6.1800 Spring 2024

Lecture #8: Introduction to Networking

Katrina's favorite lecture

Katrina LaCurts | lacurts@mit.edu | 6.1800 2024

6.1800 in the news

so much of life today relies on the Internet — so much so that Internet shutdowns are sometimes used as tools of oppression

Tracking Internet Shutdowns in 2023

Robbie Mitchell
Senior Communication and Technology Advisor, Internet Society

Categories: Shutdown

January 11, 2024

It is increasingly common for governments to shut down the Internet on a national or sub-national level to solve specific problems, including controlling civil unrest, stemming the flow of misinformation, or preventing cheating on national exams.

As of the end of 2023, governments and other actors across 18 countries intentionally disrupted Internet connectivity or blocked access to specific Internet services for their citizens. Of the 124 events Pulse tracked across the year, including four that continued from last year, 55 have been nationwide disruptions lasting from a couple of hours to a week, culminating in more than 2,370 days of disruptions.

https://pulse.internetsociety.org/blog/tracking-internet-shutdowns-in-2023-2

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so much of life today relies on the Internet — so much so that Internet shutdowns are sometimes used as tools of oppression

keep that in mind today as we talk about the history of the Internet. was it originally designed to be this crucial to modern life?

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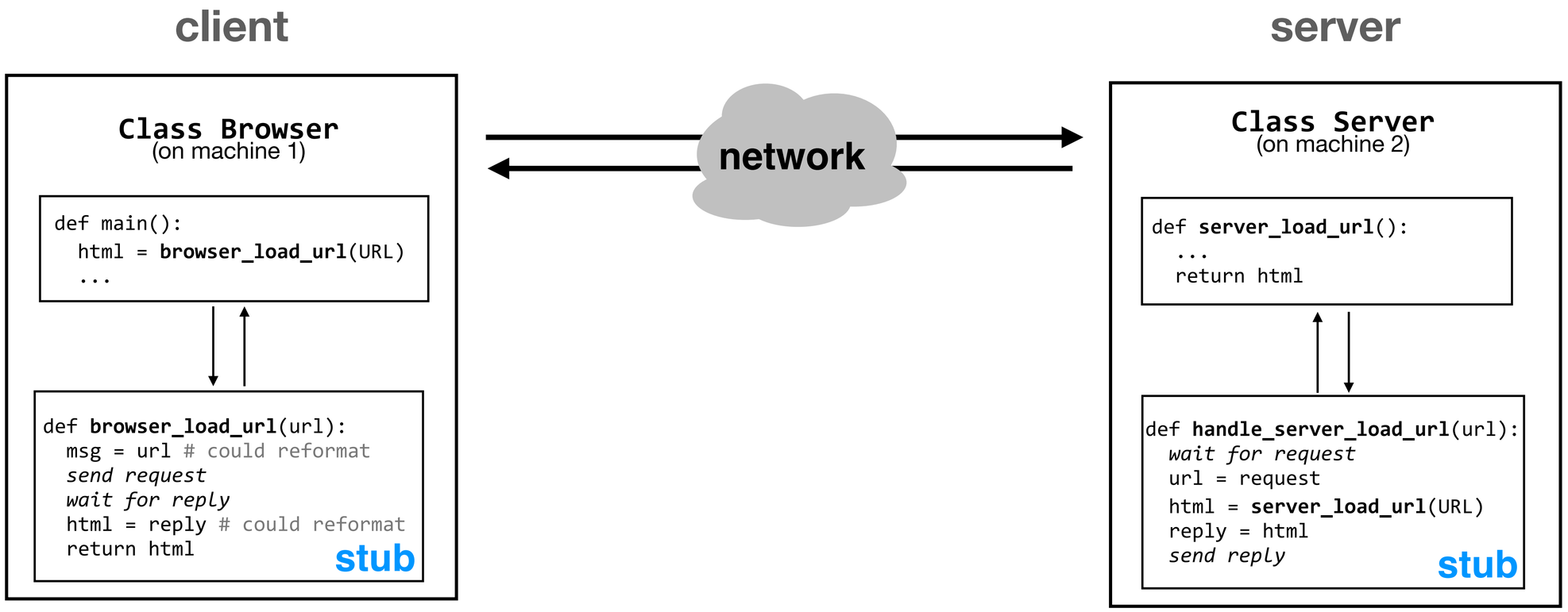

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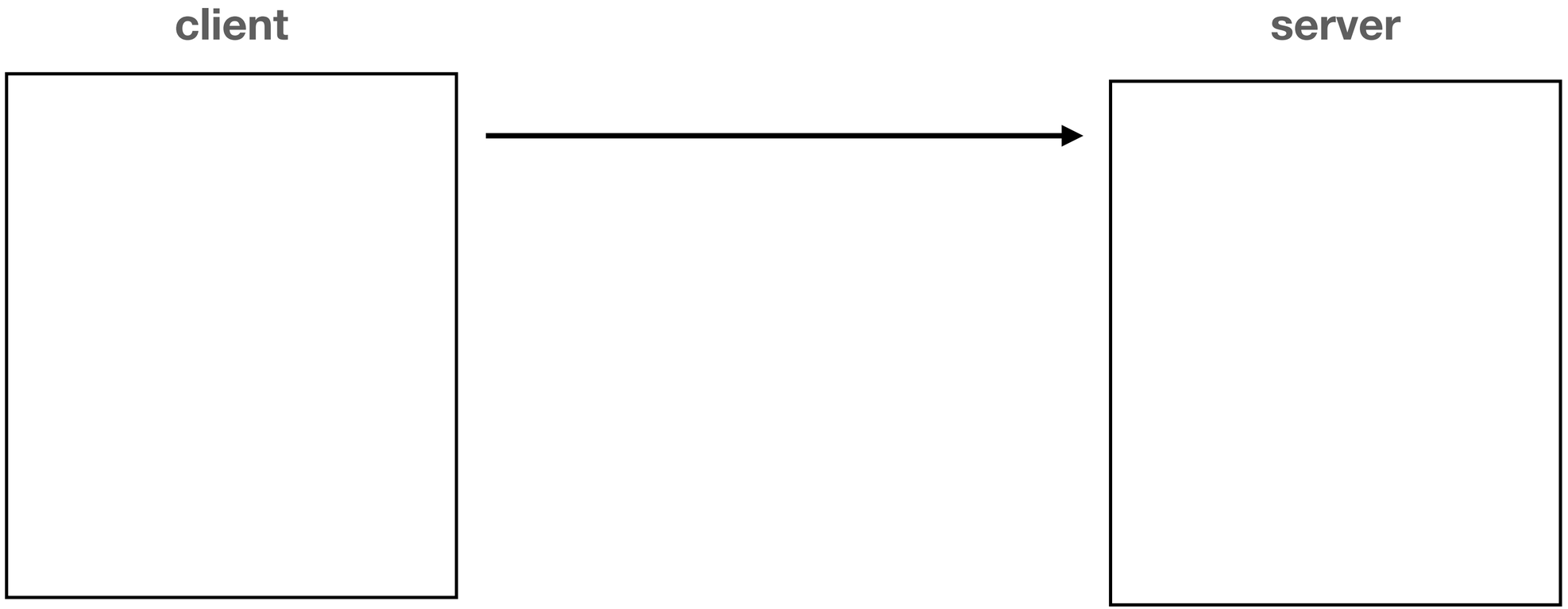

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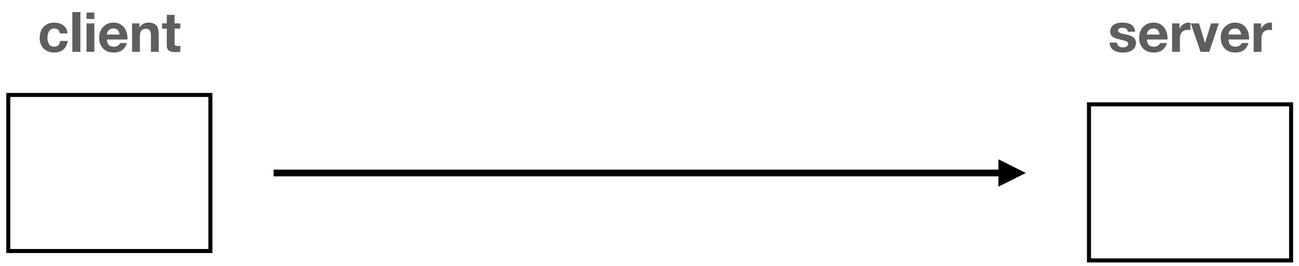

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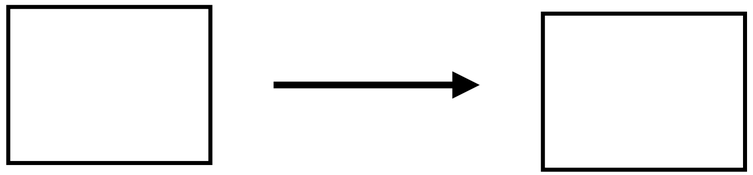

point-to-point links: get a source to talk to a directly-connected destination

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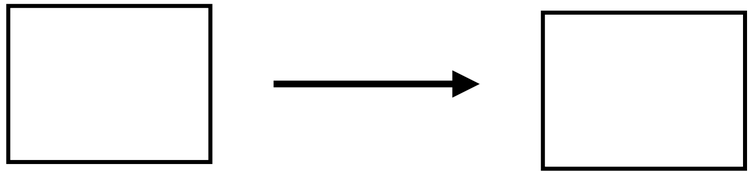

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`link` communication between two directly-connected nodes

examples: ethernet, bluetooth, 802.11 (wifi)

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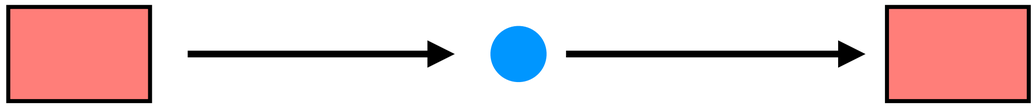

switches: help forward data to destinations that are far away

switches do other things, too

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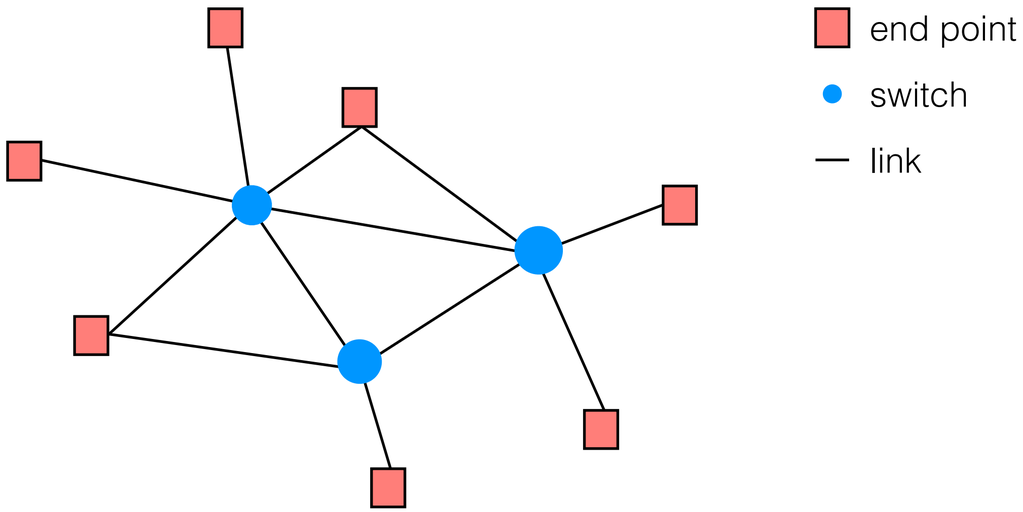

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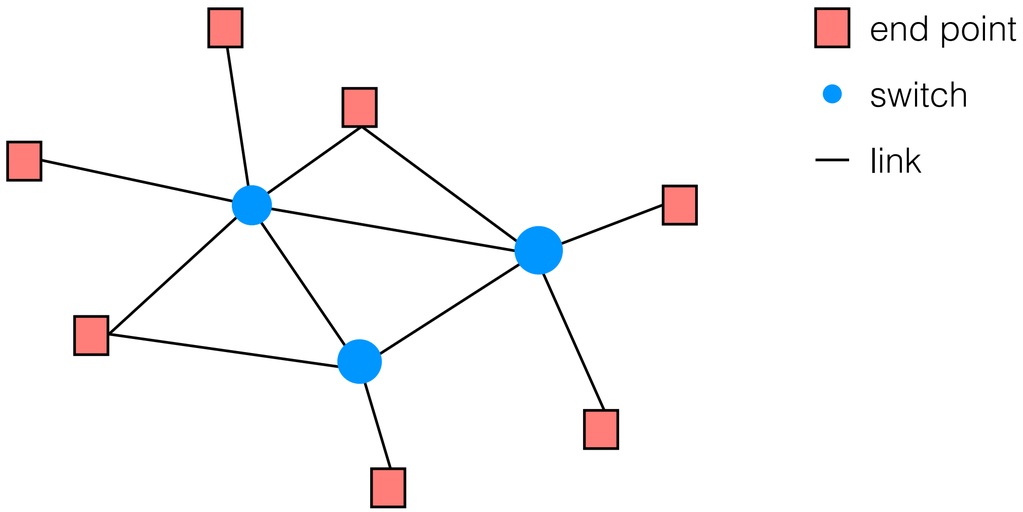

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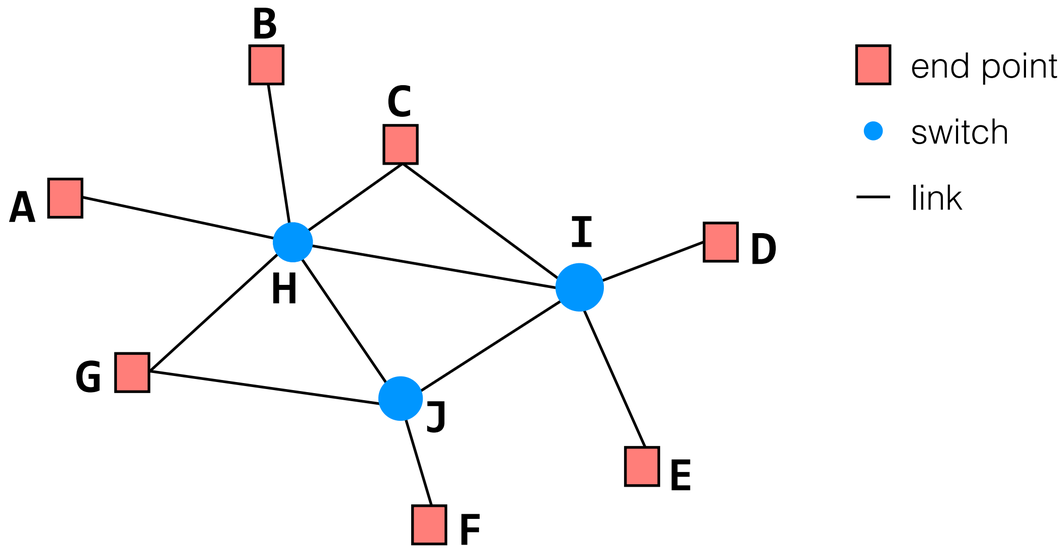

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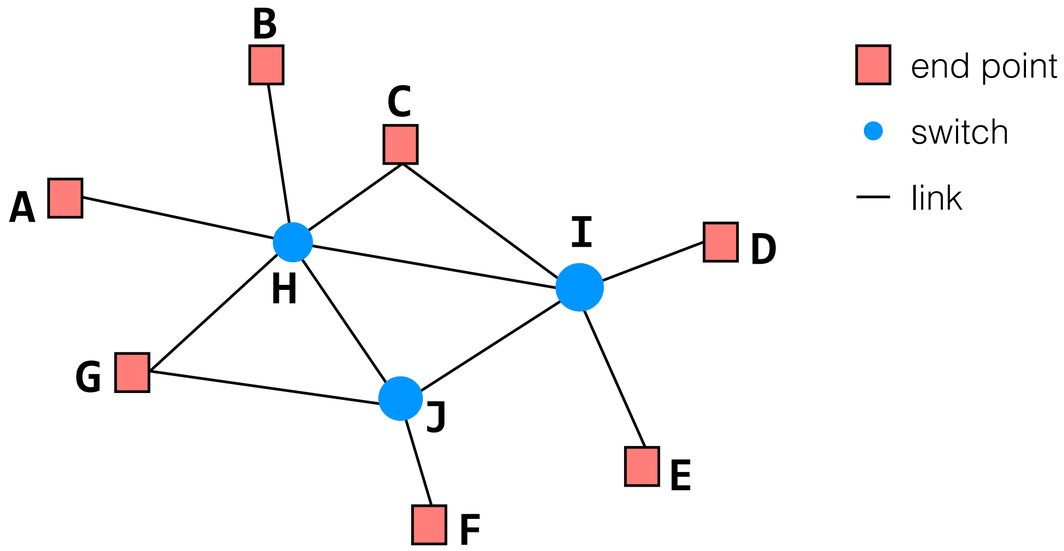

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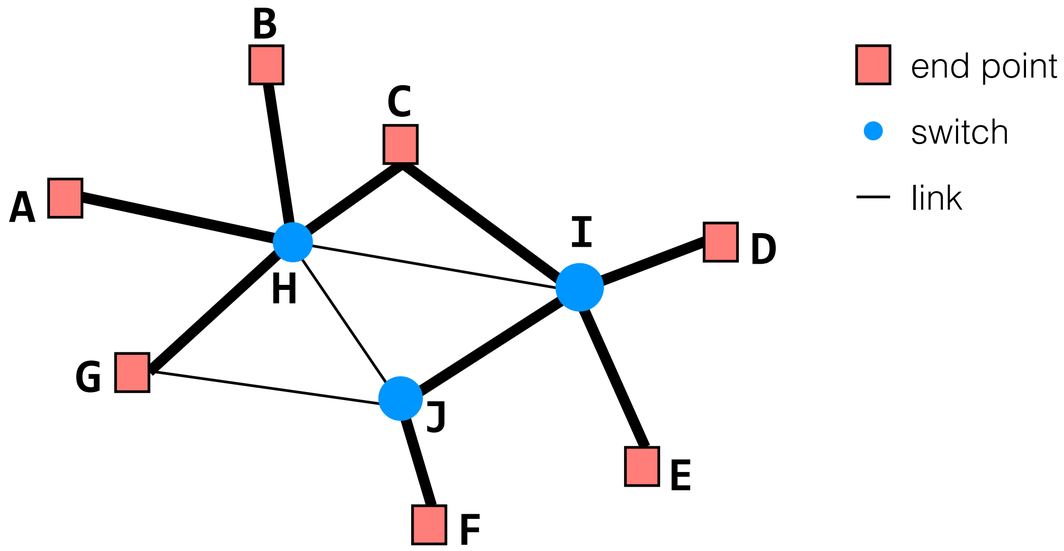

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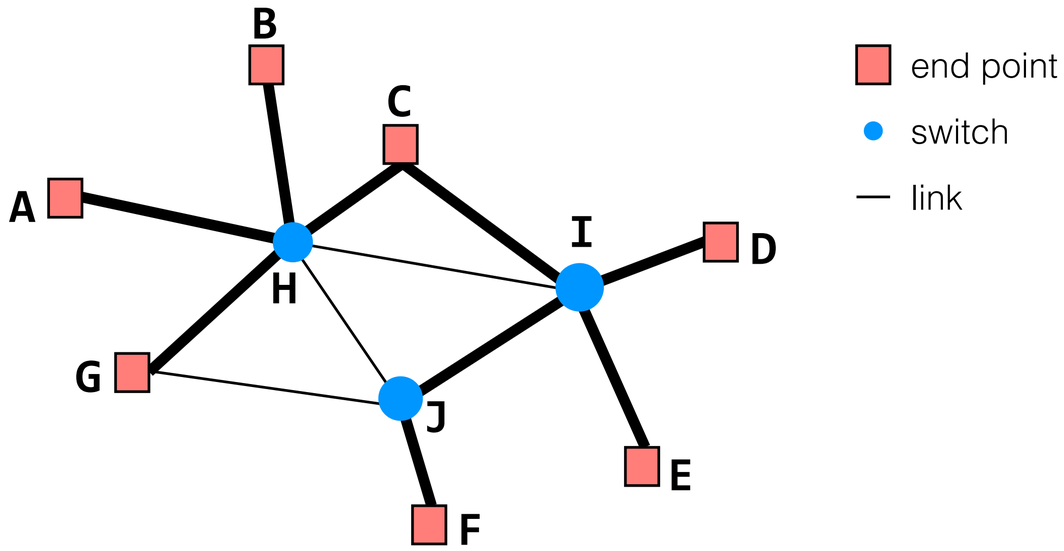

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`transport`	`sharing the network, reliability (or not)`
`network`	`naming, addressing, routing`
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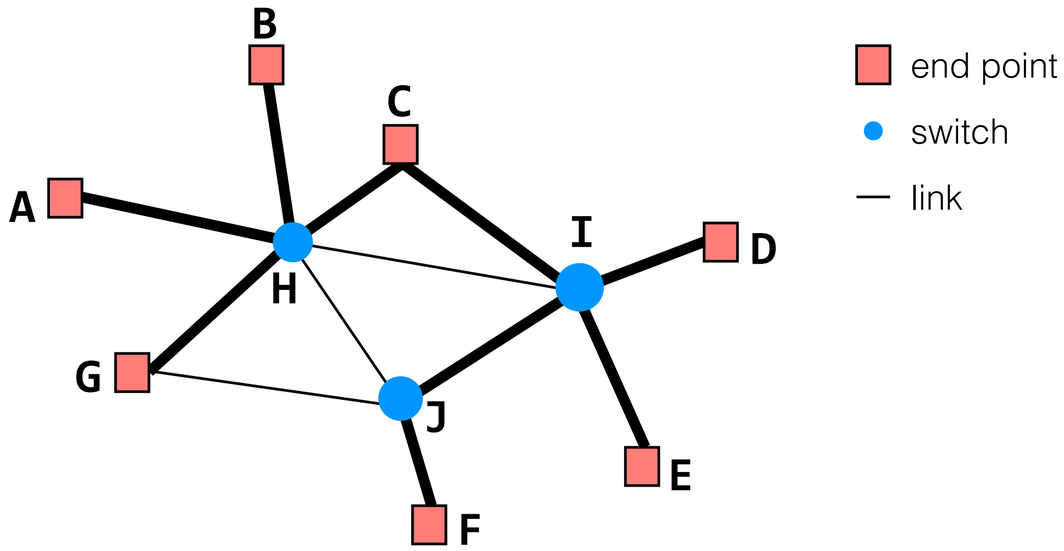

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FIGURE 6.1 Drawing of September 1969
(Courtesy of Alex McKenzie)

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https://personalpages.manchester.ac.uk/staff/m.dodge/cybergeography/atlas/historical.html

1970s: ARPAnet

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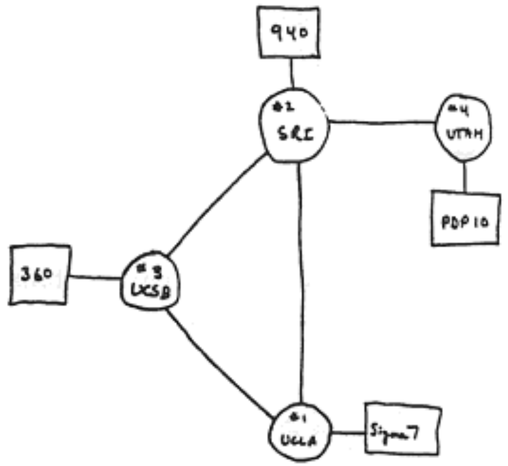

FIGURE 6.2 Drawing of 4 Node Network
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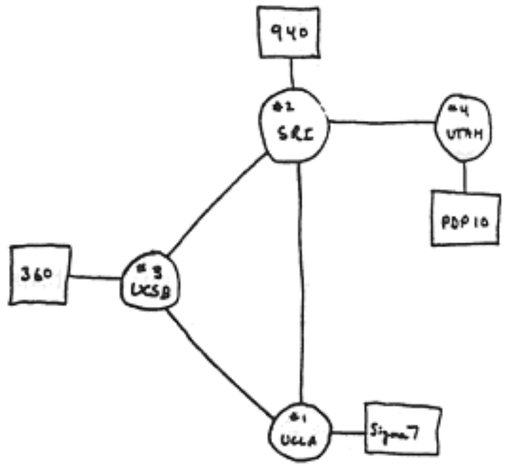

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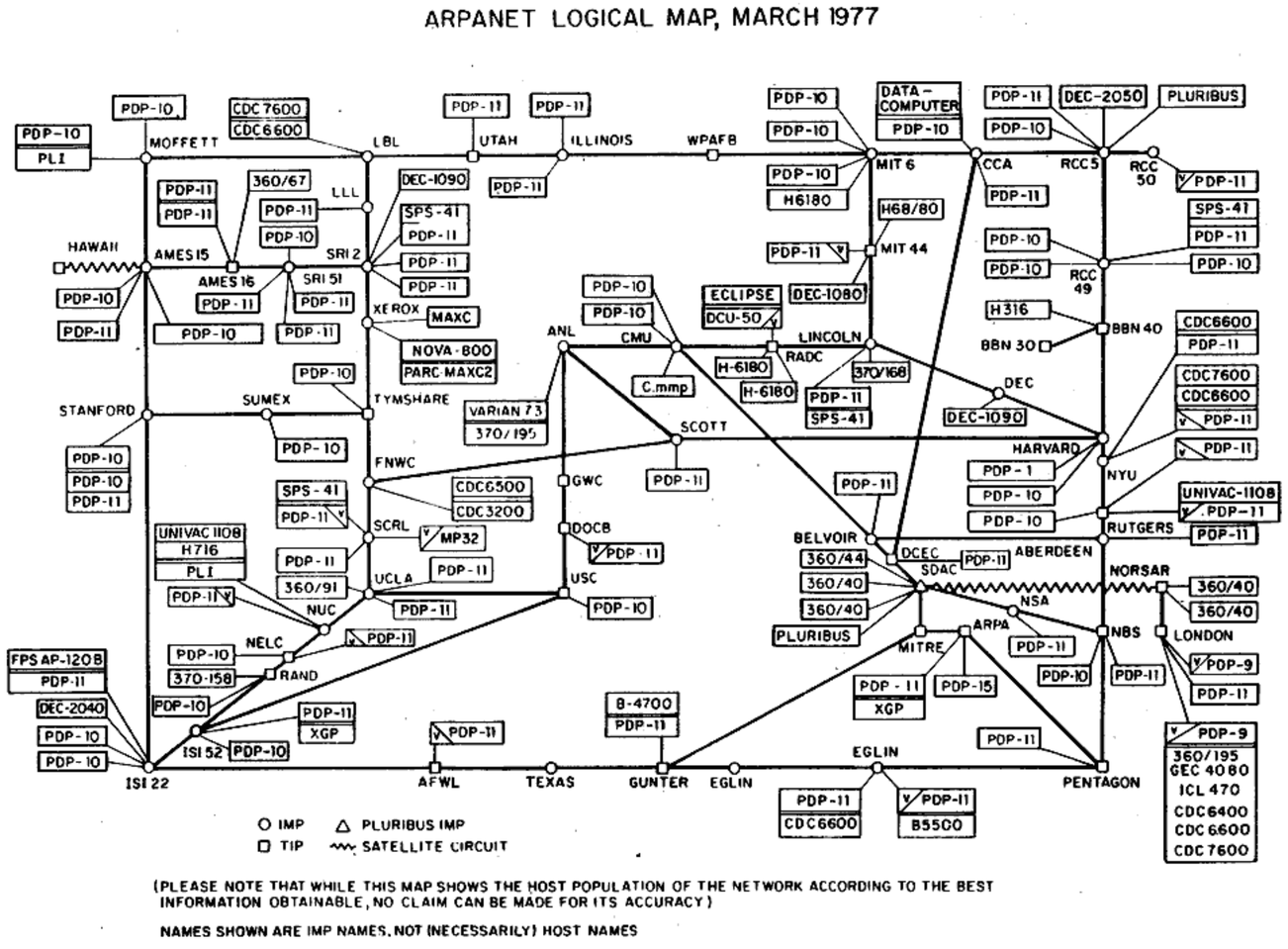

application the things that actually generate traffic

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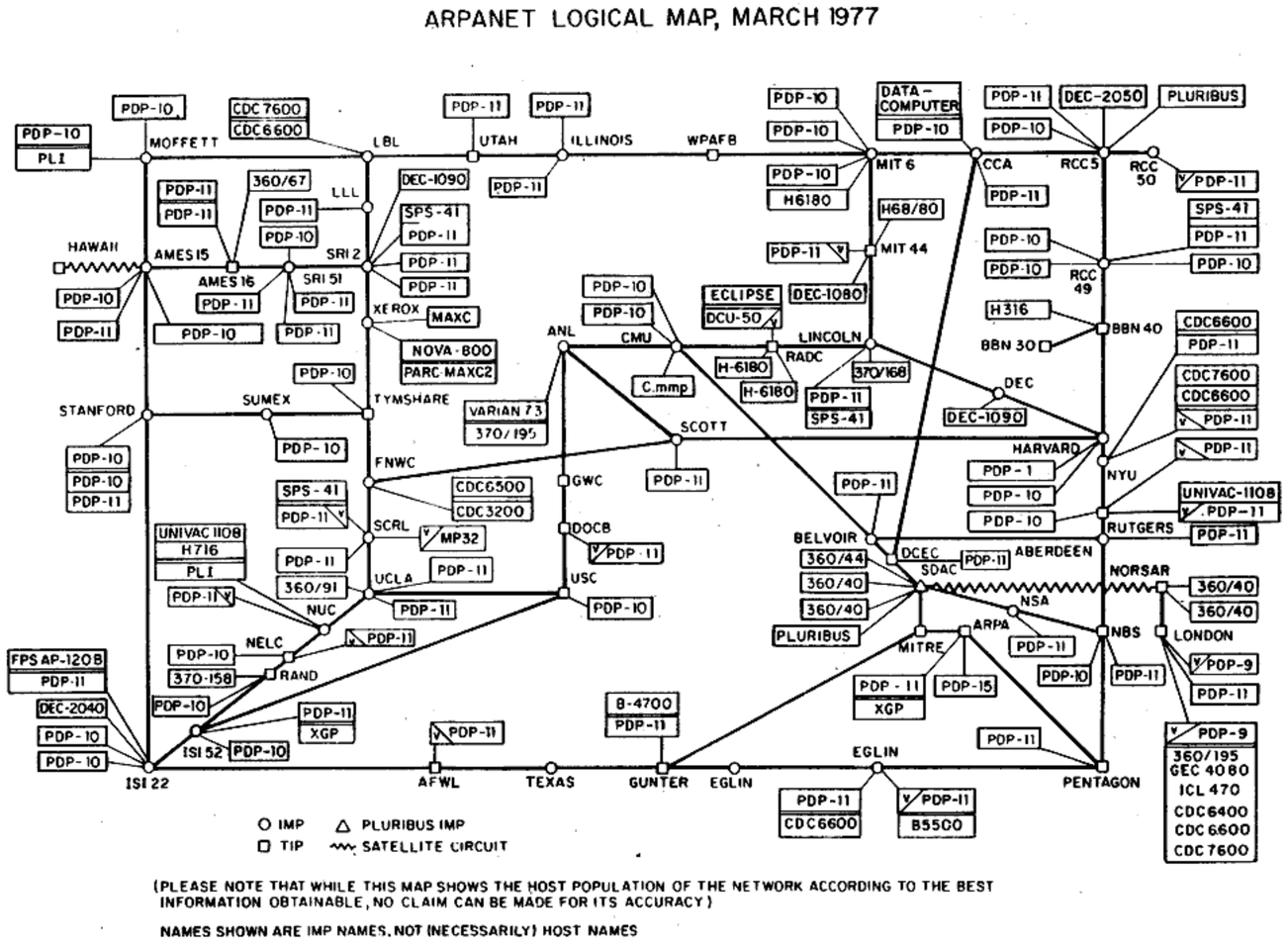

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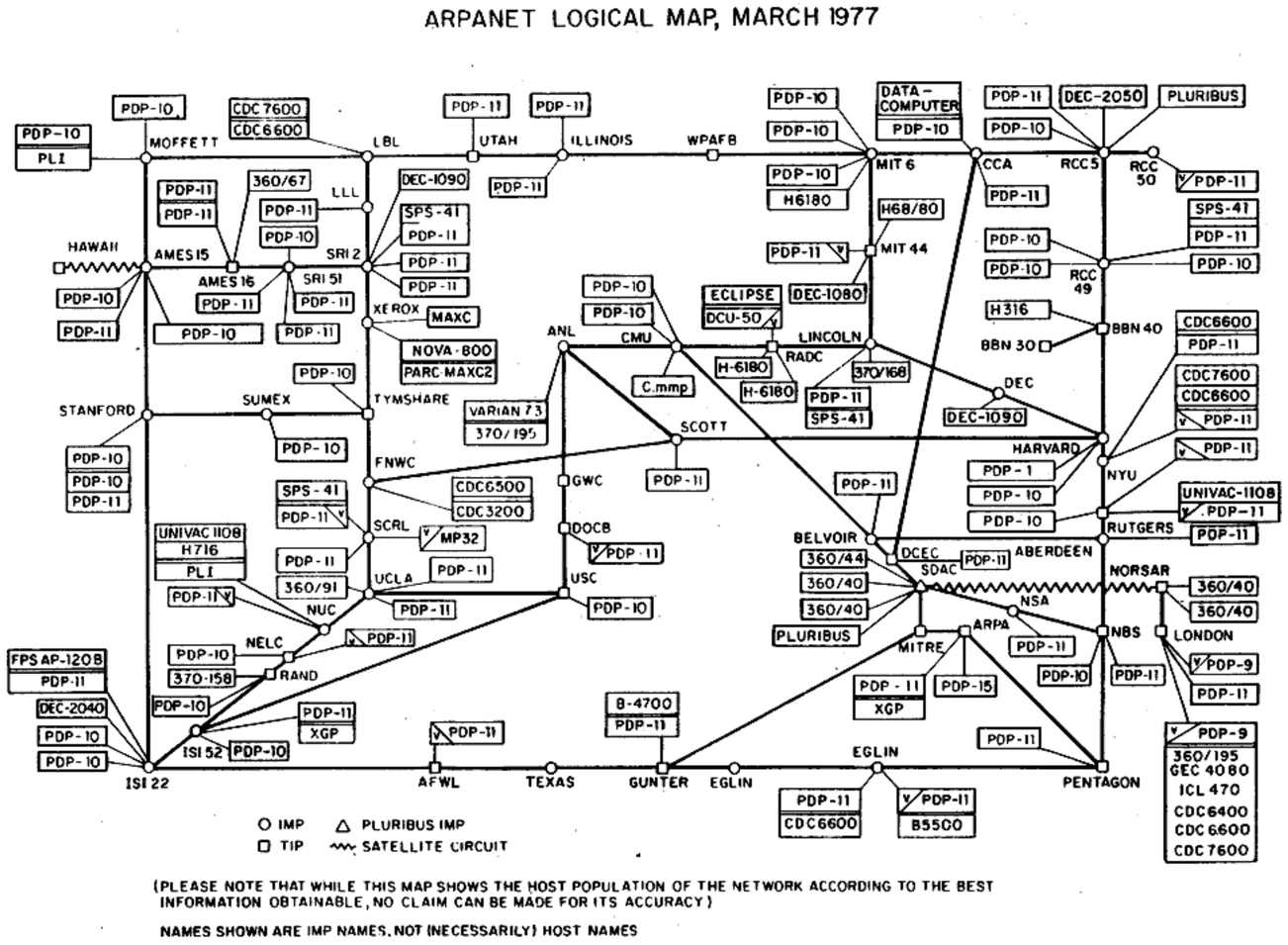

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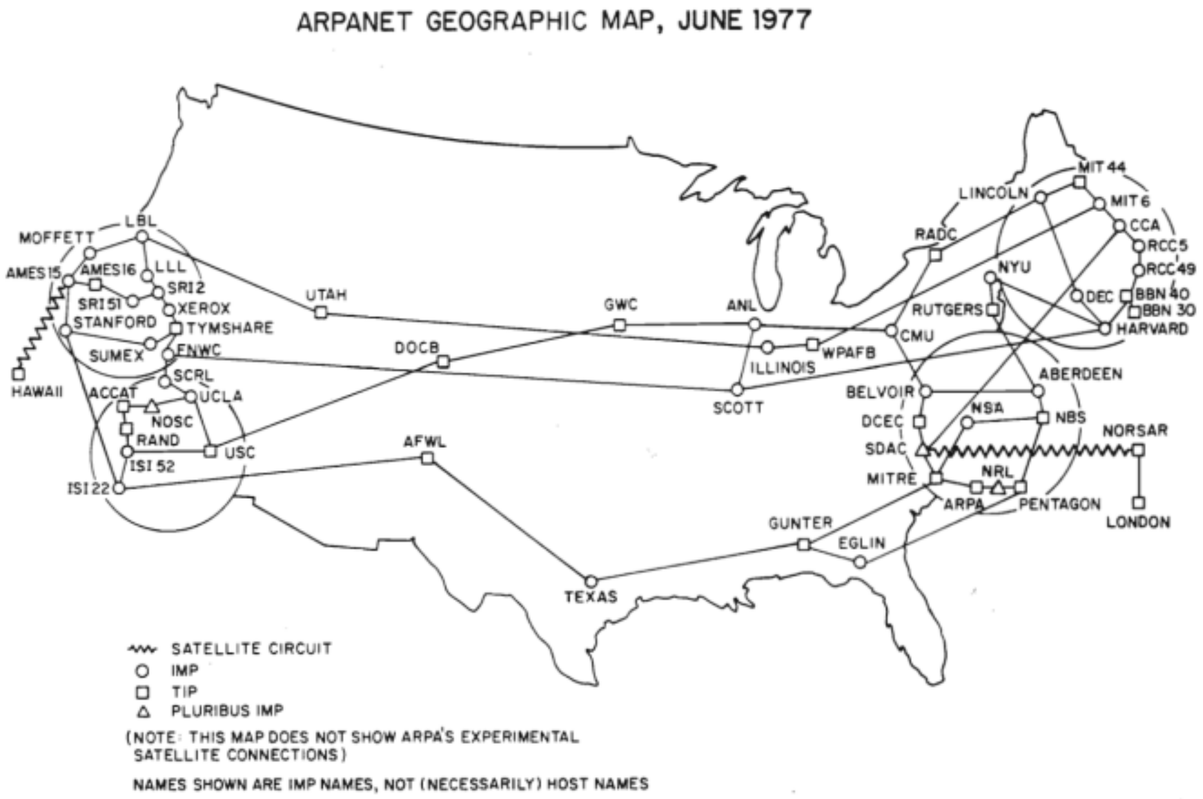

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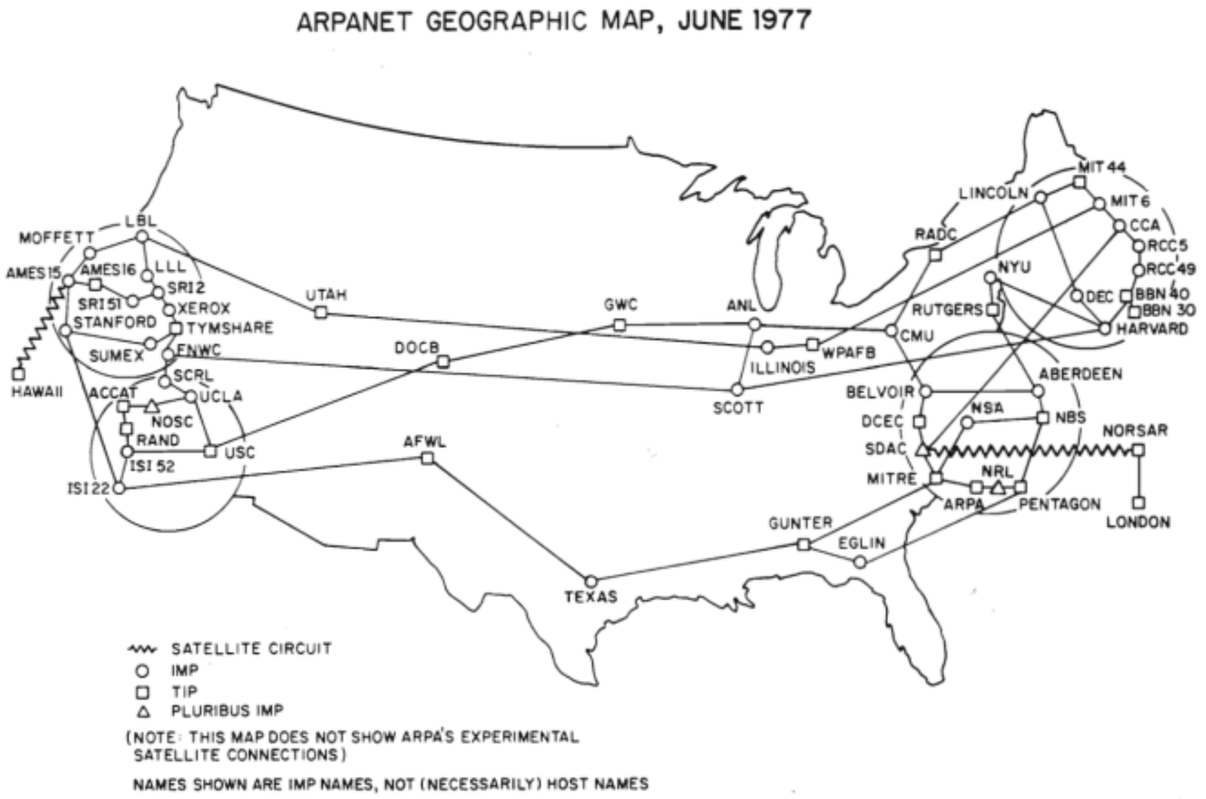

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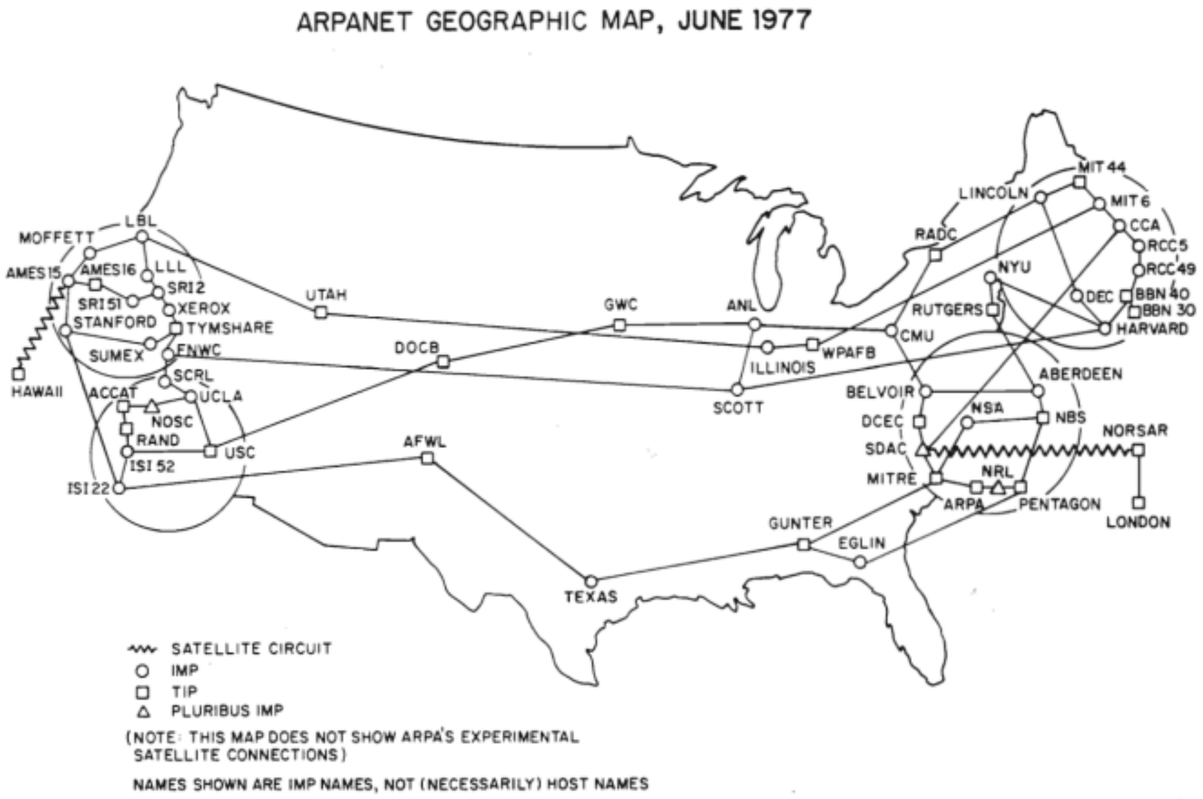

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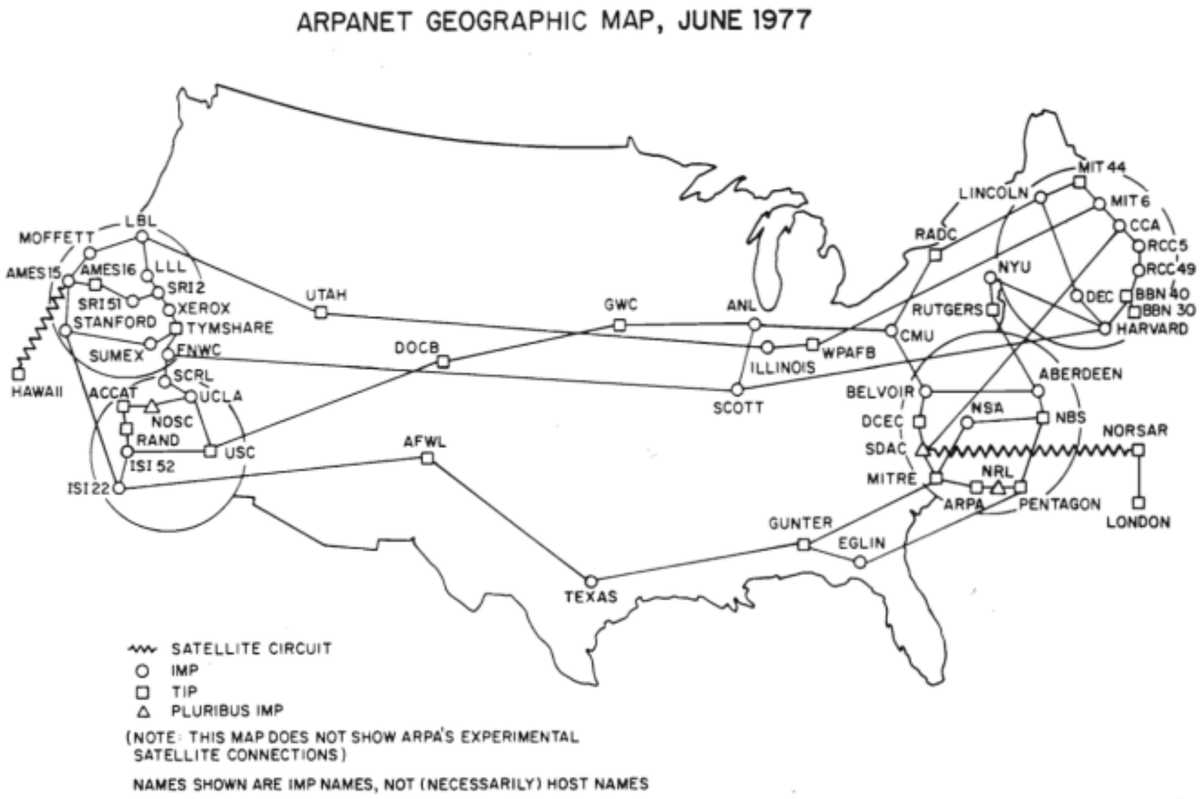

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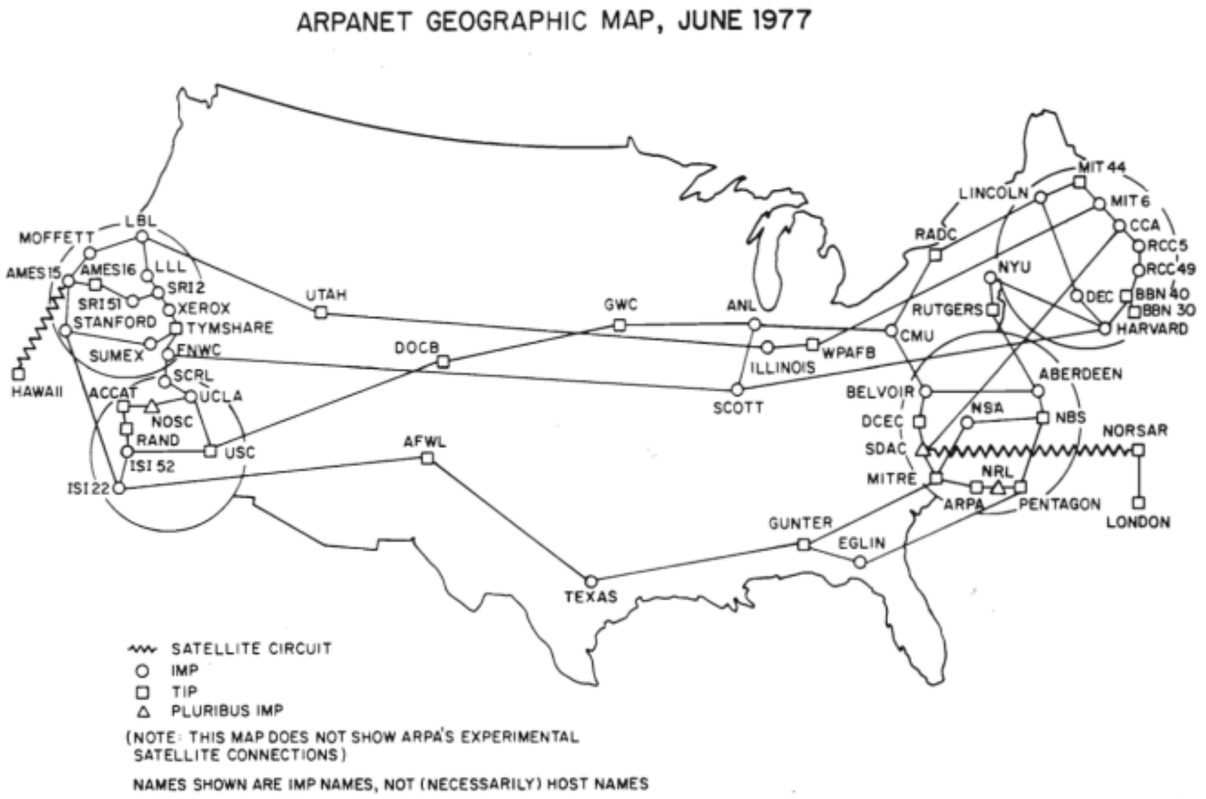

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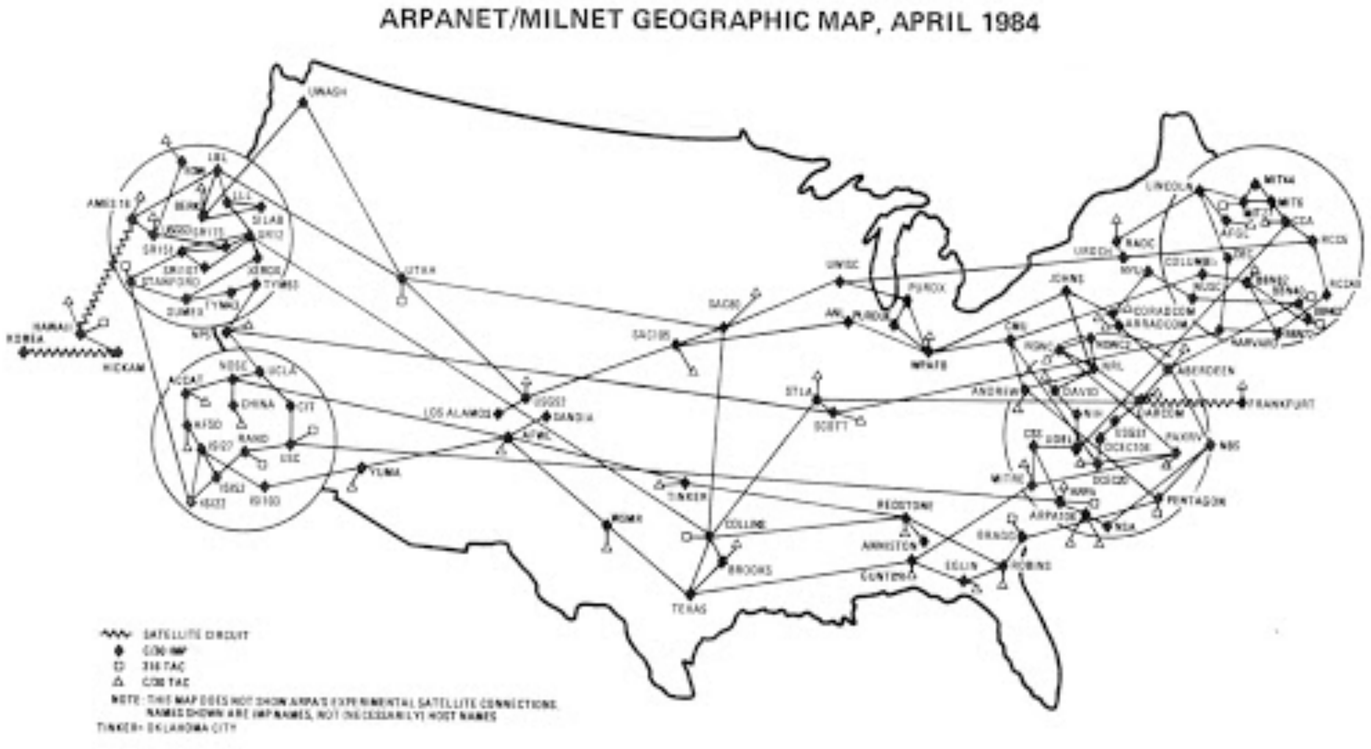

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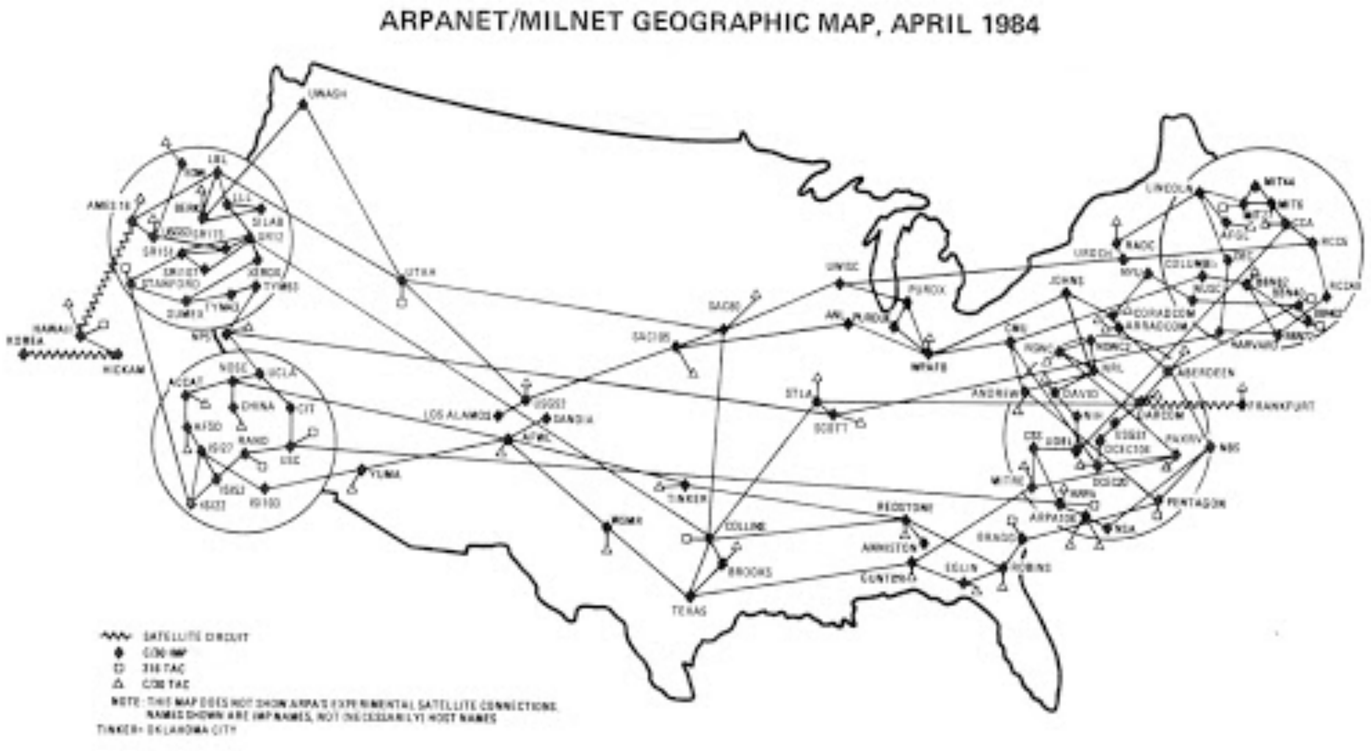

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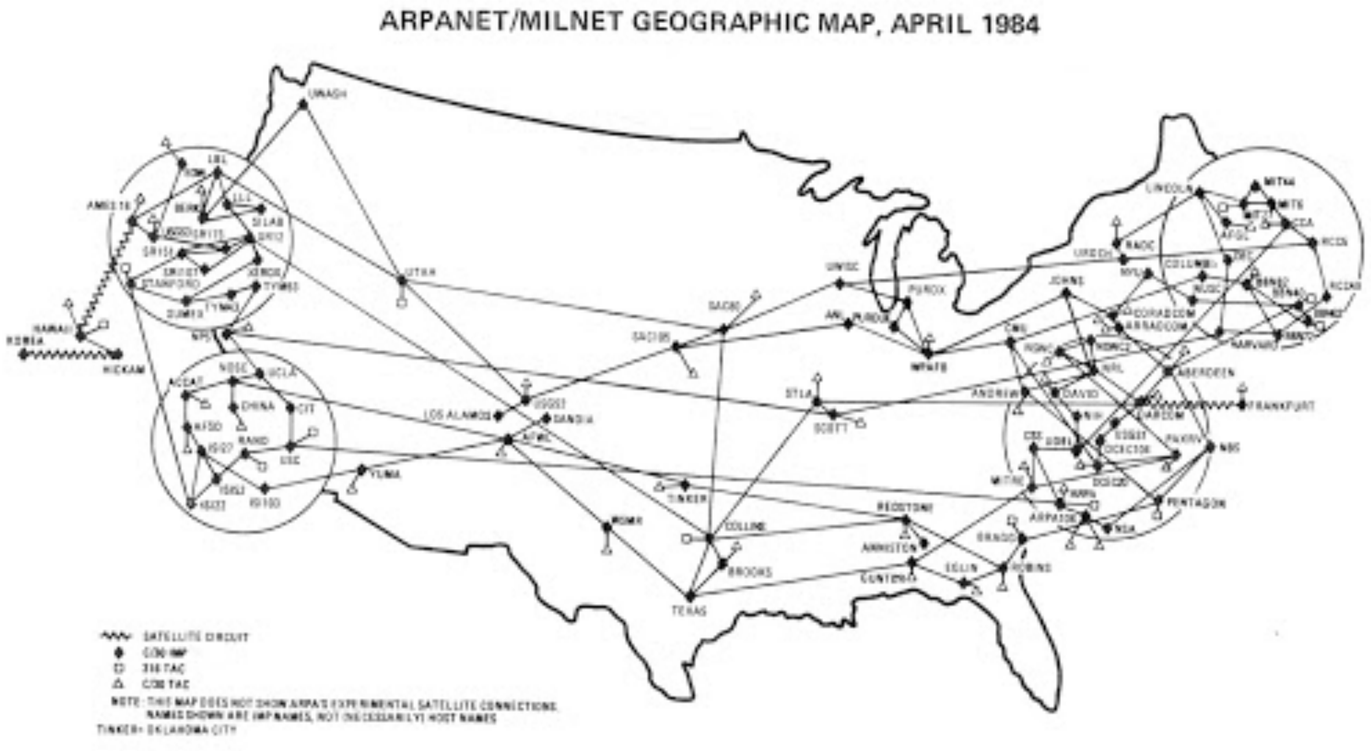

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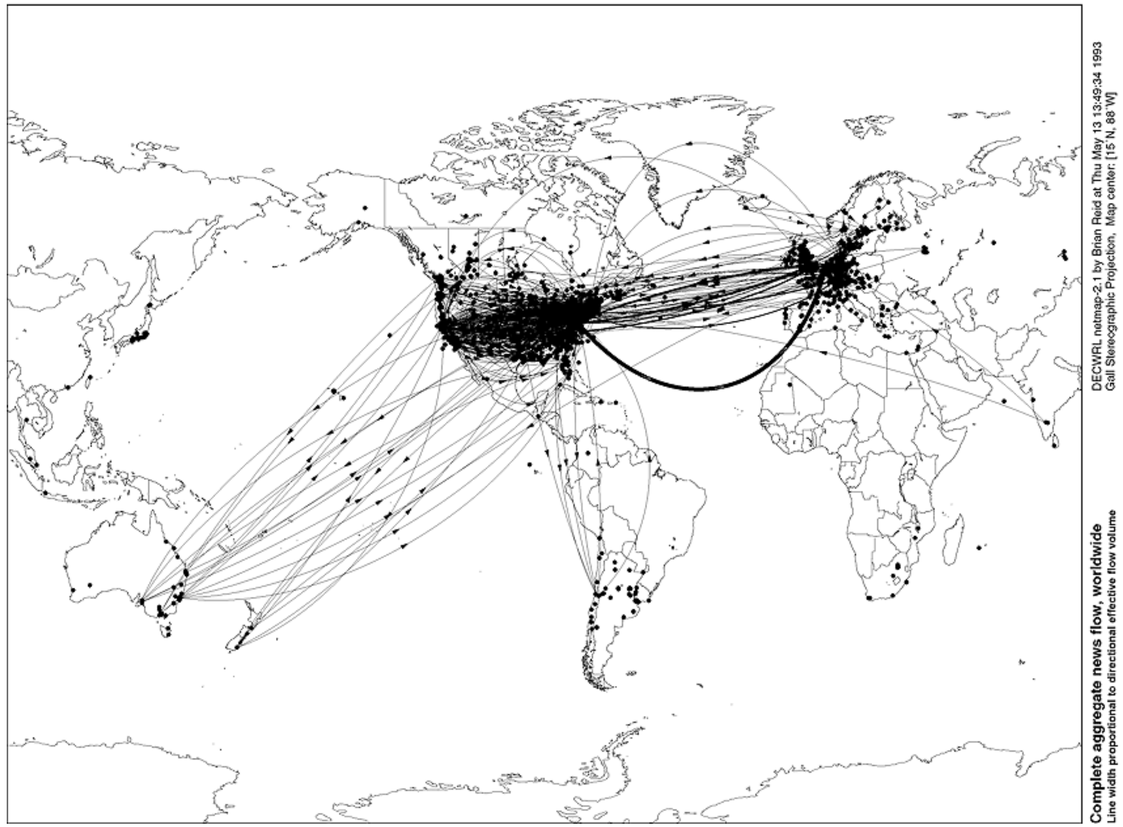

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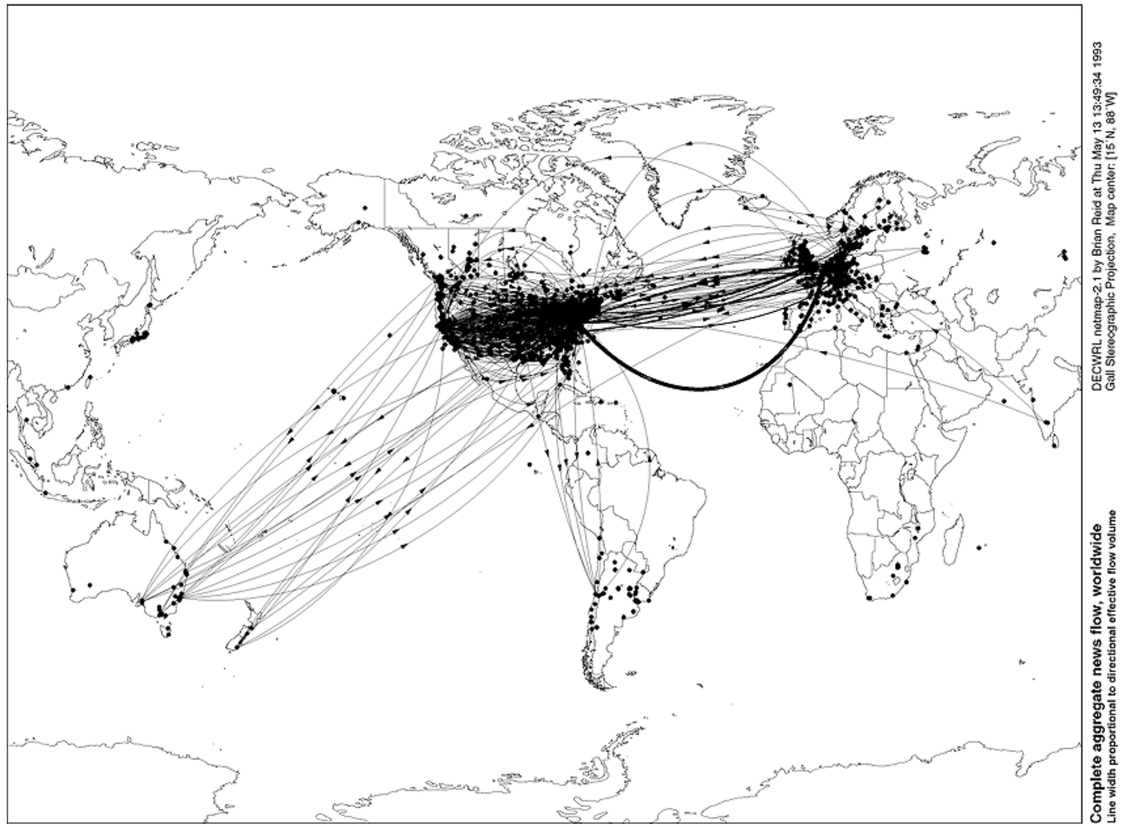

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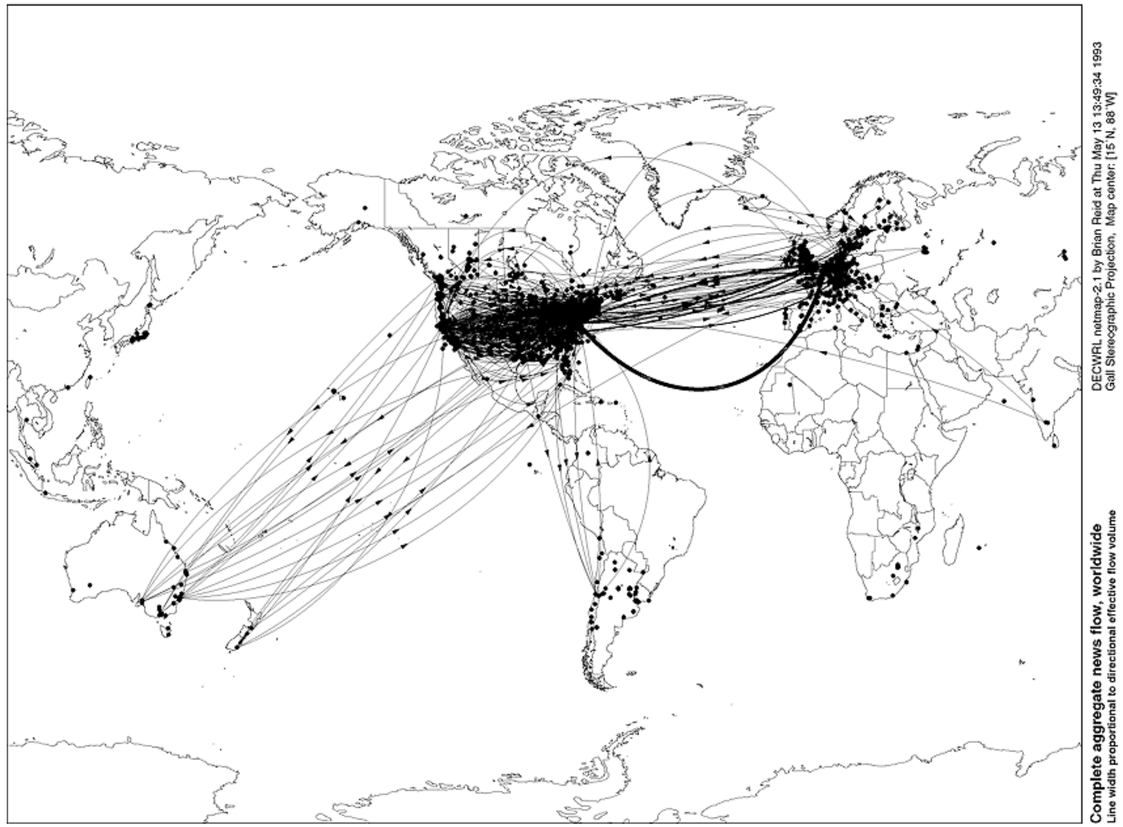

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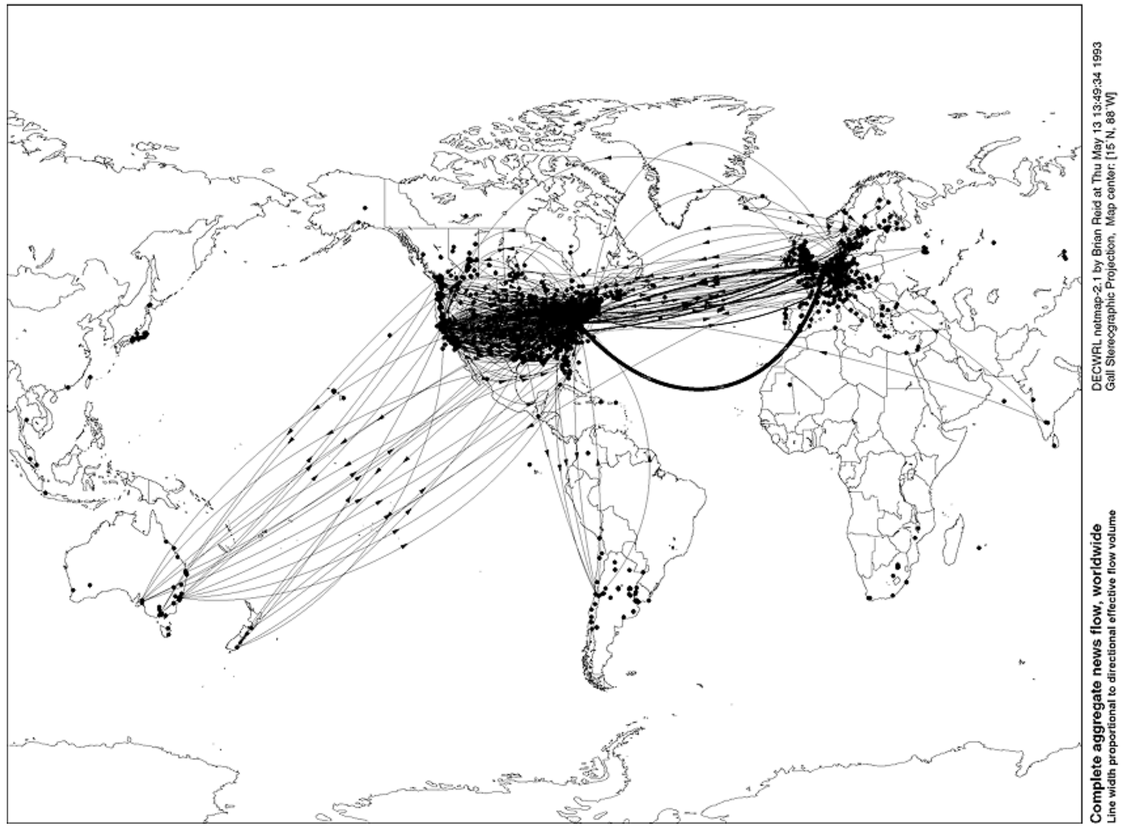

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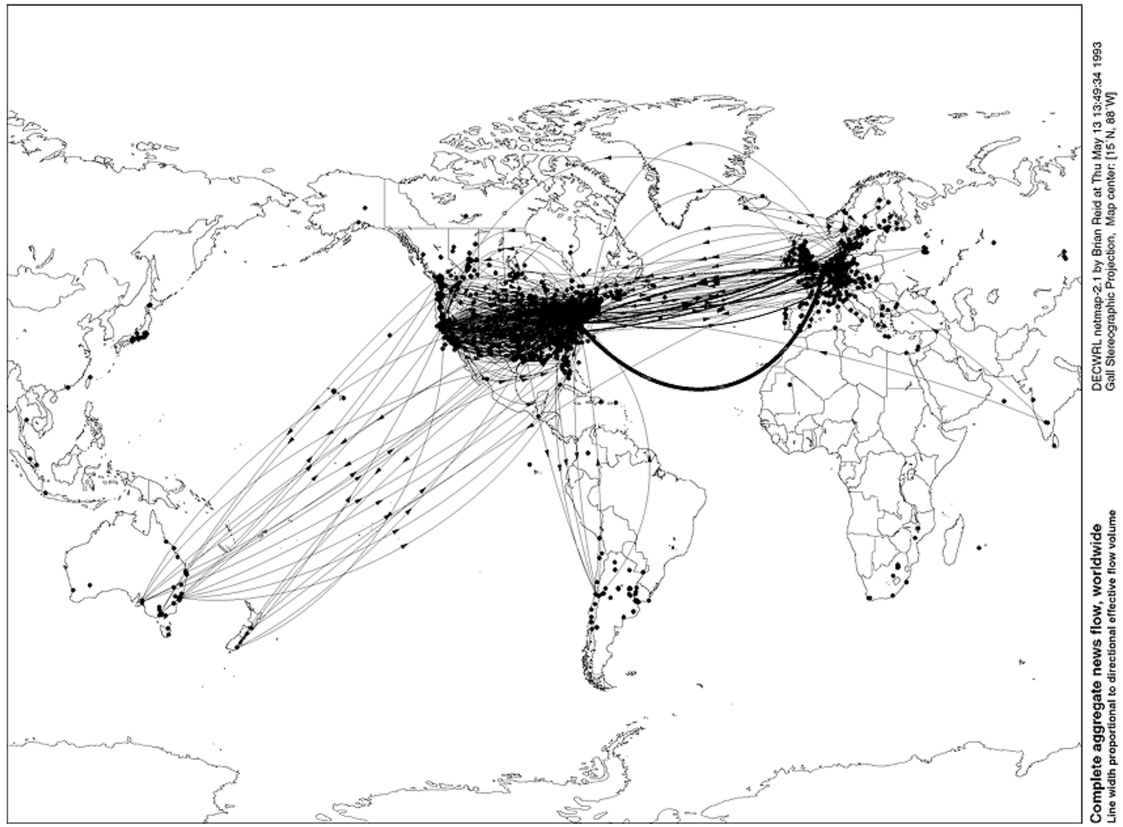
hosts.txt | distance-vector routing | TCP, UDP | OSPF, EGP, DNS | congestion collapse | policy routing | CIDR



https://www.vox.com/a/internet-maps

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transport — sharing the network, reliability (or not)

examples: TCP, UDP

network — naming, addressing, routing

examples: IP

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http://blog.lastpass.com/2013/05/for-the-love-of-security-end-of-week-link-round-up/internet-1993-3/

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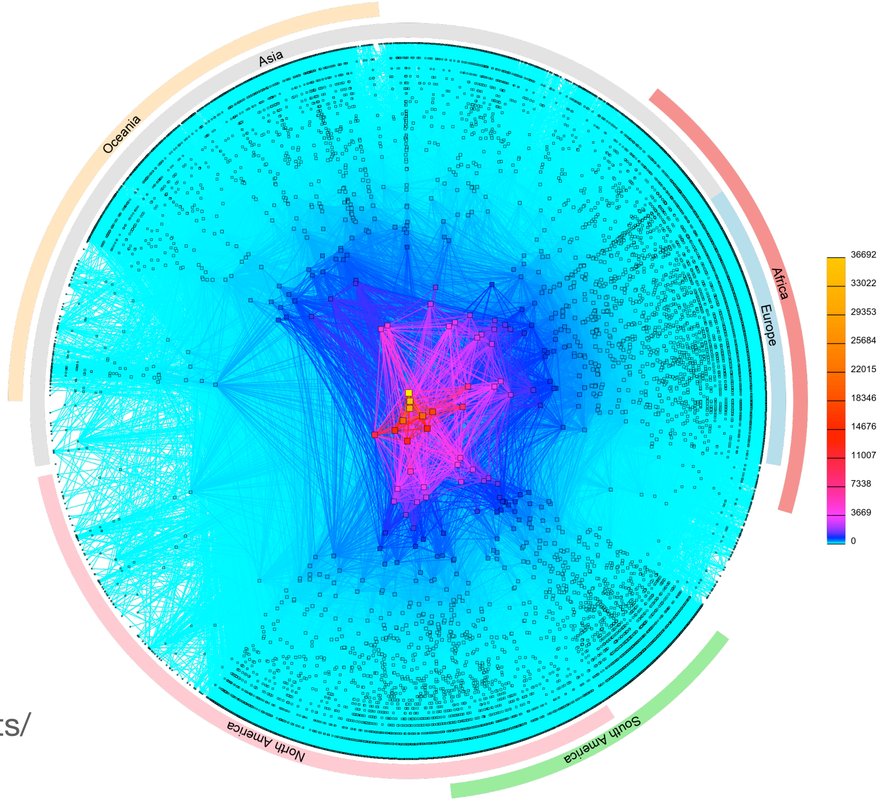

CAIDA's IPv4 AS Core, January 2020 (https://www.caida.org/projects/cartography/as-core/2020/)

on the Internet, we have to solve all of the "normal" networking problems (addressing, routing, transport) **at massive scale, while supporting a diverse group of applications and competing economic interests**

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