

Before the Internet

The Internet Book

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[illegible]

Limited Access and High Cost

- Having an independent local telephone service in each town limits the usefulness of a telephone
- Telephone service will not be a viable business until the cost of service becomes low enough for an average family to have a phone installed

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The Difficult Transition

- The single most important idea behind a communication service arises from its coverage - if no one else has the service, it is useless; if everyone else has the service, it is a necessity

Ubiquitous Access

- In the US, the telephone system became the communication system of choice in the twentieth century because the government mandate of universal telephone service guaranteed that subscribing would benefit everyone
- The important point is not that the government intervened, but that popularity of the telephone surged as universal service became a reality

Relevance to Internet

- Although the US government has contributed to Internet development, it has not decided to mandate universal service

Internet and LAN technologies

- Internet researchers imagined a future in which LAN technology would become inexpensive and widely available. They assumed, for example, that each organization would use one or more LANs to interconnect all its computers. They designed the Internet with the assumed future in mind. As it turned out, the assumption was correct

Open Systems Are Necessary

- The Internet is an Open System because all specifications are publicly available and any company can build a compatible technology
- A large organization needs an open network system because it acquires computers from multiple vendors; using a closed network system restricts the computers that can connect to the network

The Internet meets UNIX

- Berkeley incorporated the TCP/IP software into their version of the UNIX system, and modified application programs to use TCP/IP. (BSD UNIX).
- Computer Science departments in universities received TCP/IP software along with a release of UNIX system software from U.C. Berkeley. Most of them used it on their LANs for teaching, research and production computing

The Internet Improves Science

- By the mid-1980s, the National Science Foundation (NSF) recognized that eminence in science would soon demand computer communication.
- Computer communication changed the way scientists do research.
- NSF decided that to keep the US competitive, it needed to extend network access to every science and engineering researcher.

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History

- 1982. US military chose TCP/IP
- 1983. ARPANET and associated military networks use TCP/IP
- mid 1980s. CSNET (Computer Science Network), funded by NSF provides Internet access to computer science departments
- 1985. NSFNET interconnects scientists with the five supercomputing centers in the US

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The NSFNET approach

- NSF Mid-Level Networks
- NSF backbone
 - joint proposal (1987):
 - IBM (computer manufacturer)
 - MCI (long-distance telephone company)
 - MERIT (organization that operated a network connecting schools in Michigan)
- summer of 1988: NSFNET becomes the backbone of the Internet

The ANS Backbone

- End of 1991. IBM, MERIT and MCI formed a nonprofit company called Advanced Networks and Services (ANS)
- ANS is not owned by the federal government
- 1995. MCI Corporation developed vBNS (very high-speed Backbone Network System). Commercialization and privatization of the Internet

Exponential Growth

- Since 1983 the Internet grows quickly, so fast than is doubling in size approximately every 10 months.
- So does the traffic in the Internet !

The Global Internet

- Not everyone had a UNIX system
 - IBM created BITNET (e-mail)
 - An alternative was FIDONET (e-mail)
 - An alternative was UUCP (e-mail)
- The European Academic Network (EARN) used BITNET technology (1970s)
- In mid 1990s EBONE becomes the high-speed European Backbone network

A Global Information Infrastructure

- New infrastructures makes new industries possible (i.e.. The interstate highways)
- The postal mail service adopted the notion of universal delivery and made it available to all.
- The telegraph changed the basic communication infrastructure because it introduced high-speed message delivery

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A Global Information Infrastructure

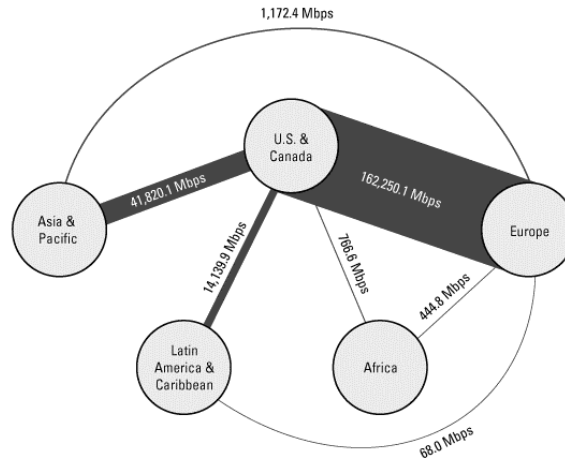
- Telephones changed the communication infrastructure by extending communication services to individual homes and offices, and by providing instantaneous communication needed for interactive conversations
- **The Internet offers a wide variety of services. Most of the services currently available had not been invented when the Internet was designed**

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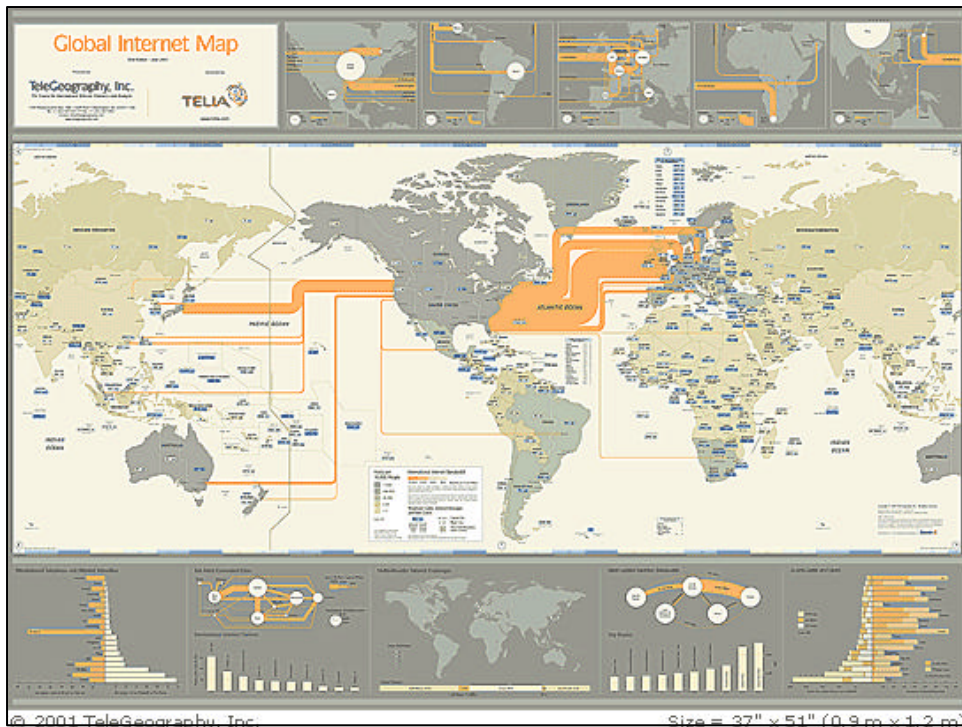
Interregional Connectivity



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