

Music & the Internet

MUMT301

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Plan

- Syllabus and final project
- Review of the last class and assignment
- History of Internet
- The WWW and HTML
- Introduction to HTML
- Code editors
- In-class exercise
- Assignment #2

Review

- Music Technology Computer Lab (MTCL/E-215)
 - Network account (credentials: lastnamefirstinitial:change)
 - Local account (mumt) (credentials: mumt:musictech)
 - Backup (e.g., external drive, memory stick, Dropbox, iCloud, etc)
 - Emergency contact: Darryl Cameron (darryl@music.mcgill.ca)
- NIN Ghosts I-IV project as a case study of the New Music Economy
- Transformations in the music industry
 - Shift from physical to virtual in the 2000s
 - Music is in the cloud
- New music economy
 - Connectivity vs. control
 - Service vs. product
 - Amateur vs. professional

Review

- UNIX/Linux command shell crash course
 - **ssh, passwd, man, pwd, ls, cd, mkdir, rmdir, mv, cp, rm, cat, nano**

Assignment1 review

		Prog Lang	OS	Mobile Tech	Social Media	Acronyms	Instrument	Music reading	Music collection	MRS	Code	Git	Github	Live music in Montreal	Two upcoming musical artists
Max Badea-Hasasia	http://132.206.14.130/mbadea/assignment1.txt	Tiny Java	Windows	Google Pixel. OS?	Facebook, Instagram		Classical guitar, piano, percussoin, tabla, sax, flute, accordion, voice, beginner cello	Sightead guitar	~1000 songs and 40 artists I listen to once a month	Spotify recommendation systems and radios					
Merve Guvendiren	http://132.206.14.130/mguvendiren/assignment1.txt														
Jonah Orbach	http://132.206.14.130/jorbach/assignment1.txt	No	macOS	iPhone8, iOS 12.4	Instagram, Facebook, Whatsapp	HTTP (HyperText Transfer Protocol) It defines how message are formatted and transmitted on the web. REST (Representational State Transfer). It's a software style that defines a set of constraints that are used for creation on the web. API (Application Program Interface) It is used to build software applications. They're usually developed in a form that is consumable by a client application.	Mainly production but also play drums and piano, and, sing	Slowly	100K songs when I downloaded music. Now, 40 playlists in Spotify with a total of ~10K songs. Also use Soundcloud and buy records.	Spotify recommendation system. Also Soundcloud for dance and hiphop. Word of mouth best way of finding music, but also follow large list of blogs and social media accounts.	OK	Git is a control system that tracks changes in source code during software development. It is often used to track changes in different files.	Github is a company that develops software using git.	Tyler, the Creator, Thom Yorke, Bon Iver	JPEGMAFIA, Oscar Jerome

Introduction to Internet

- What is Internet?
- History of Internet
- What is the web?
- The Internet network

What is Internet?

-
-
-
-

What is Internet?

- It is a **network of networks** that put together intranets, extranets, and networks, allowing the interconnection of all of them
- It uses the standard **TCP/IP protocol suite** to link several billion devices worldwide
- Who invented the Internet?
 - March 9, 1999
- In defense of Al Gore: Robert Kahn and Vint Cerf (they coined the term Internet in 1974)
 - <http://web.eecs.umich.edu/~fessler/misc/funny/gore.net.txt>

Pre-history of the Internet

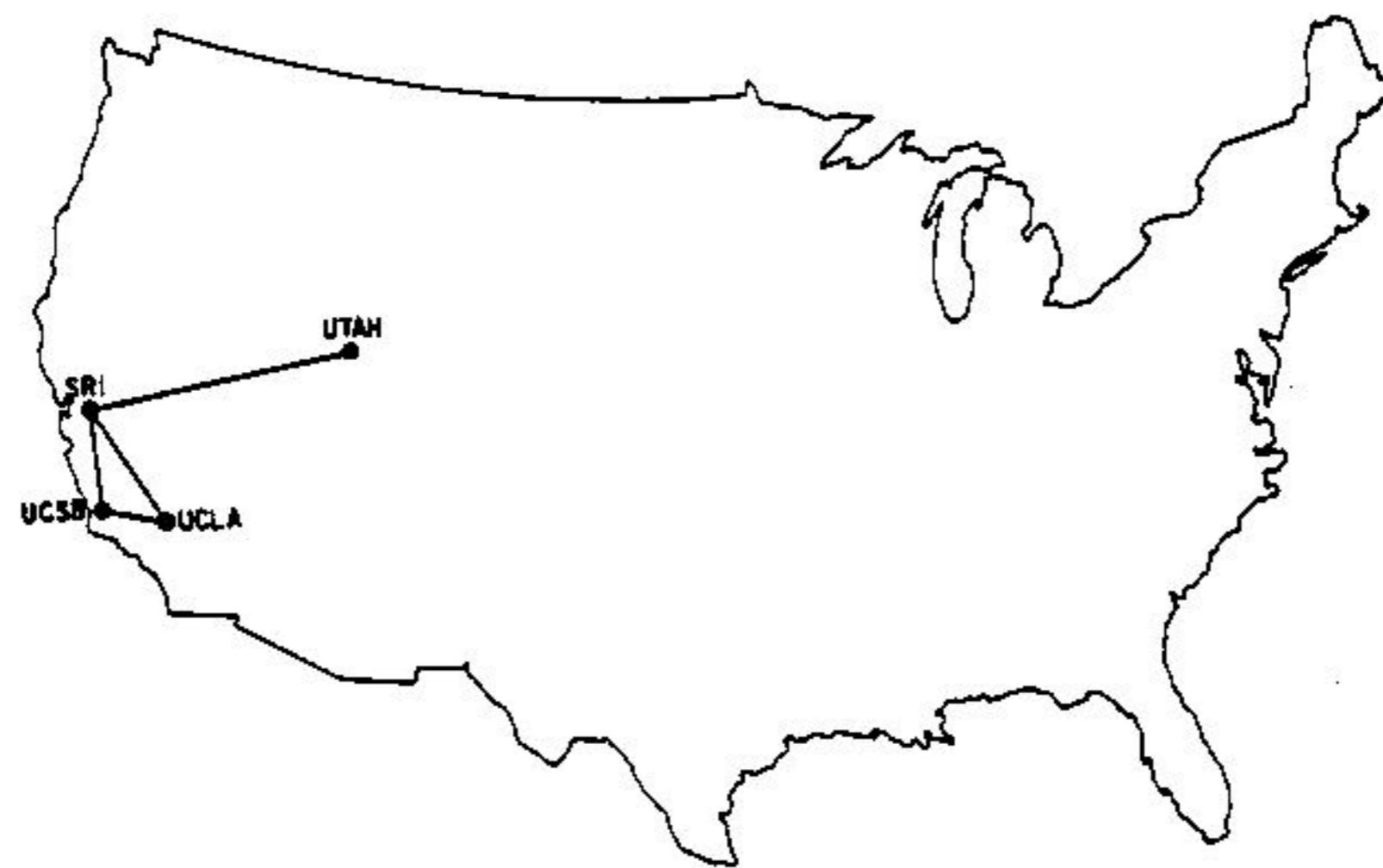
- 1961: Leonard Kleinrock@MIT publishes the first paper on packet switching theory
- 1962: Joseph Licklider@DARPA envisioned a “Intergalactic Computer Network”, a globally interconnected set of computers, through which everyone could quickly access data and programs from any site
- 1964: Paul Baran@RAND devised a solution to communication in the aftermath of a nuclear attack and published a seminal paper on IEEE conceptualizing a distributed network
- 1967: First ACM symposium on Operating System Principles: publications on packet switching from MIT (Lawrence Roberts), NPL (Davies et al.)

Pre-history of the Internet

- 1968: ARPANET developed by community of researchers led by Heart, Kahn, Roberts, and Frank (implemented preliminary version of TCP/IP protocol for the first time)
- 1969: UCLA selected to be the first node on the ARPANET, second node at Stanford. First host-to-host message! *lo...*
- 1969, Dec: four-node network established
- Computers were added quickly to the ARPANET after 1969 and there was a large amount of work in developing host-to-host protocols and network software

Pre-history of the Internet

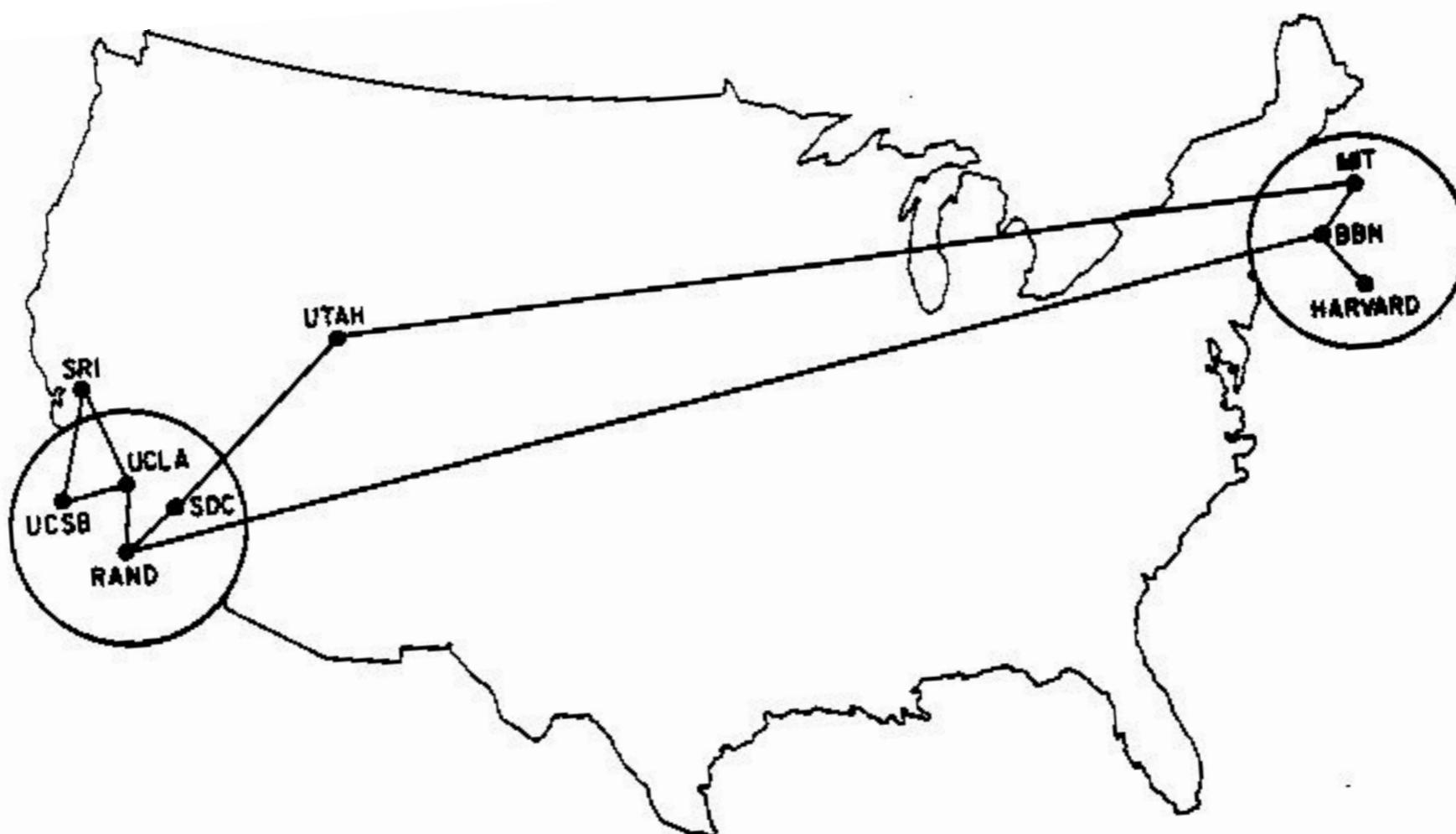
Dec. 1969



Taken from Heart, F., et al. 1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

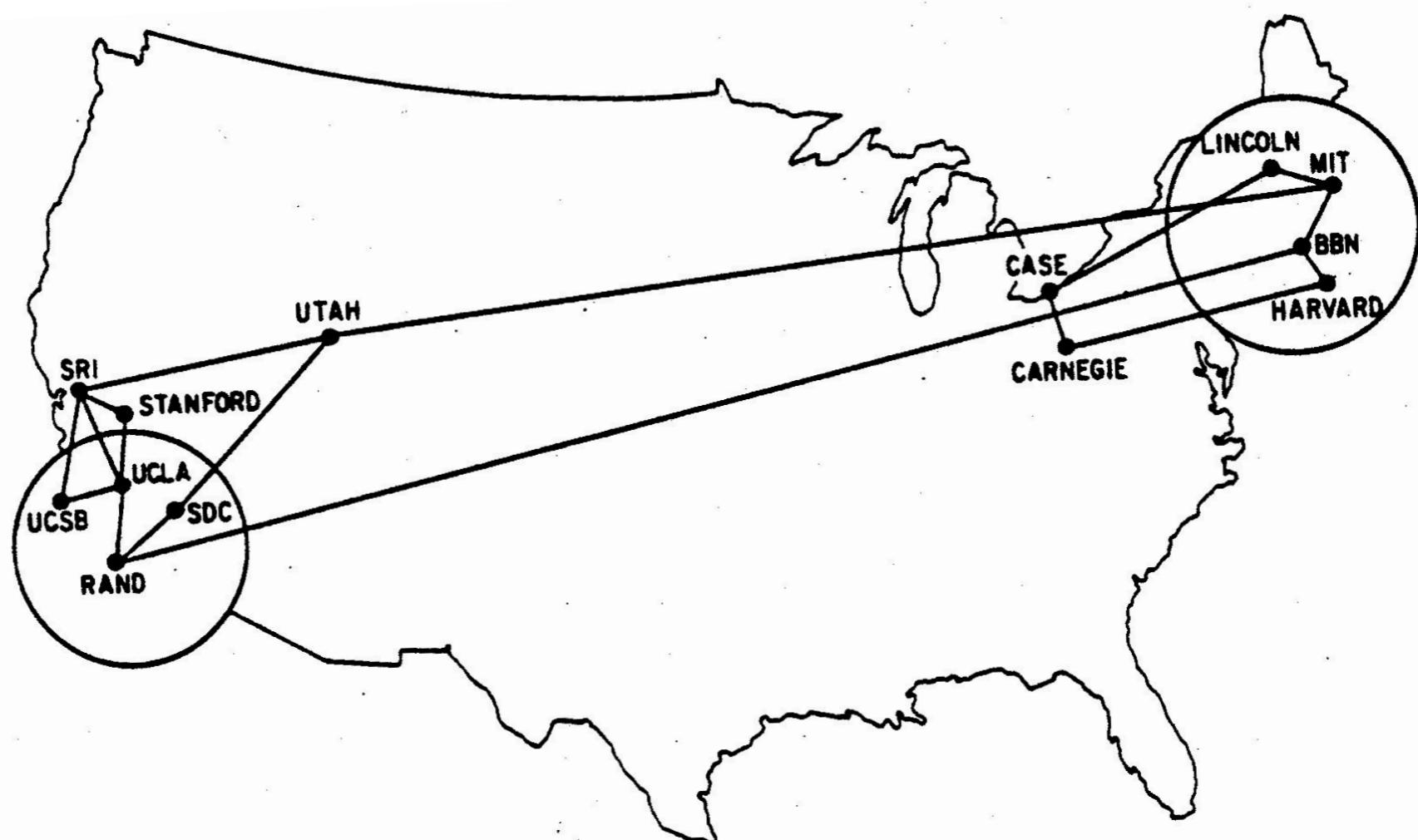
Jun. 1970



Taken from Heart, F., et al. 1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

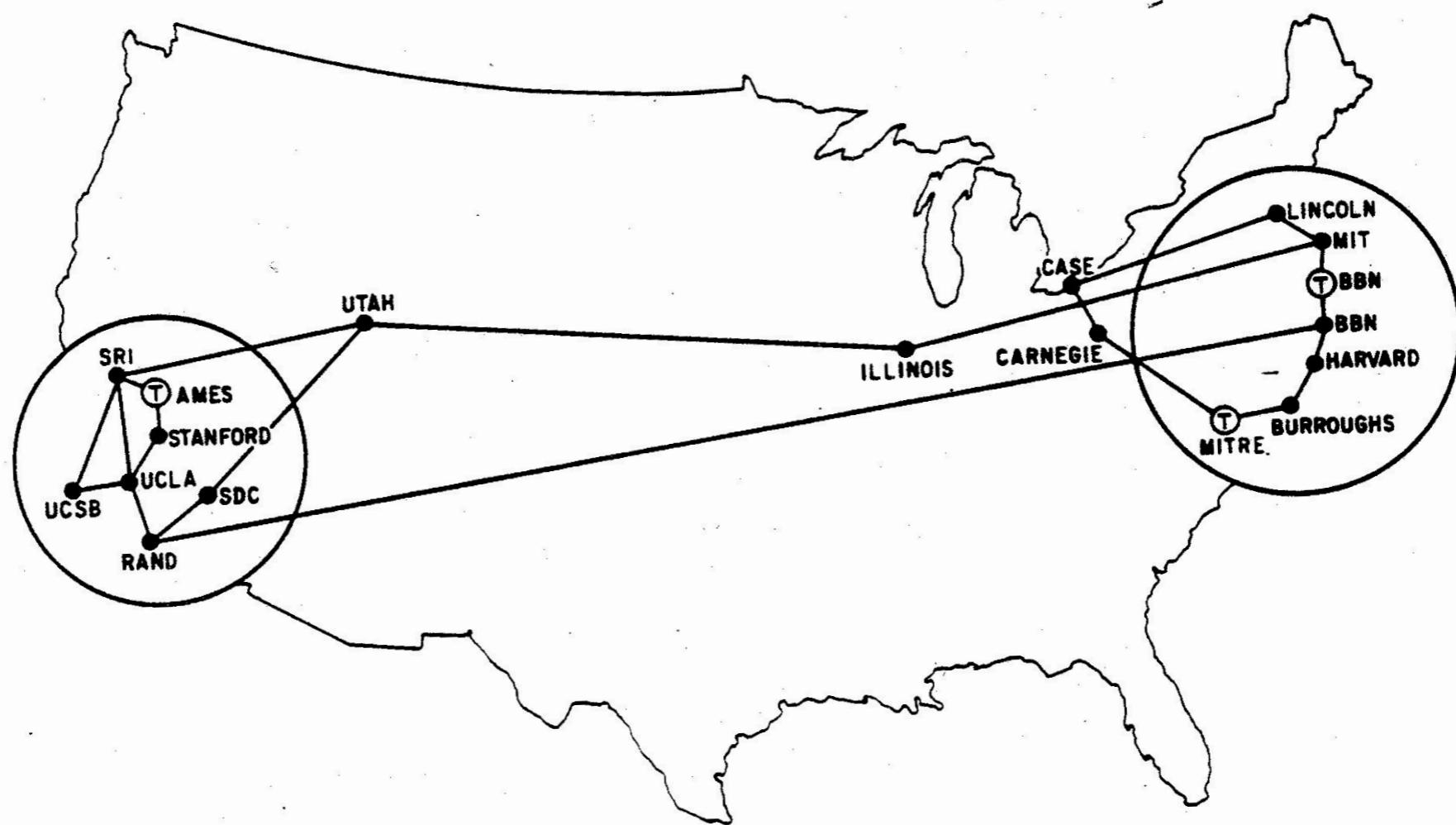
Dec. 1970



Taken from Heart, F., et al. 1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

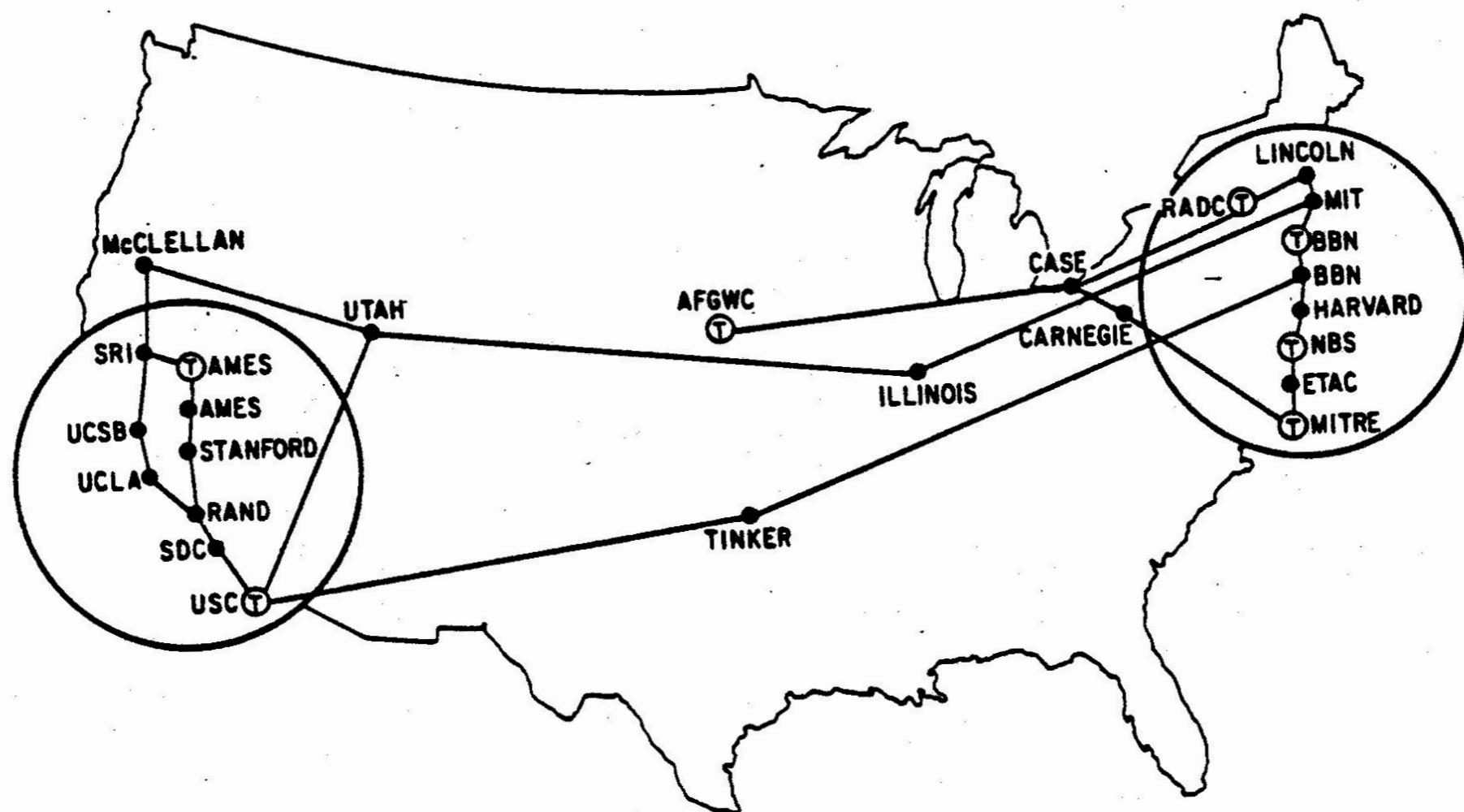
Sept. 1971



Taken from Heart, F., et al. 1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

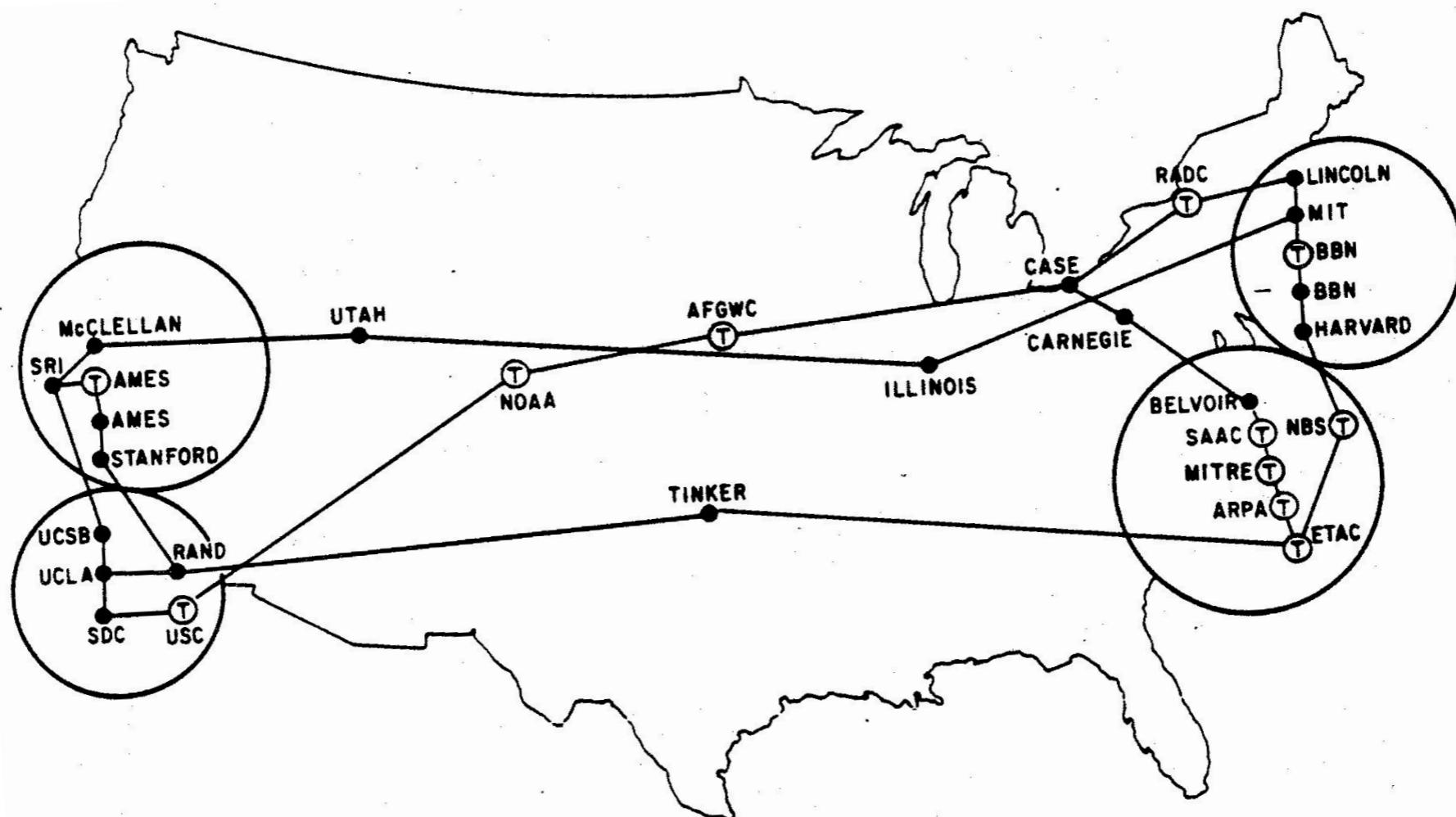
Mar. 1972



Taken from Heart, F., et al. 1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

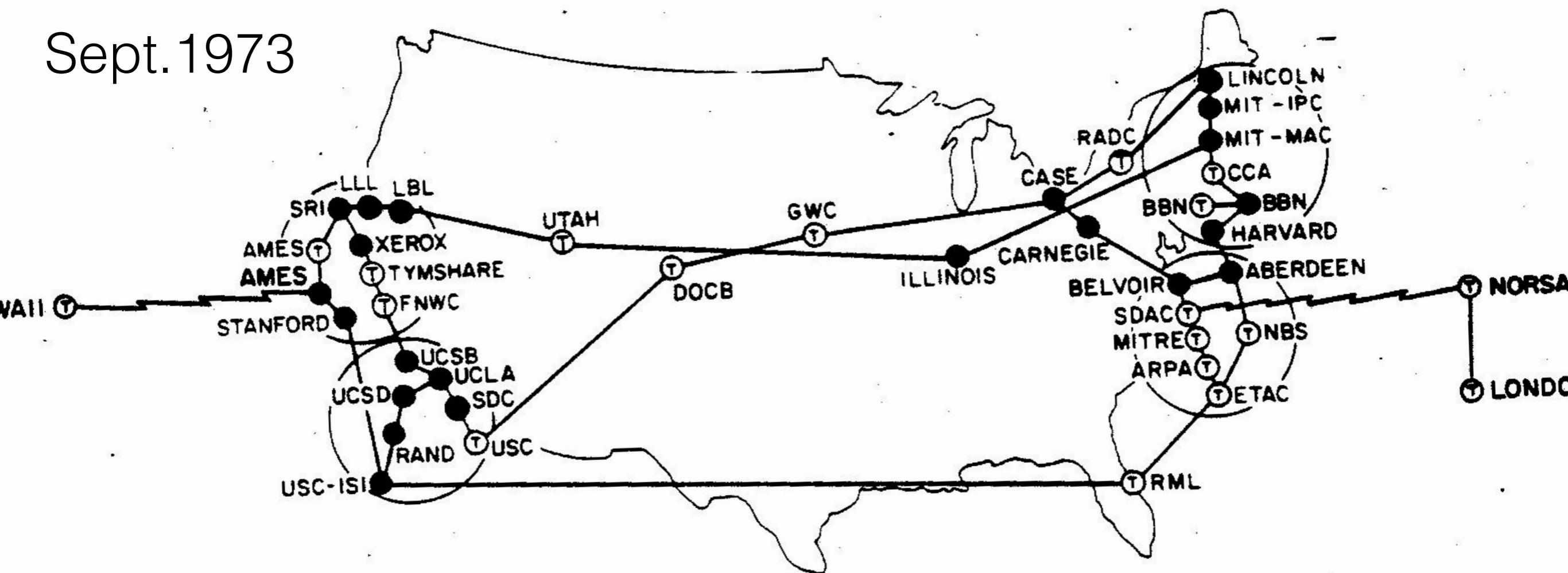
Aug. 1972



Taken from Heart, F., et al. 1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

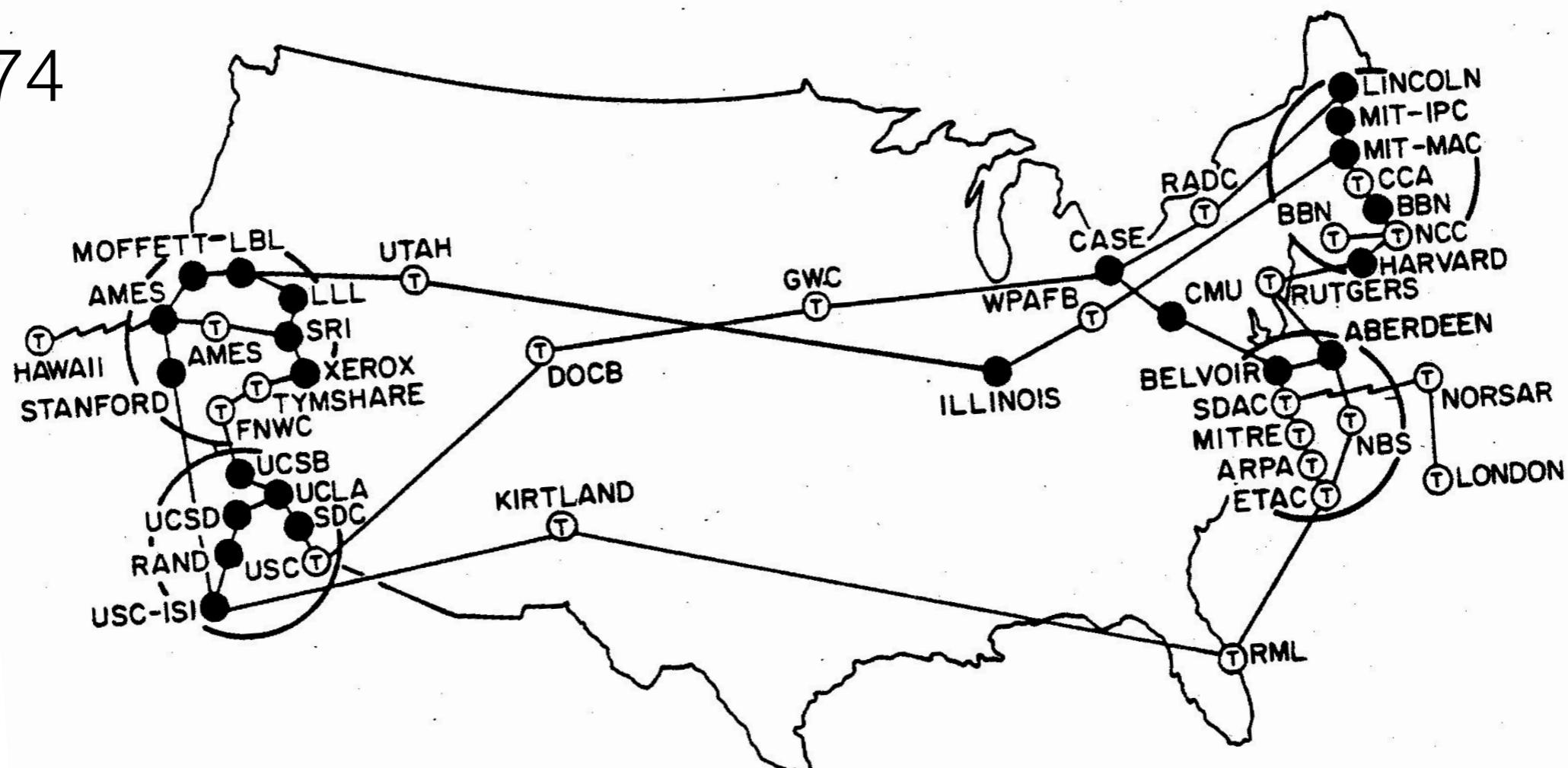
Sept. 1973



Taken from Heart, F., et al. 1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

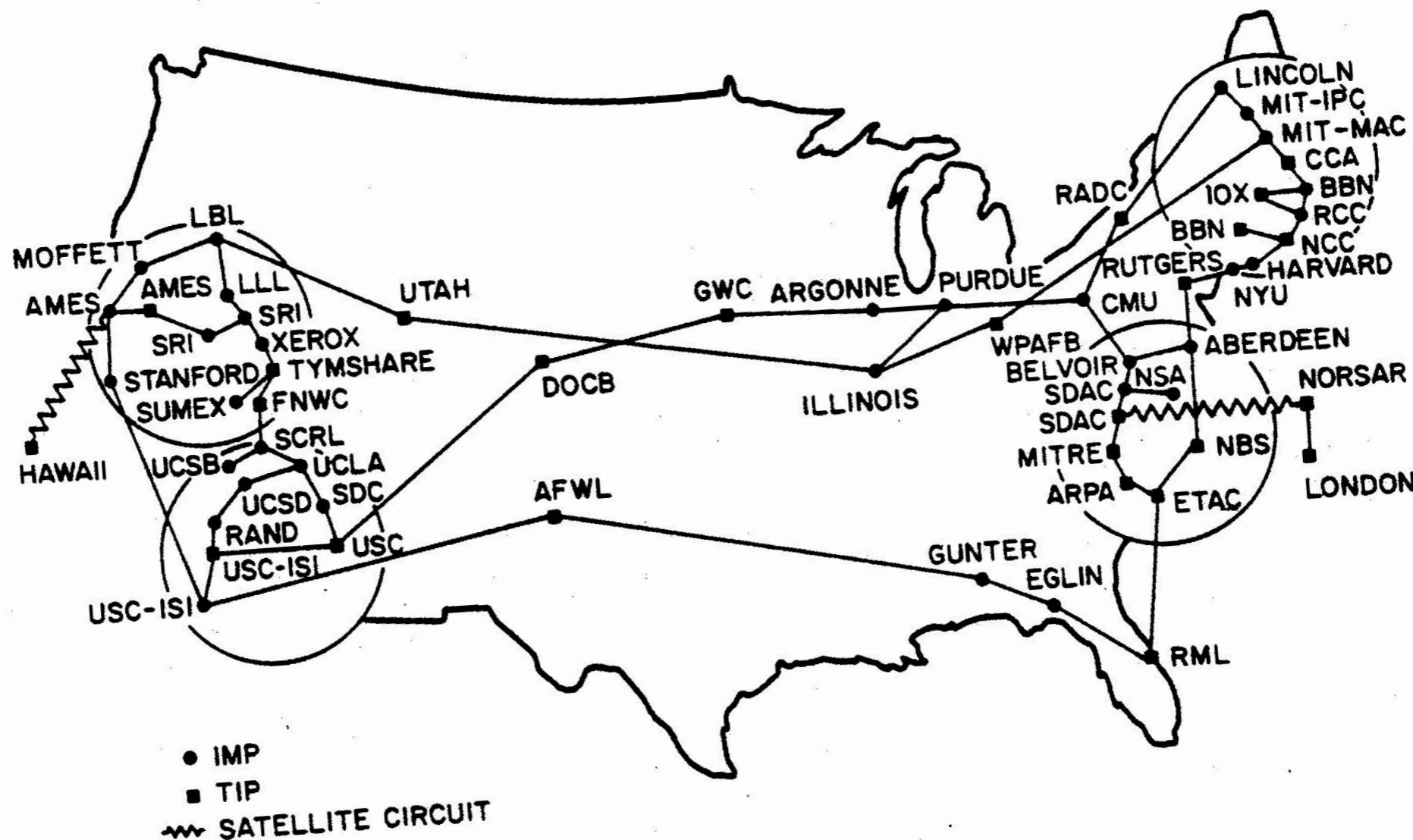
Jun. 1974



Taken from Heart, F., et al. 1978: ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

Pre-history of the Internet

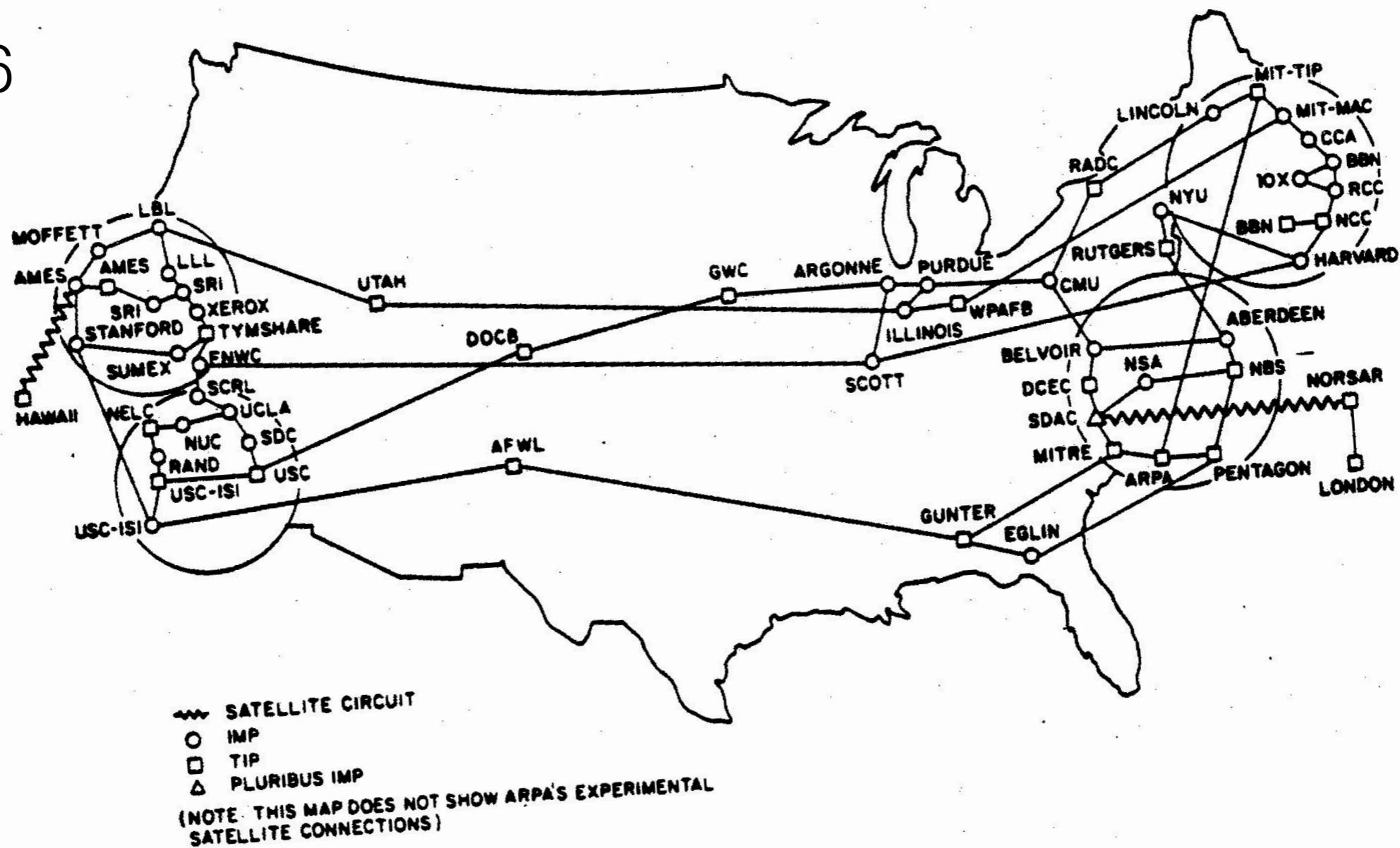
Jul. 1975



Taken from Heart, F., et al. 1978. ARPANET Completion Report. Bolt, Beranek, and Newman. Burlington, MA.

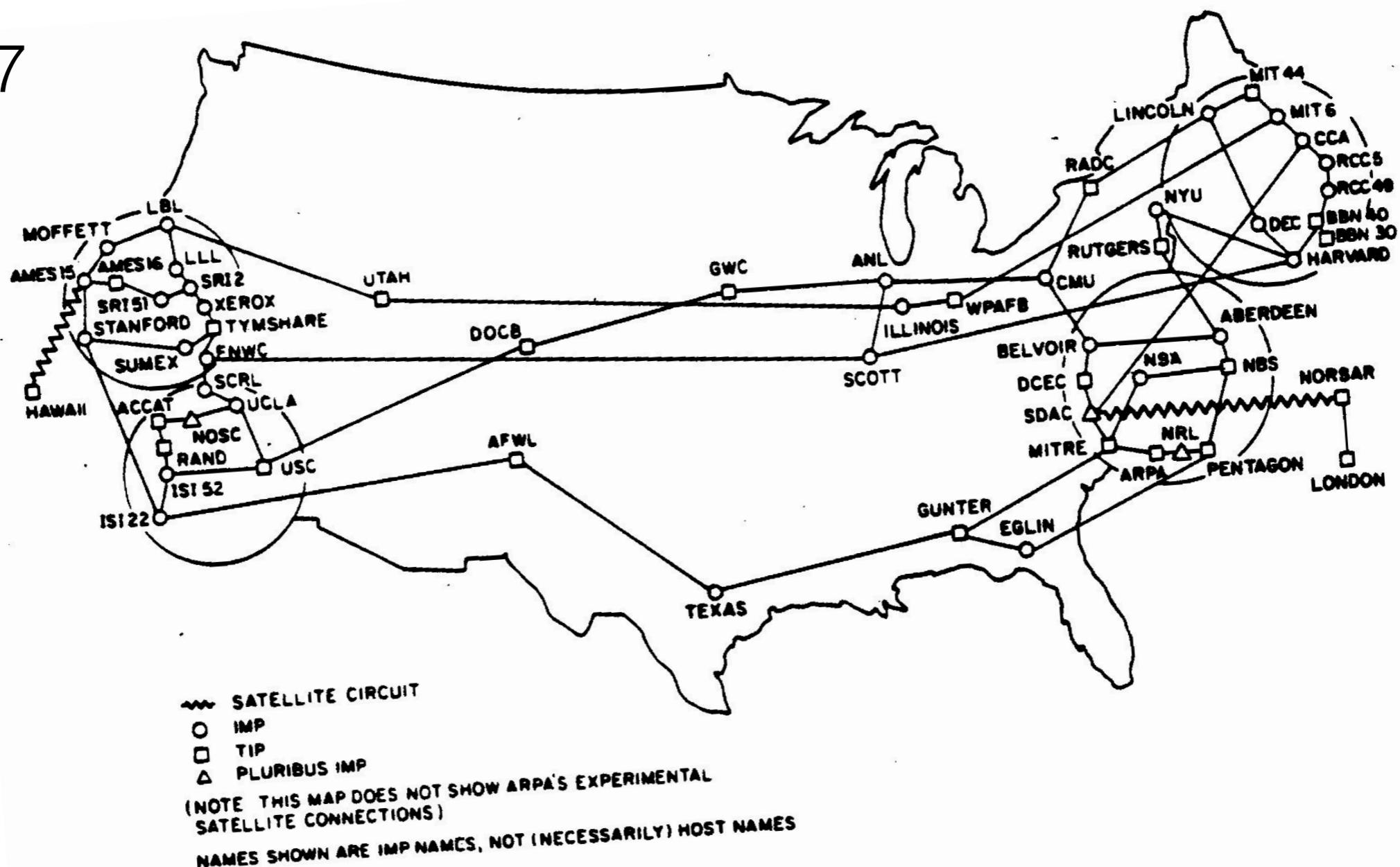
Pre-history of the Internet

Jul. 1976



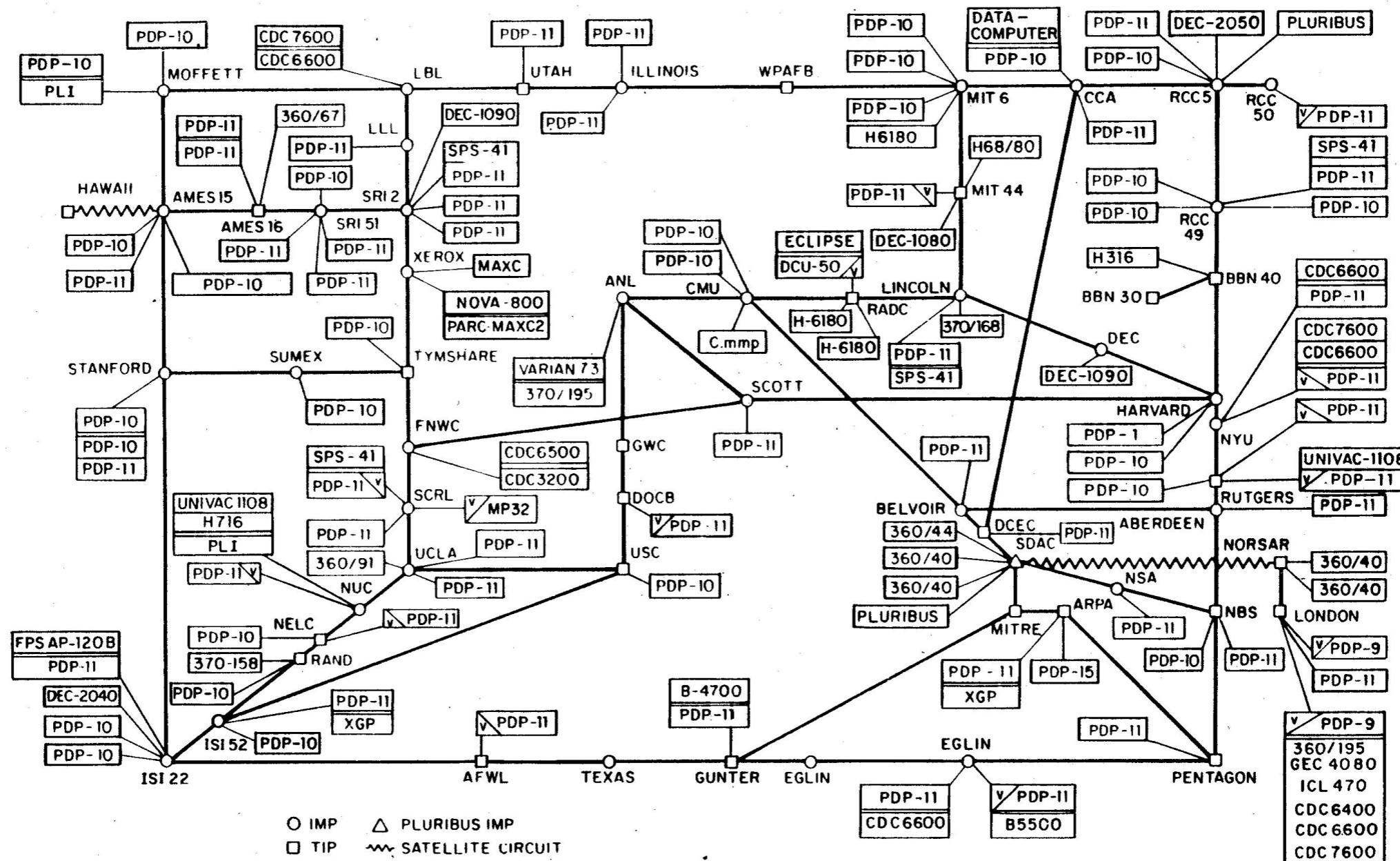
Pre-history of the Internet

Jul. 1977



Pre-history of the Internet

ARPA NET 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

Initial Internetting Concepts

- The original ARPANET grew into the Internet
- 1972: Robert Kahn introduced the key technical idea of an **open-architecture network**, and developed with Vint Cerf a new protocol that eventually would be called **TCP/IP** (Cerf and Kahn, 1974)
- Key concept of the Internet: it **wasn't designed for a specific application**, but as a **general infrastructure for conceiving any application**
- First applications:
 - email
 - resource sharing
 - file transfer
 - remote login
 - packet-based voice communication
 - file and disk sharing

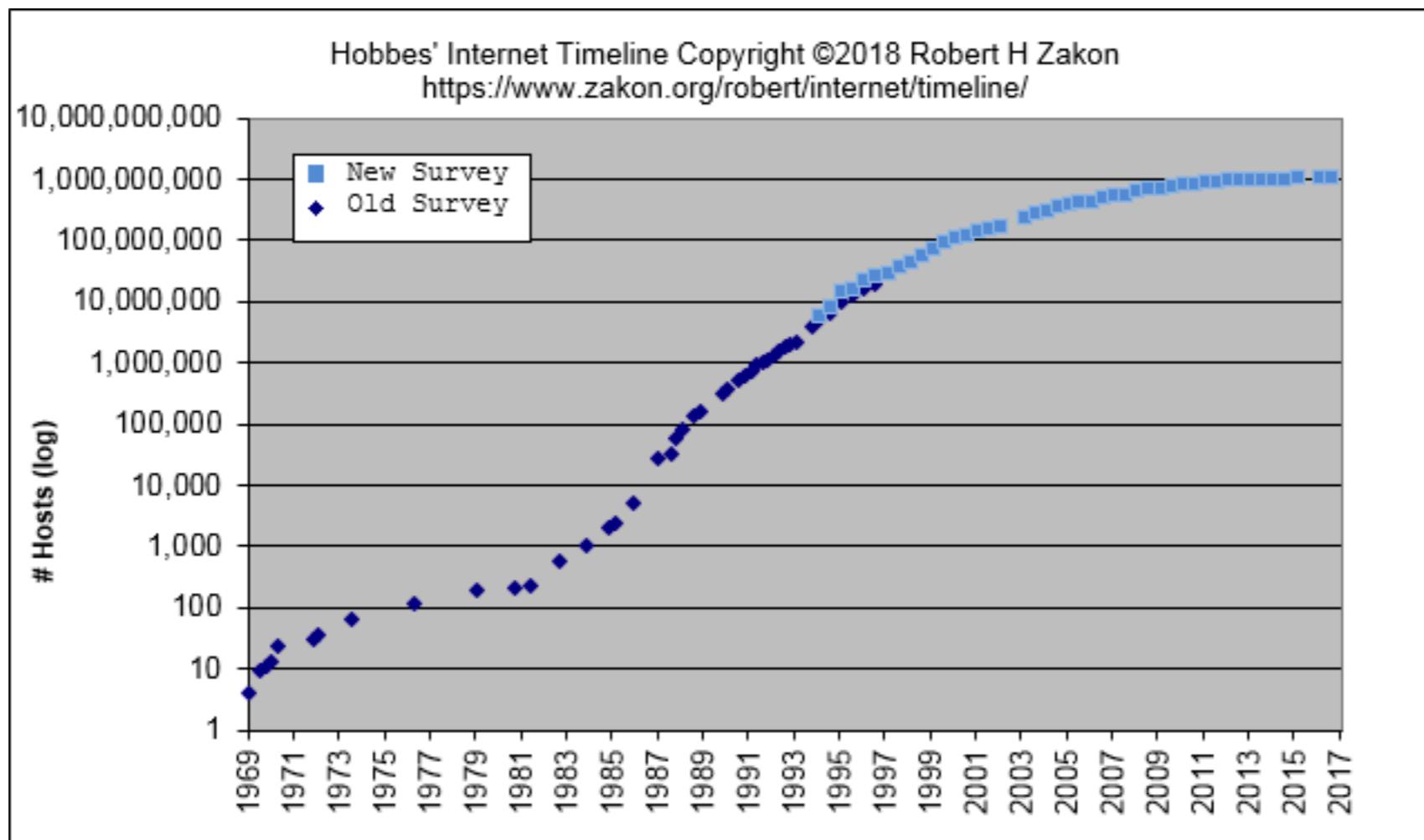
Protocols and expansion

- 1973: Bob Metcalfe@Xerox PARC developed the **Ethernet** technology
- 1976: compact and simple TCP implementation was designed for first **personal computers**
- 1980s: widespread creation of LANs and use of PCs lead to some management issues:
 - There were too many numeric addresses, and so **hosts were assigned names**
 - a **single table** of hosts and names was **no longer feasible**
- 1983 was an important year for the Internet:
 - Paul Mockapetris invented the **Domain Name System** (DNS), allowing to resolve (i.e., to map) **hierarchical host names** into an Internet address
 - **Internet protocols** were incorporated natively into the **Unix OS** at UC Berkeley, which led to a widespread adoption of the Internet into the research community

Widespread infrastructure

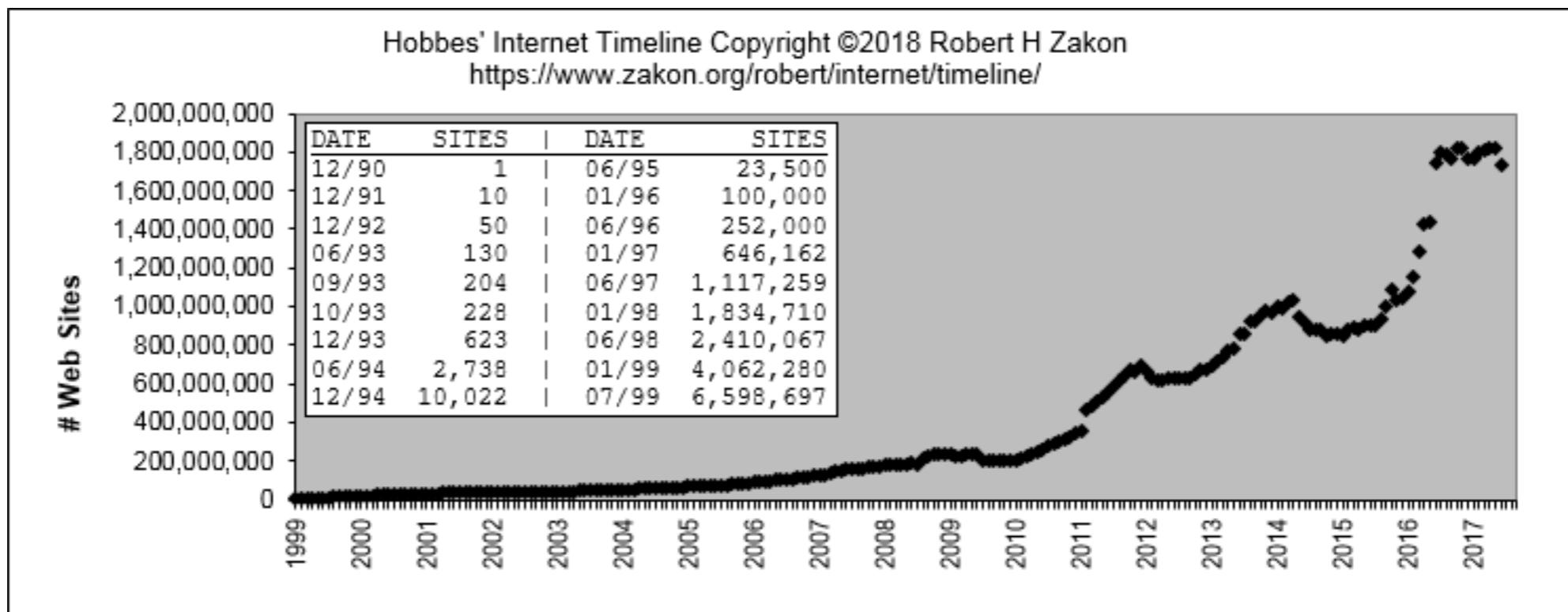
- **US Federal agencies** made and implemented **policy decisions** that shaped Internet by the late 80s
 - Federal agencies **shared the cost of common infrastructure**
 - NSF encouraged regional networks to **look for non-academic customers** to lower costs
 - NSF **prohibited the use of its national network for non-academic or research purposes** with the intention of **stimulate the growth of private networks**
 - The **NSF national network was defunded** in 1995, but its policies led the Internet to grow to around 30,000 networks just in the US
- 1995: FNC passed a resolution **defining the term Internet:**
 - **“Internet” refers to the global information system that:**
 - is linked together by a globally **unique address space** based on the IP
 - is able to **support communications using TCP/IP**
 - provides **high level services** layered on the communications and infrastructure previously described

Growth of number of Internet Web servers

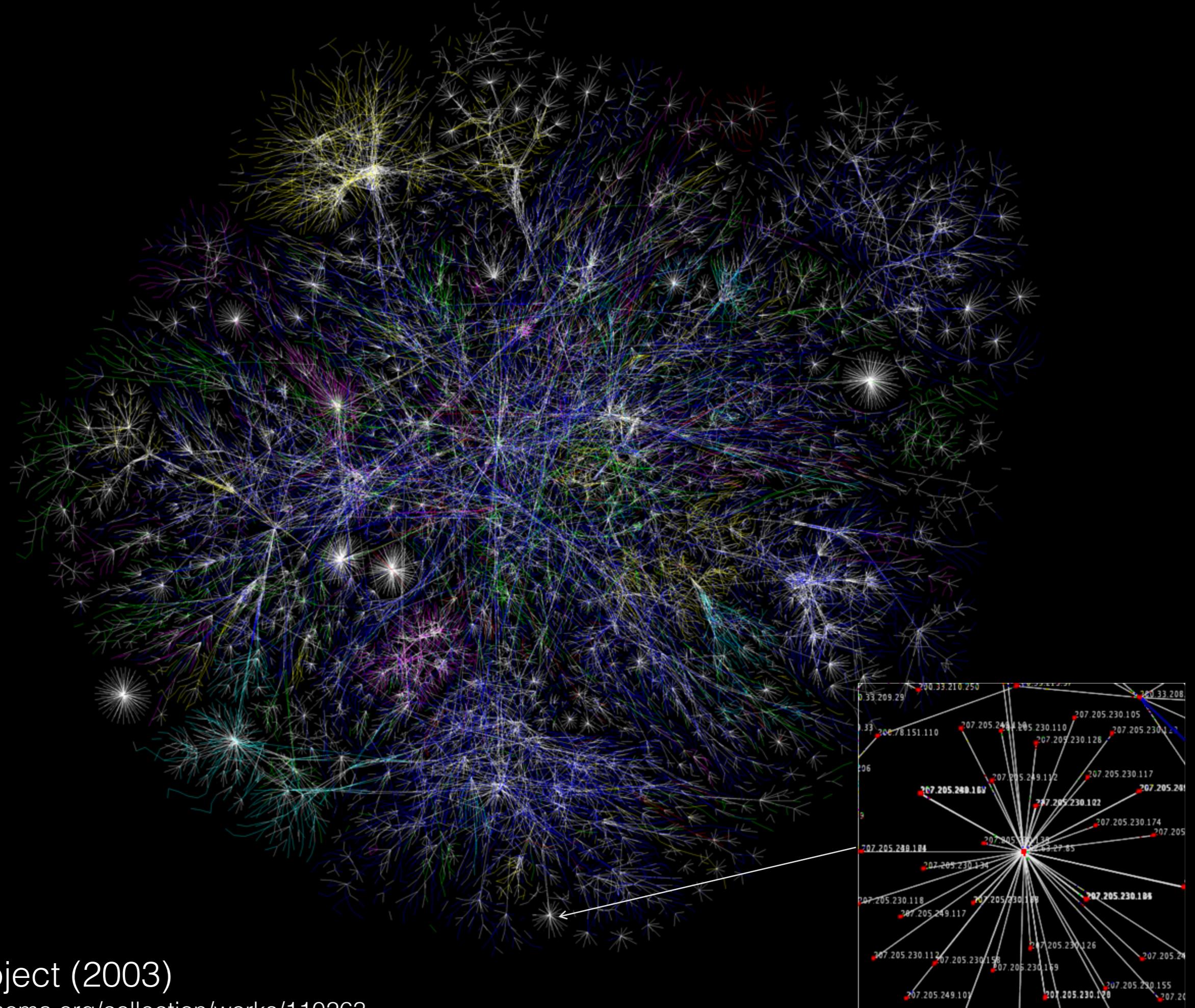


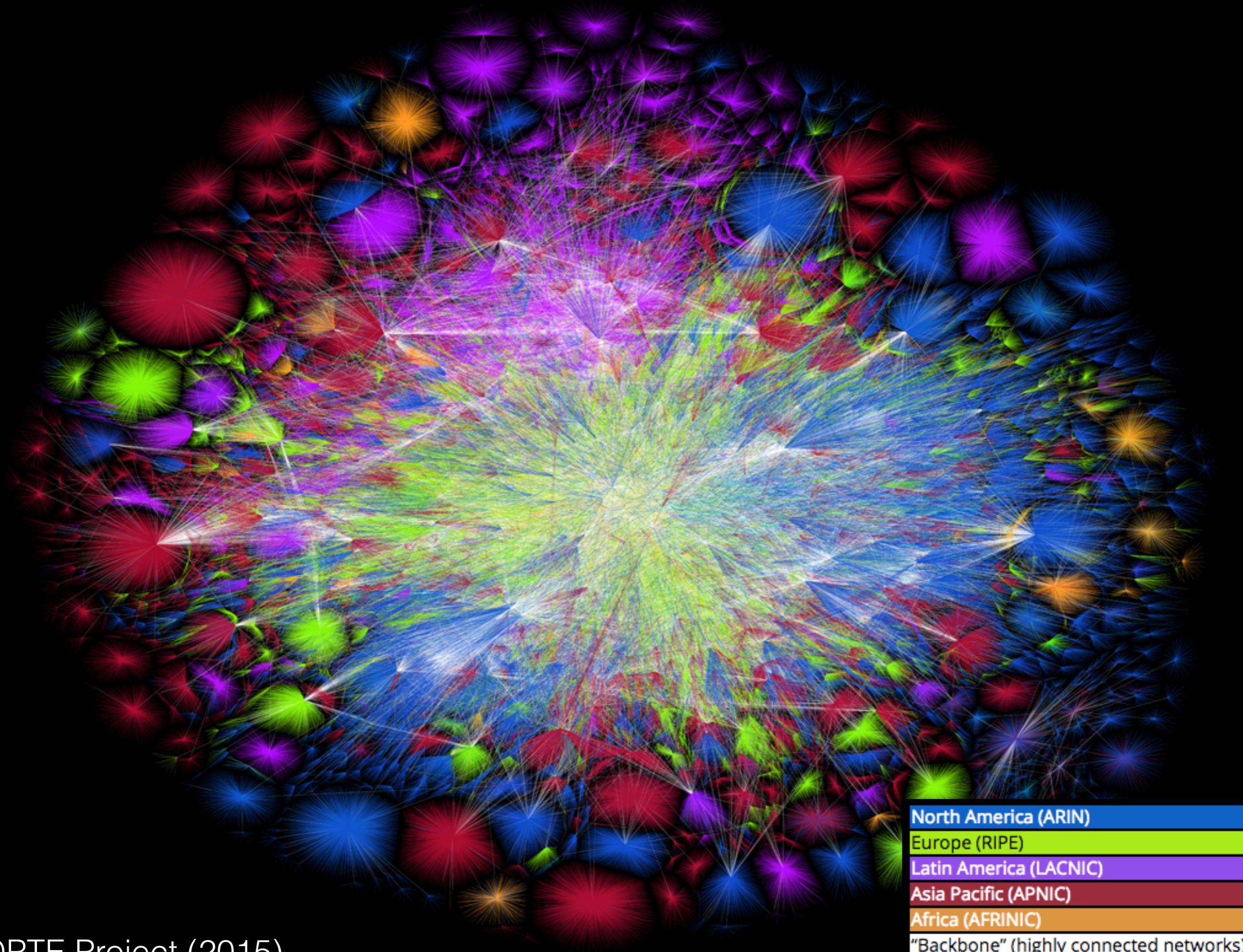
Taken from Hobbes' [Internet Timeline](#)

Growth of number of Internet Web sites



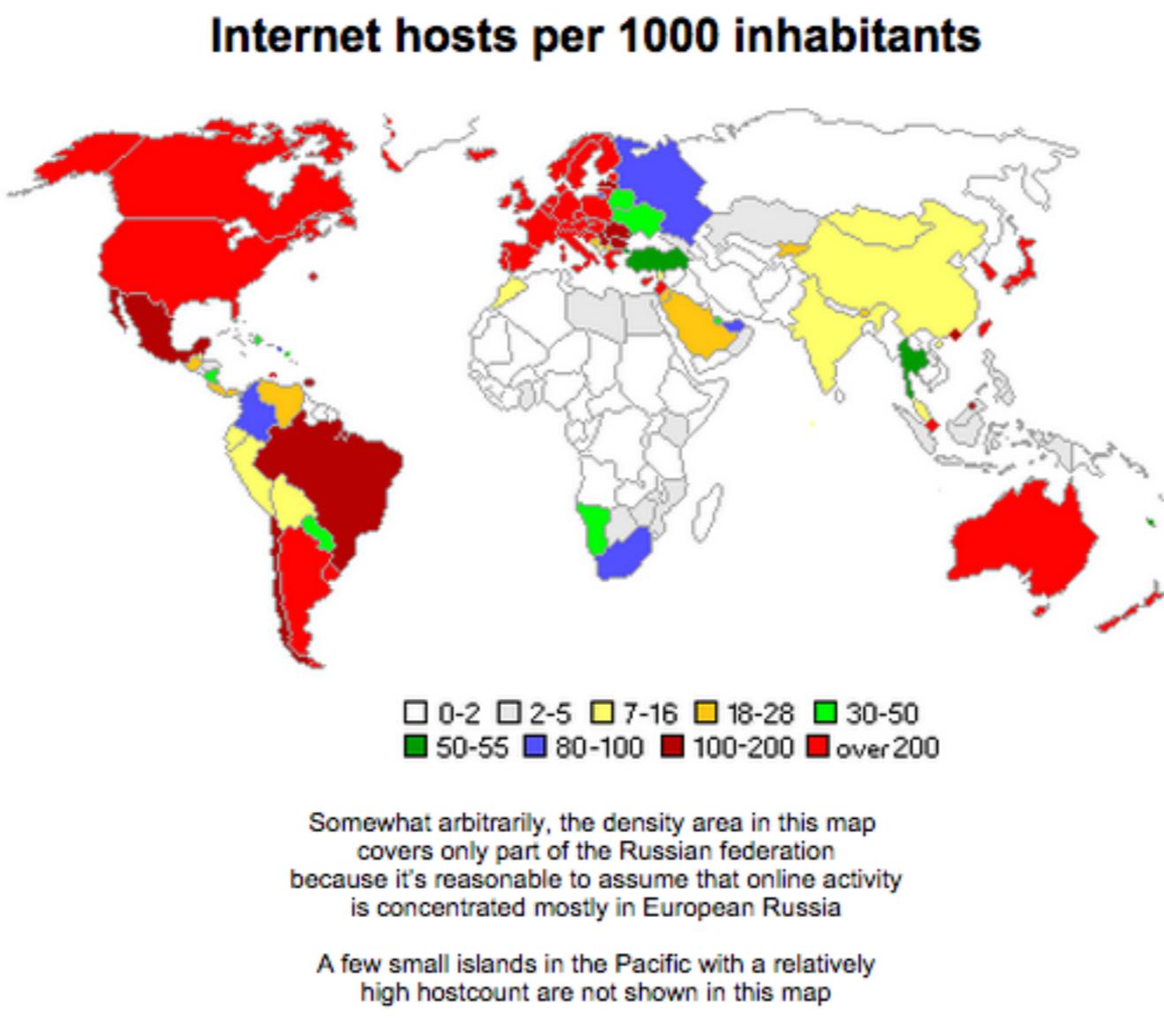
Taken from Hobbes' [Internet Timeline](#)





OPTE Project (2015)

Internet penetration by country



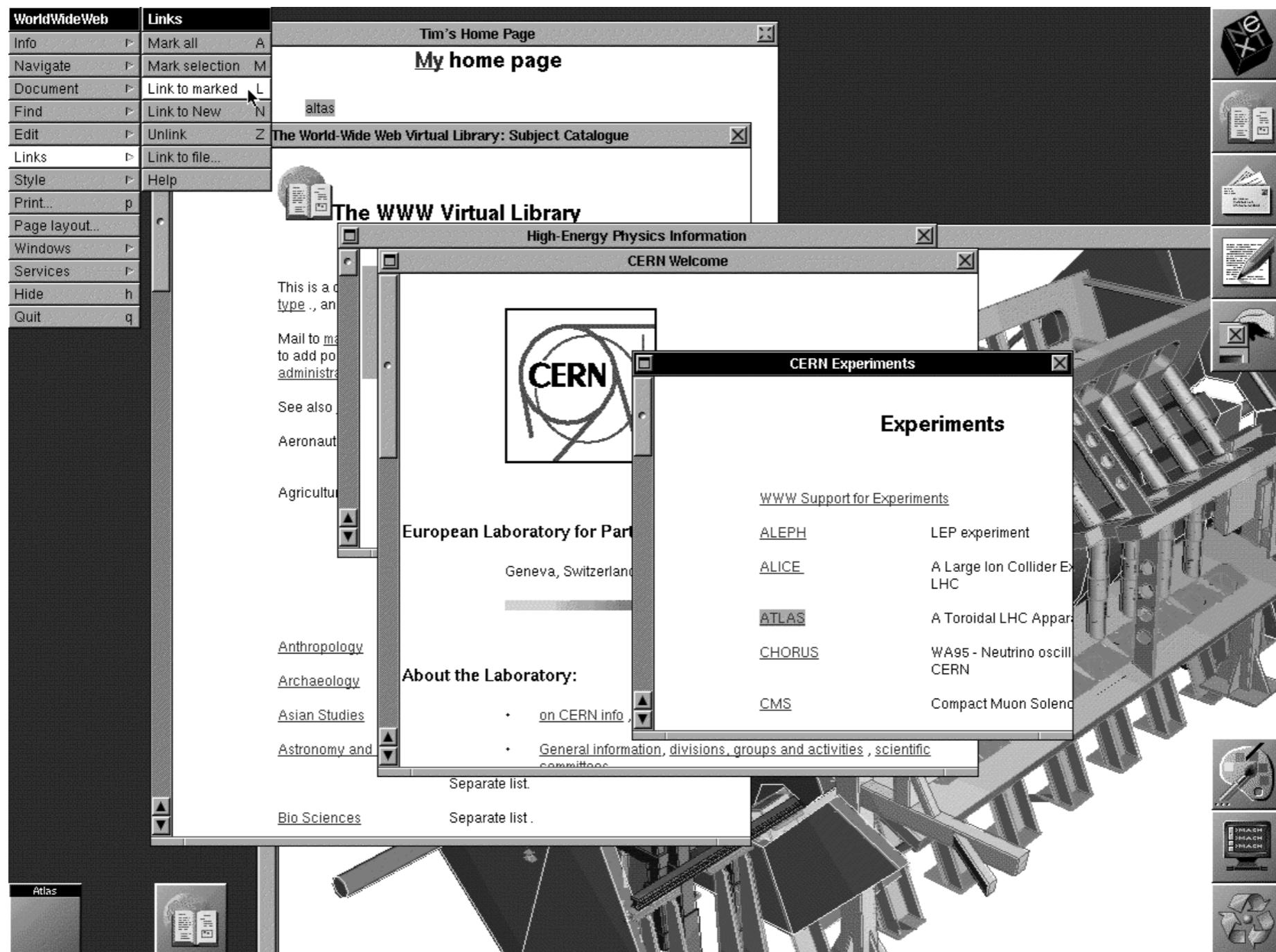
Internet stats

- Internet usage and population in the world
 - <http://www.internetworldstats.com/stats.htm>
- Internet traffic
 - <http://www.internetlivestats.com/>

The Web (WWW)

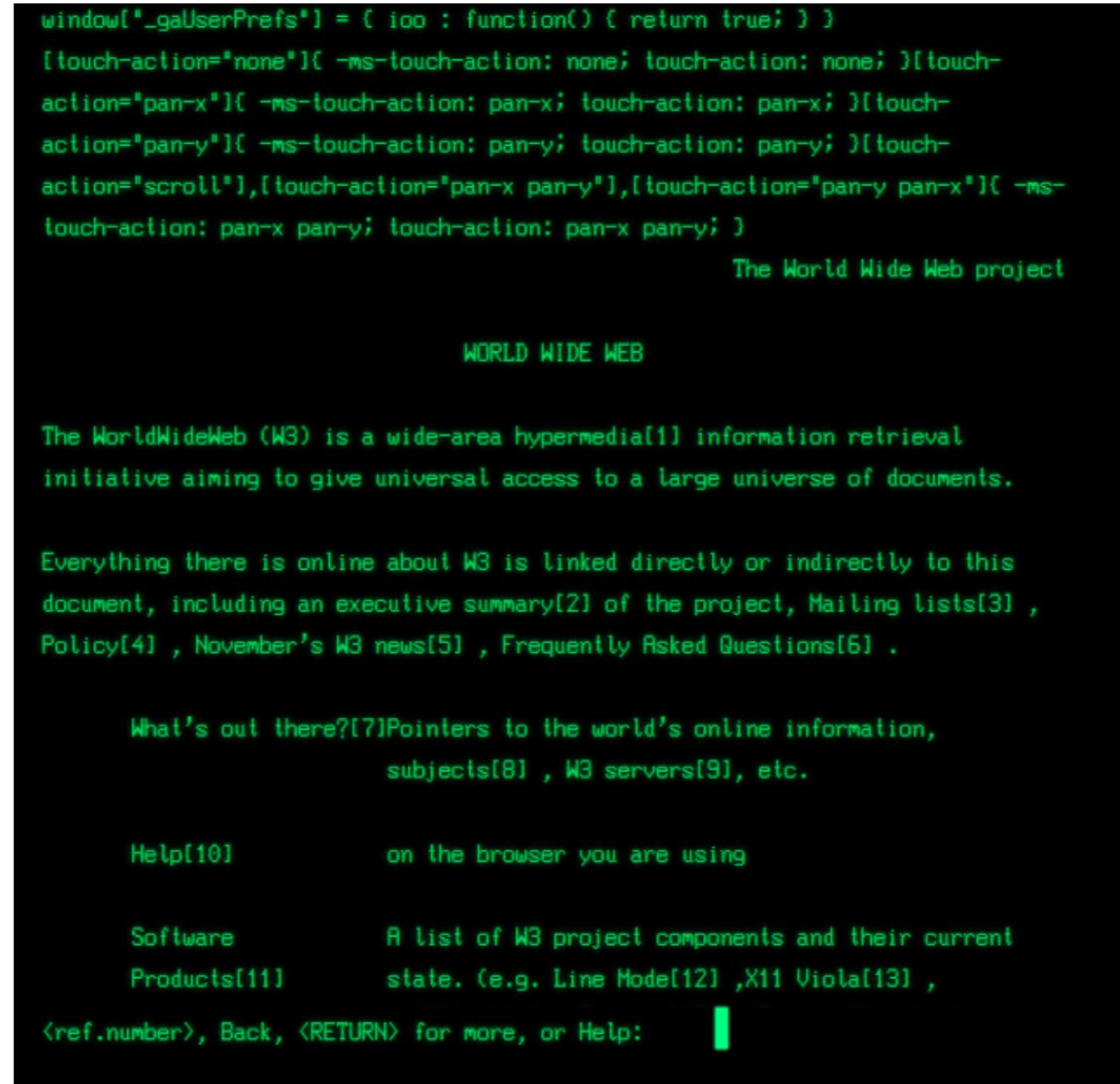
- W3C (World Wide Web Consortium) appeared as the new **organization for the coordination and evolution of the various protocols**. Initially led by Tim Berners-Lee @ CERN
- He designed the Web as a **system of interlinked hypertext documents** that are accessed via the Internet
- With a web browser, people can view **web pages that may contain text and media**, and can be **navigated between them by hyperlinks**
- The **first website** in the world was **dedicated to the WWW** project itself and was hosted on Berners-Lee's computer
- The site was restored in its original address and **can be accessed** at <http://info.cern.ch/hypertext/WWW/TheProject.html>

History of WWW: Browsers



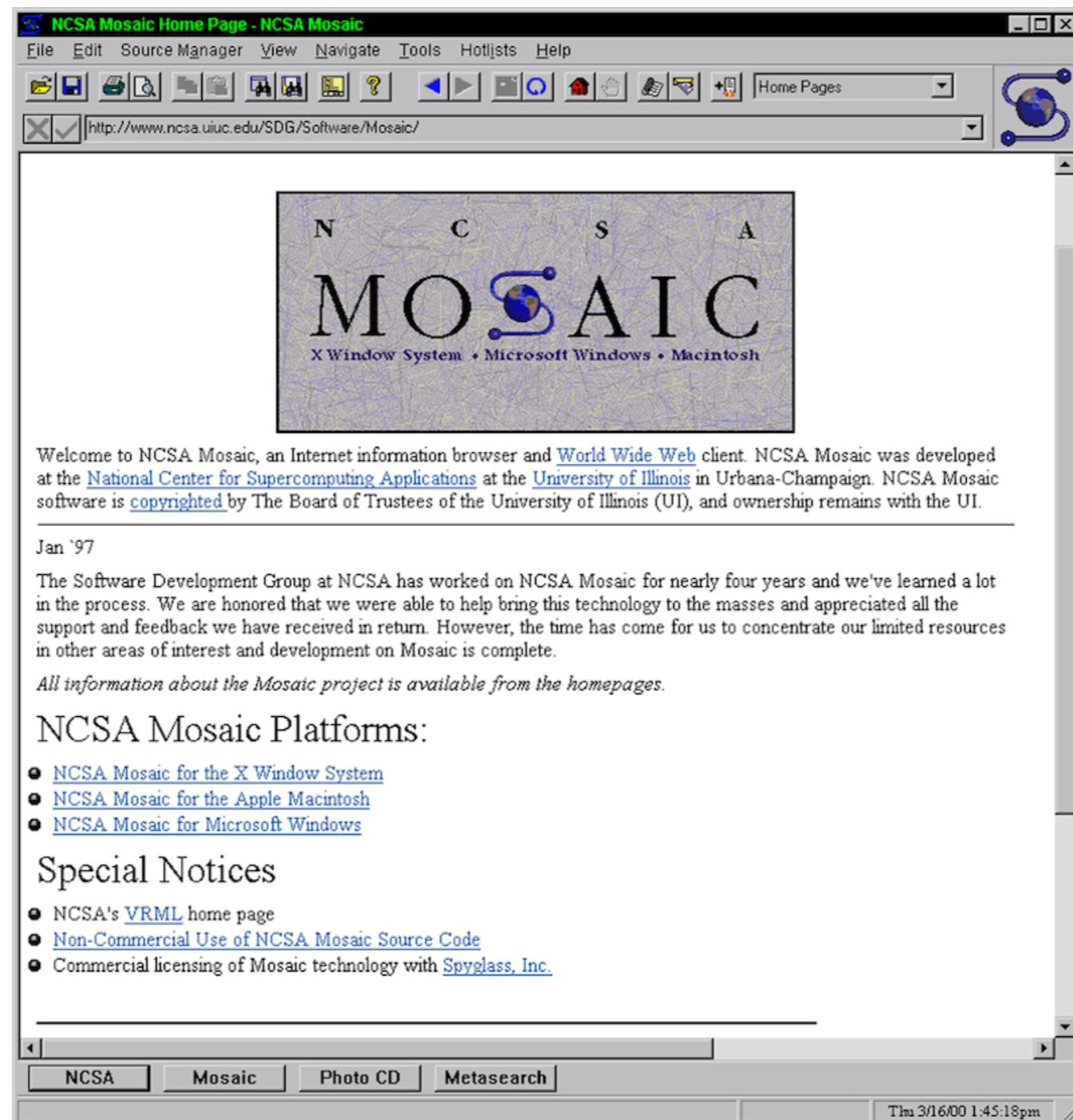
1990: WorldWideWeb by Tim Berners-Lee

History of WWW: Browsers



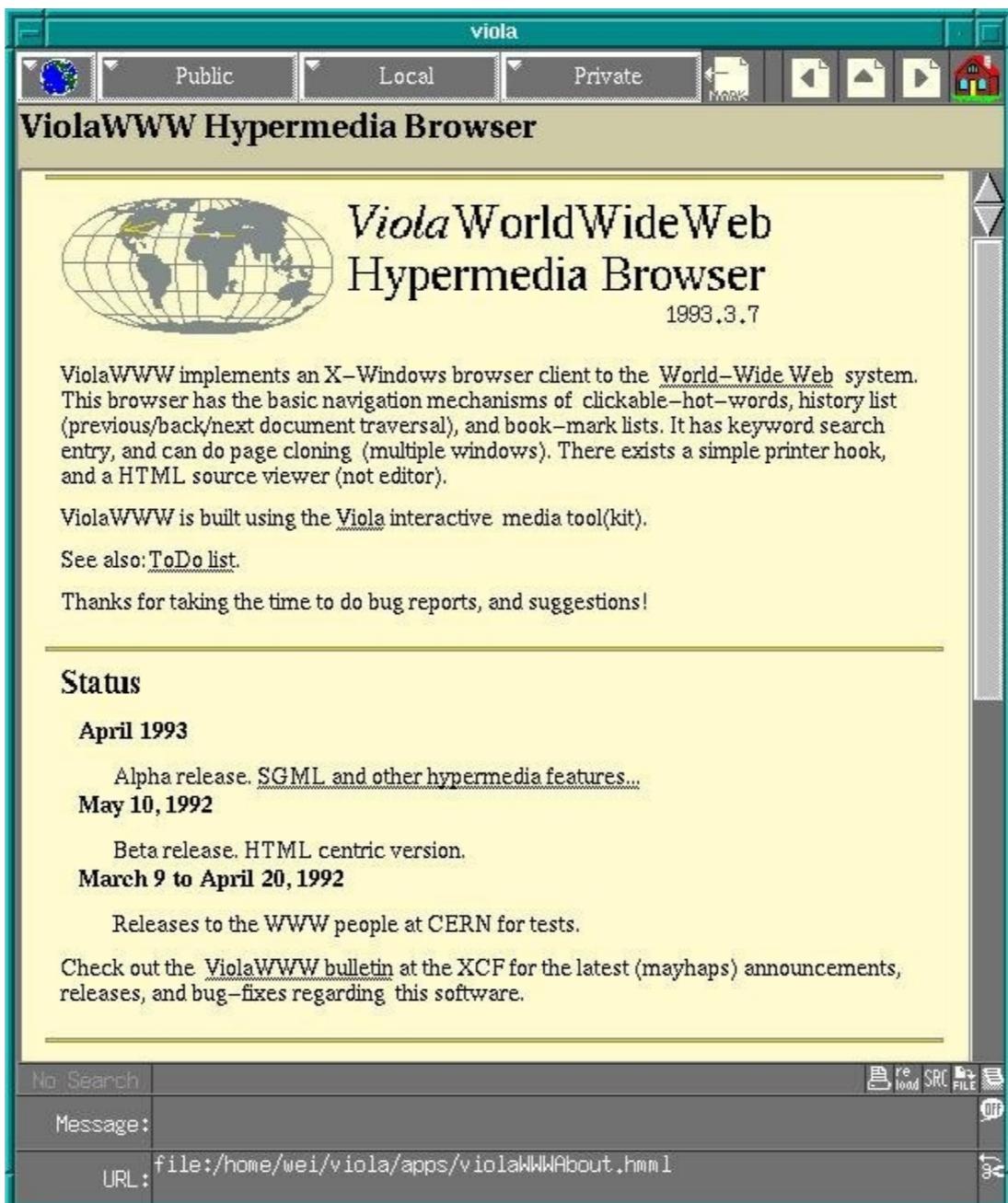
1992: WorldWideWeb Line Mode browser by Tim Berners-Lee

History of WWW: Browsers



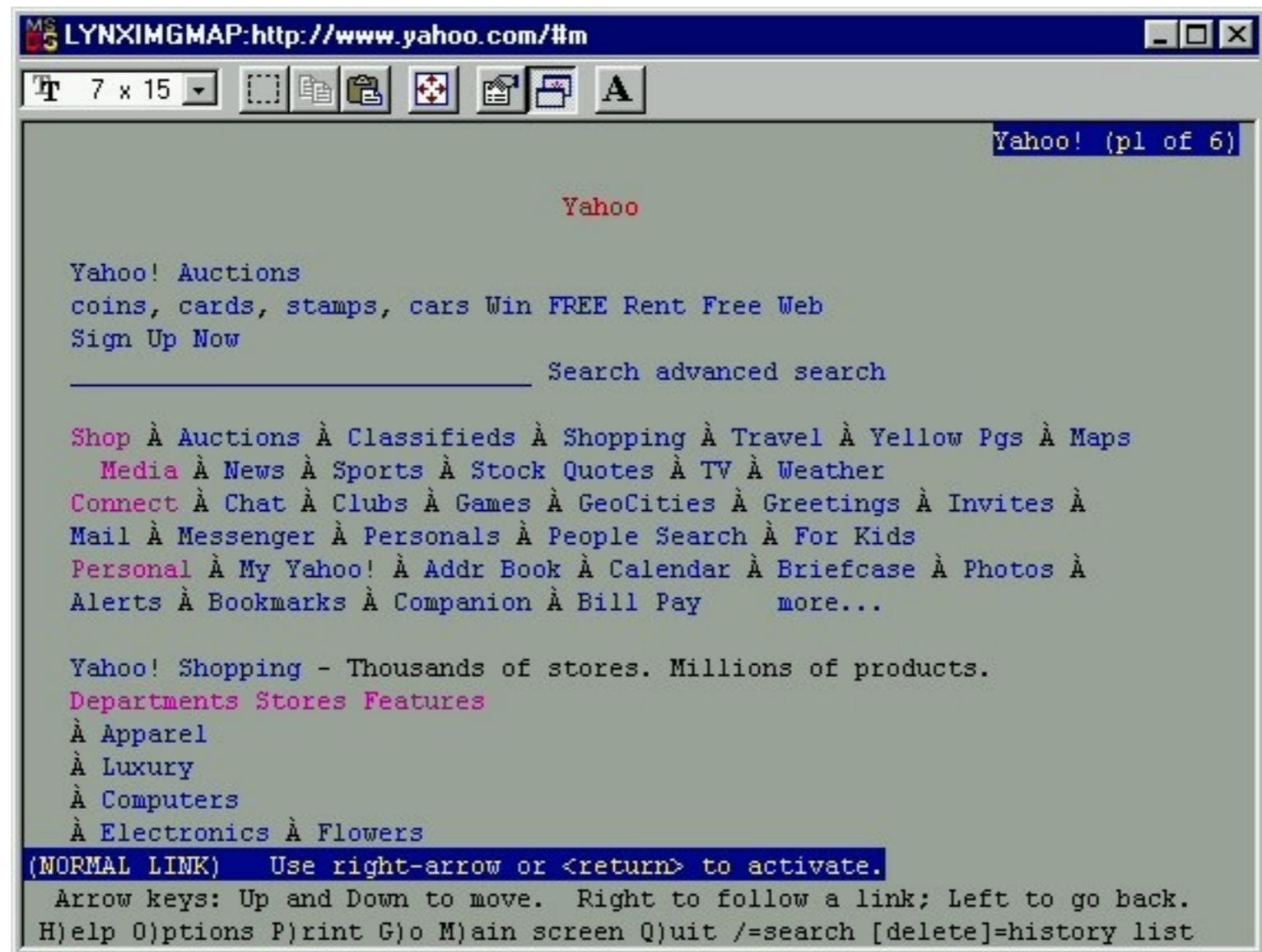
1992: Mosaic@NCSA

History of WWW: Browsers



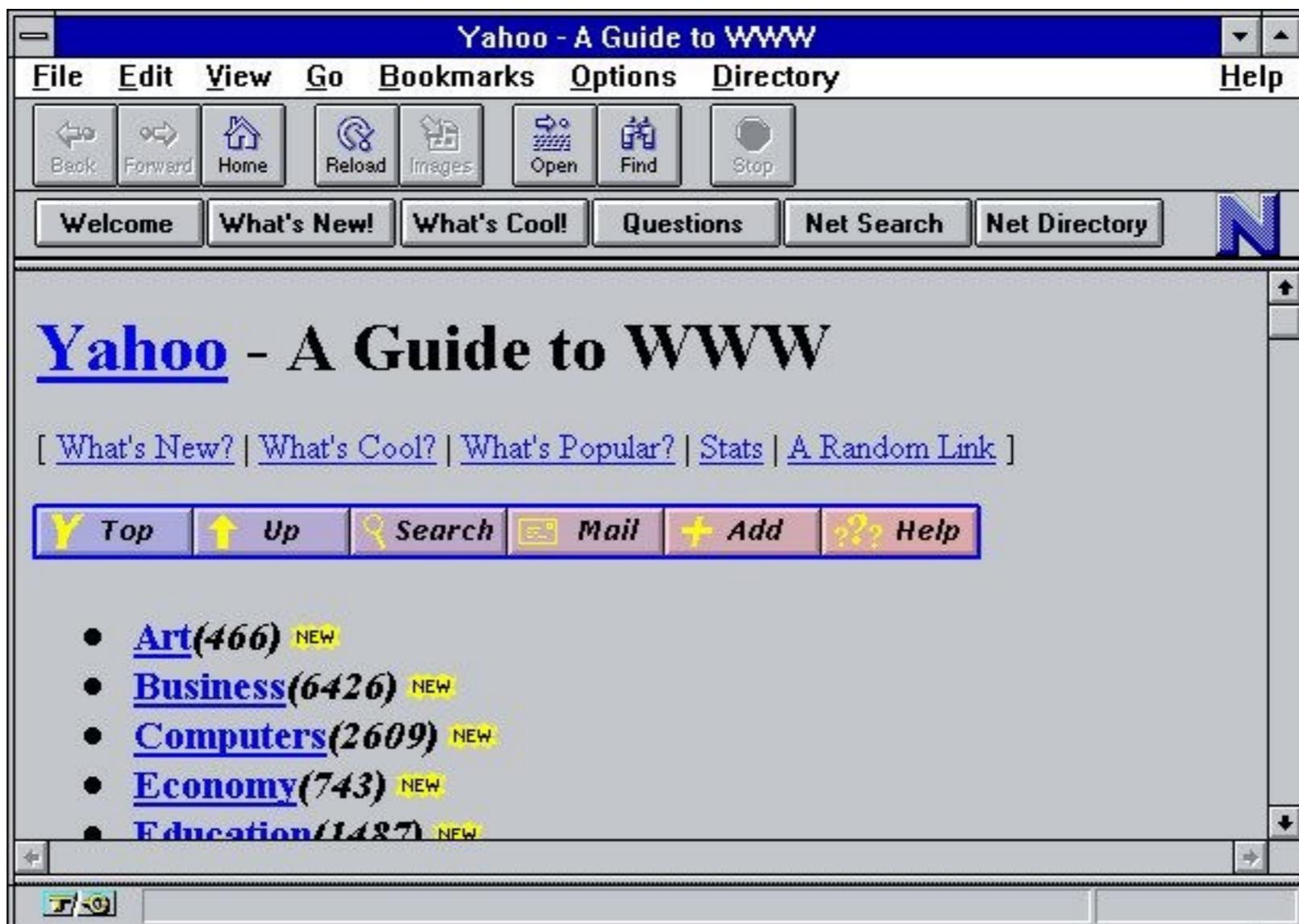
1992: ViolaWWW by Pei-Yuan Wei

History of WWW: Browsers



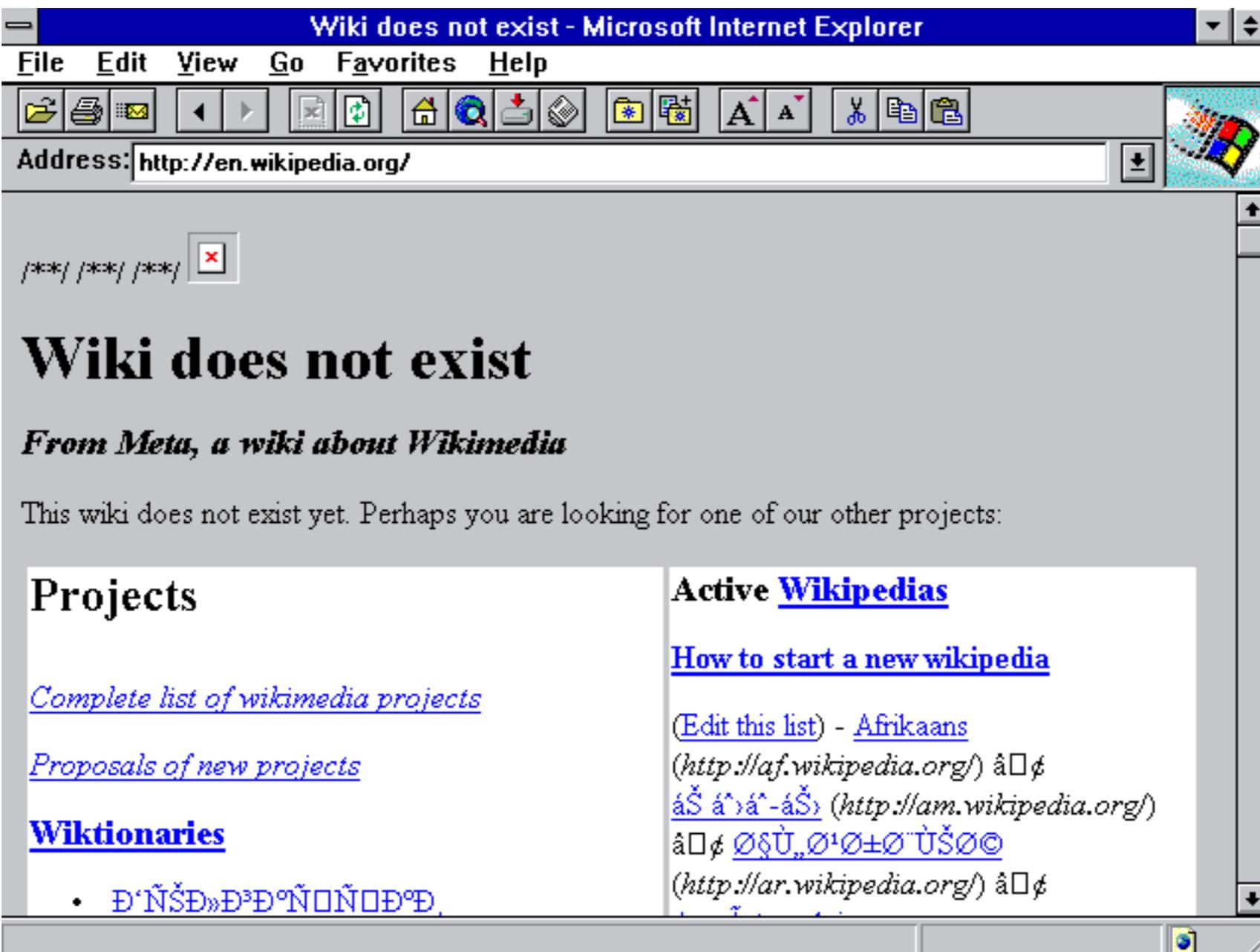
1992: Lynx@University of Kansas

History of WWW: Browsers



1994: Netscape (M. Anderseen from Mosaic@NCSA)

History of WWW: Browsers



1995: Internet Explorer (Microsoft)

History of WWW: Browsers



2003: Safari (Apple)

History of WWW: Browsers



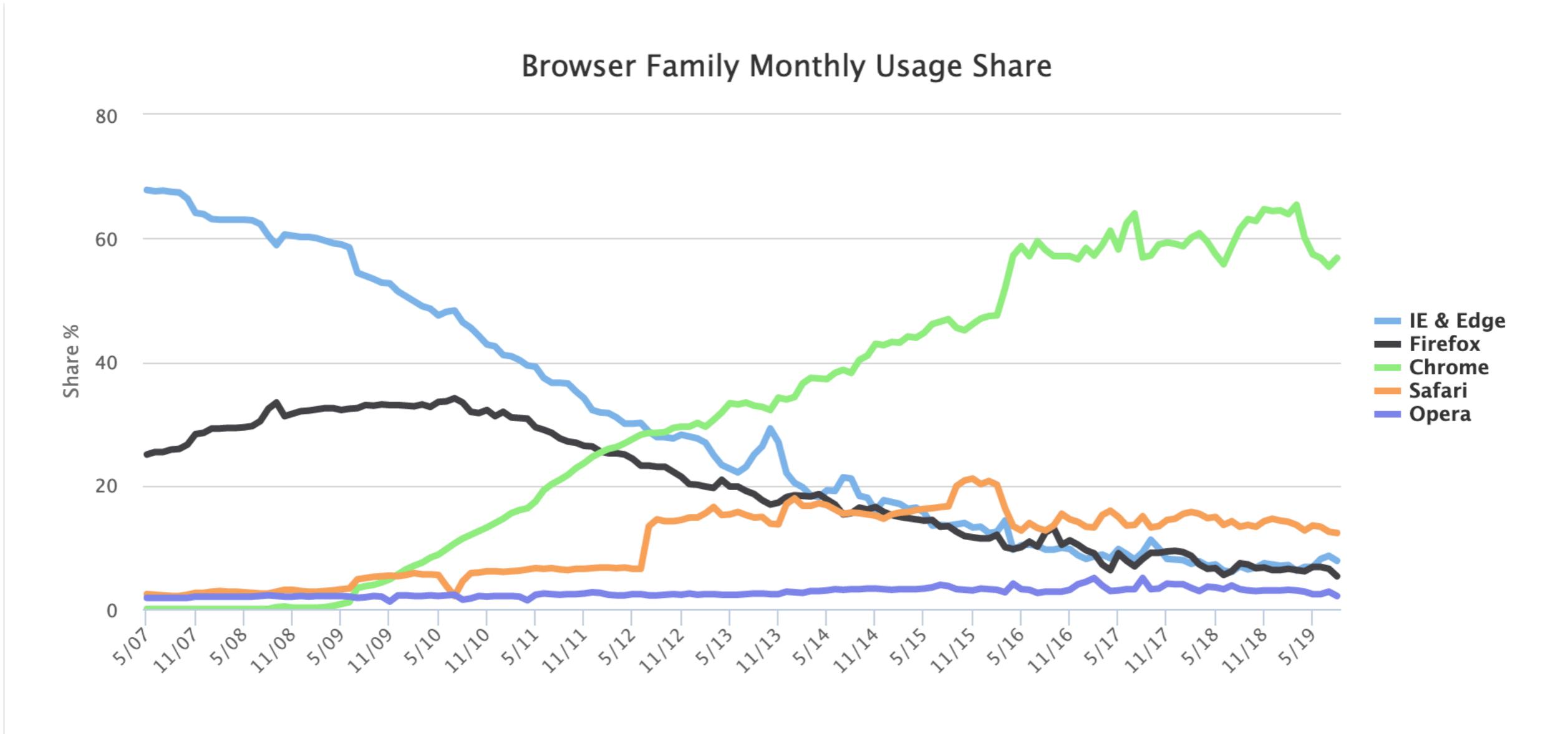
2004: Firefox (Mozilla project)

History of WWW: Browsers



2008: Chrome (Google)

History of WWW: Browsers



Taken from <http://www.w3counter.com/trends>

BREAK

Intro to HTML

(from [w3schools.com](https://www.w3schools.com))

- **What is HTML?**
 - Hypertext Markup Language
 - a markup language is a computer language that **uses tags to define elements within a document**
 - a document is annotated in a way that content and structure are **syntactically distinguishable**
 - language for describing web pages!
 - The **tags describe document content**
 - HTML documents, a.k.a. web pages, contain **HTML tags** to describe document content and **plain text**

Intro to HTML

(from [w3schools.com](https://www.w3schools.com))

HTML Tags

- Are **keywords** surrounded by **angled brackets** (e.g., `<html>`, `<title>`)
- Normally **come in pairs** (e.g., `<p>` and `</p>`)
- The end tag is written like the start tag, with a slash before the tag name

`<tagname>content</tagname>`

HTML Elements

- An **individual component** of an HTML document
- Most elements are written with the **text content between tags**:

`<title>This is the title</title>`

`<p>This is a paragraph</p>`

- Some elements **can have attributes**

`MUMT301 Homepage link`

Intro to HTML

(from [w3schools.com](https://www.w3schools.com))

Most basic HTML page structure:

```
<html>

    <head>
        <title>Page title</title>
    </head>

    <body>
        <h1>This is a heading</h1>
        <p>This is a paragraph.</p>
        <p>This is another paragraph.</p>
    </body>

</html>
```

Intro to HTML

- HTML5 Tutorials: [HTML W3 schools](#)
- Comprehensive reference list of HTML elements: [HTML5 list of elements](#)

Code editors

- Text editor program designed specifically for editing source code
- Syntax highlighting, indentation, autocomplete features, and bracket matching, among other features
- May be standalone, built into an IDE, or web-based
- Free options (fully functional with some restrictions)
 - Atom
 - Sublime Text
 - Studio Visual Code
 - codeanywhere.com (integrated SFTP)

Code editors

- NOW! Open Studio Visual Code

Intro to HTML

([w3schools.com/html](http://www.w3schools.com/html))

Simple in-class assignment

- In your local machine
 - create a folder for your website development (e.g., ~/Desktop/foo/)
 - open a code editor
 - create new file, and save it as **index.html** within the folder **foo**
- In the **index.html** file write HTML code to:
 - give the page a title
 - give a welcome message using heading 1
 - find a picture of you on the web and display it. See "Images on another server":
[\(http://www.w3schools.com/html/html_images.asp\)](http://www.w3schools.com/html/html_images.asp)
 - create a second HTML page (e.g., **bio.html**)
 - link the two HTML pages together
[\(https://www.w3schools.com/tags/tag_a.asp\)](https://www.w3schools.com/tags/tag_a.asp)

Files in Web server

Now we have to upload the files to its final destination in the Web server

We can make use of any FTP software, but the MTCL has CyberDuck

Open CyberDuck and create a connection with SFTP

server: 132.206.14.130

username: yourusername

password: yourpassword

Drag the contents of your local folder to your publicly accessible folder (/home/yourname/www) on the server

If everything went well, you should be able to access your site at
<http://132.206.14.130/yourname>

Github

- **Git is a version control system** that allows to record and log code changes
- Github is **web-based** hosting service for **version control using Git**
- Serve static web pages using **Github pages!**
In other words, there is no need to a dedicated server to serve a static site!

Github

- Open Github Desktop app
- Choose "Clone a Repository from the Internet"
- Choose "[GitHub.com](#)" and Sign In
- Search for and choose your repository (mumt301/repositoryname)
- Press Clone and choose a Local Path (e.g., ~/Desktop/repositoryname)
- Press "Clone"

- Move or copy the contents inside the folder of your site to the empty repository just cloned using macOS finder
- Add commit description
- Press "Commit to master"
- Press "Publish branch" or "Push origin"
- Check if your code was pushed to
[**https://github.com/mumt301/yourusername**](https://github.com/mumt301/yourusername)

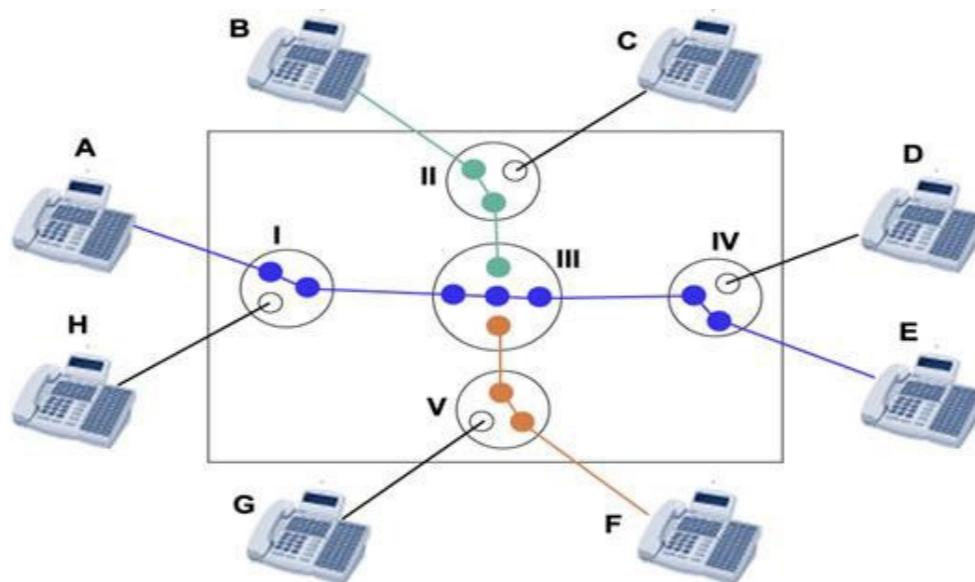
- Go to the Github pages section of the repository Setting.
- Change "Source" to "master branch" and save.
- You should be able to see your site at
[**https://mumt301.github.io/yourusername**](https://mumt301.github.io/yourusername)

Review

- Summary last class
- History of Internet
- The WWW and HTML
- Introduction to HTML
- Code editor
- Assignment 2

Switching

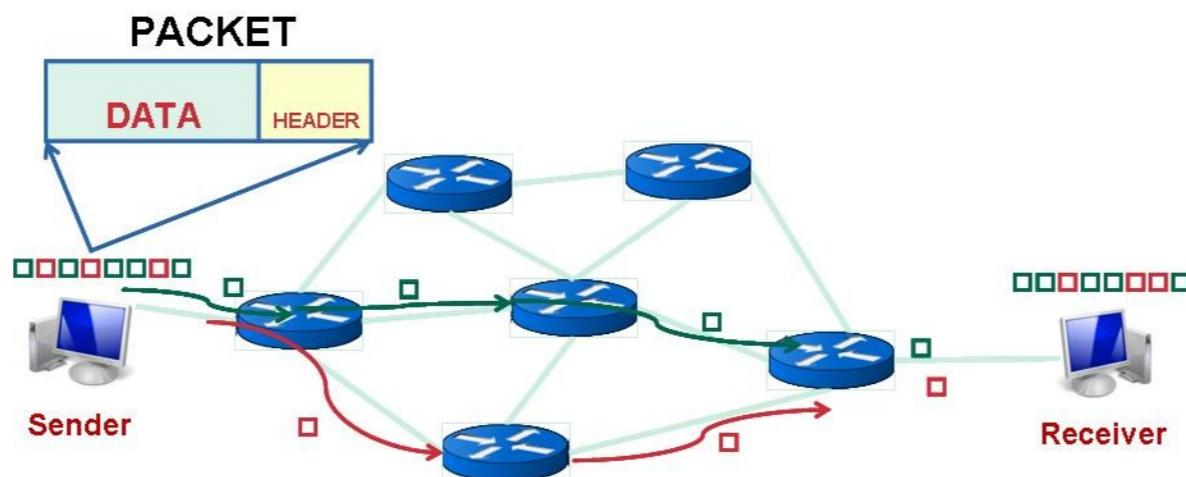
- Switching is the method by which data is transferred from an input port to an output port
- In **circuit switching**:
 - a path is first **reserved**
 - data is transferred after the **connection has been established**
 - all data passes through the **same circuit**
 - **no other user can use** the circuit until the session is completed
 - the **circuit is released after** the data is transferred



Taken from <http://cyberlawsolutions.blogspot.ca/2011/12/packet-switching.html>

Packet switching

- In **packet switching**
 - Divides the data to be transmitted into **small units** (packets) **transmitted independently** through the network
 - Each packet may be **routed via a different path**
 - The **original message is reassembled** in the correct order at the destination based on the packet number
- A **packet consists of:**
 - **Source:** the address of the computer sending the packet
 - **Destination:** the address of the destination computer
 - **Length:** the length of the packet in bytes
 - **Number:** the total number of packets in the complete message
 - **Sequence:** the number of this packet in the whole list of packets making up this communication



Taken from <http://computernetworkingsimplified.com/physical-layer/overview-circuit-switching-packet-switching/>

Final project

- Final project
 - Software project with description
 - Music project with description
 - Research paper
- Review of some previous final projects
 - Chris Middleton's Drum Sequencer: [site](#)
 - Nehir Akdag's audio visualizer suite: [site](#)
 - Saul Backer's database of hip-hop instrumentals: [site](#)
 - Andrew Ames's Dungeon Soundtracker: [site](#)
 - Jackson Hoffart's Soundcloud Mixer: [site](#)
 - Olivier Guertin's album with Internet music tools: [release](#)
 - Carlos Maldonado's web-based mixer for stems: [webpage](#)
 - Samuel Solaro's research paper on impact of digital technology and the Internet on the market structure of modern music industry: [paper](#)