected networks
  - Major links governed by “peering agreements”
  - Major ISPs have multiple peering points
  - Border Gateway Protocol (BGP) provides routing across these core links
- Each major network or ISP has own IP address space
  - Space divided into sub-networks for different customers or departments
- Internet Corporation for Assigned Names and Numbers (ICANN) responsible for IP address assignments
- Internet Engineering Task Force (IETF) responsible for protocol standardization

