

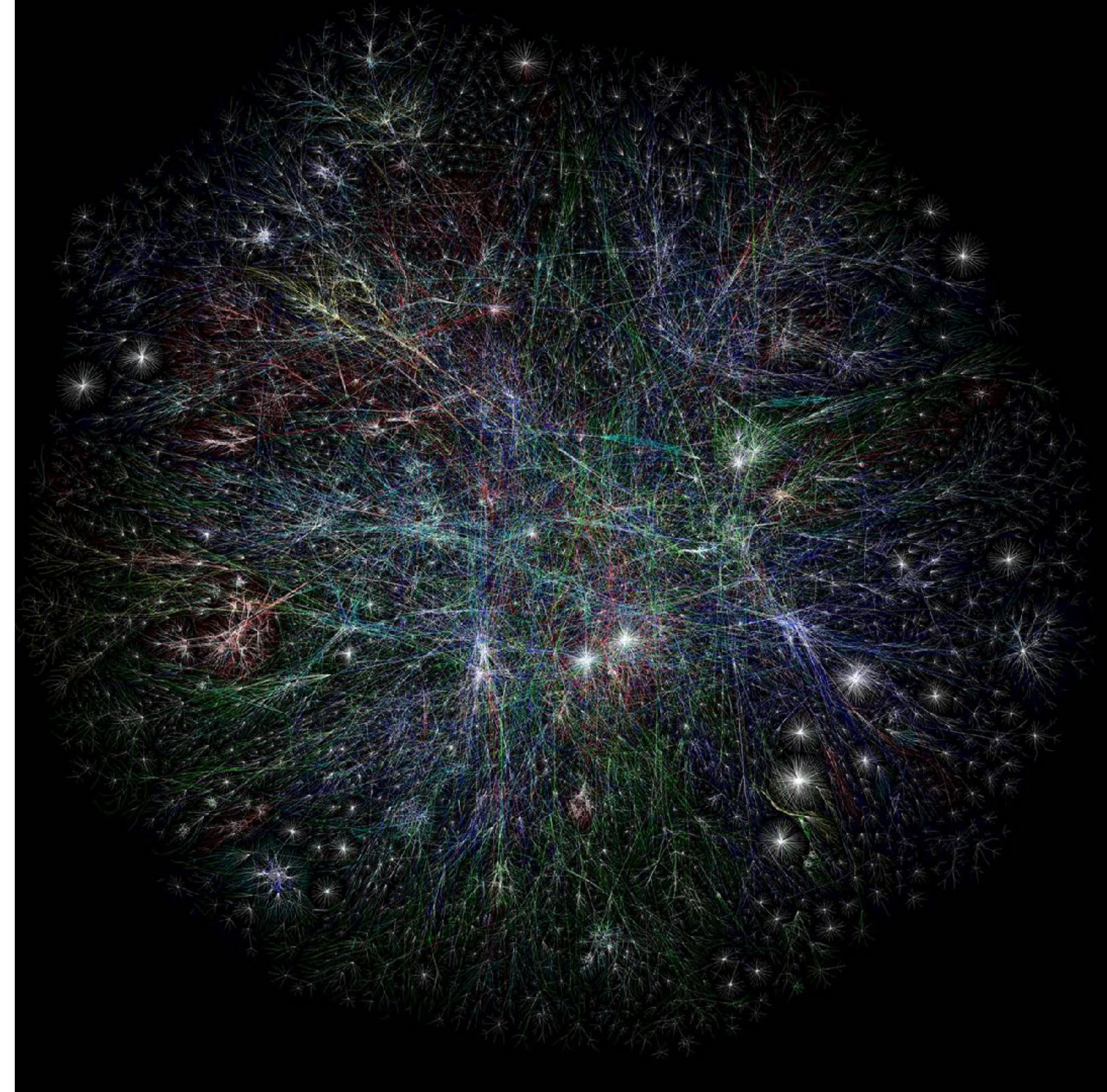
Internet



"A series of tubes"

is a phrase coined originally as an analogy by then-United States Senator Ted Stevens to describe the Internet in the context of opposing network neutrality.

The internet needs a vast infrastructure of cables, servers, towers and a lot more to work.



“While many have debated the origins of the Internet, it’s clear that in many ways it was built to withstand nuclear attack. The Net was designed as a solution to the vulnerability of the military’s centralized system of command and control during the late 1950’s and beyond. For, the argument goes, if there are no central command centers, then there can be no central targets and overall damage is reduced.”

Alexander Galloway, Protocol



Defense Advanced Research Projects Agency (DARPA)
an agency of the U.S. Department of Defense
responsible for the development of emerging
technologies for use by the military.



Promoted to the head of the information processing office at Defense Advanced Research Projects Agency (DARPA), Robert Taylor intended to realize an interconnected networking system. Bringing in Larry Roberts from MIT, he initiated a project to build such a network. The first ARPANET link was established between the University of California, Los Angeles (UCLA) and the Stanford Research Institute at 22:30 hours on October 29, 1969.

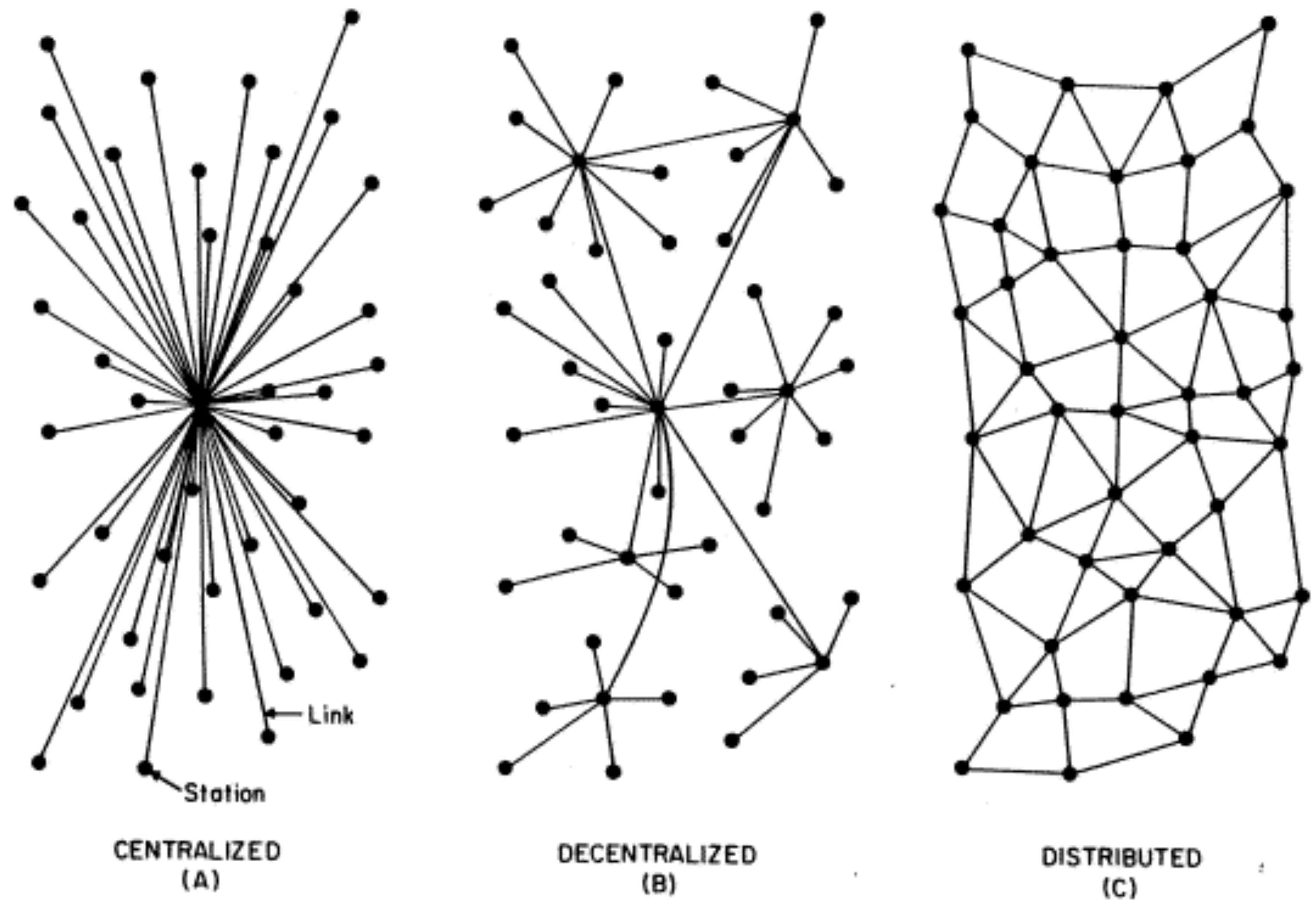
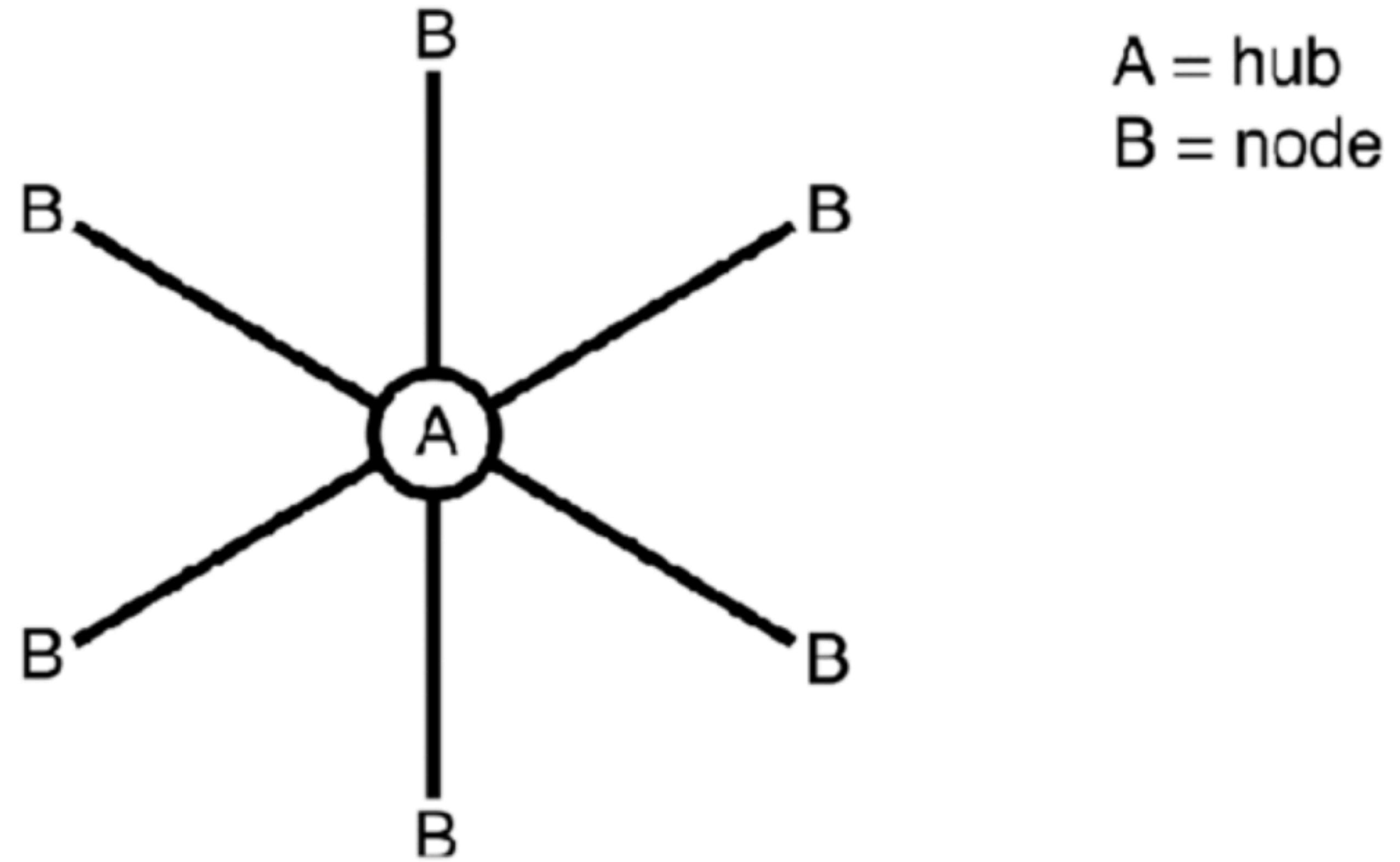


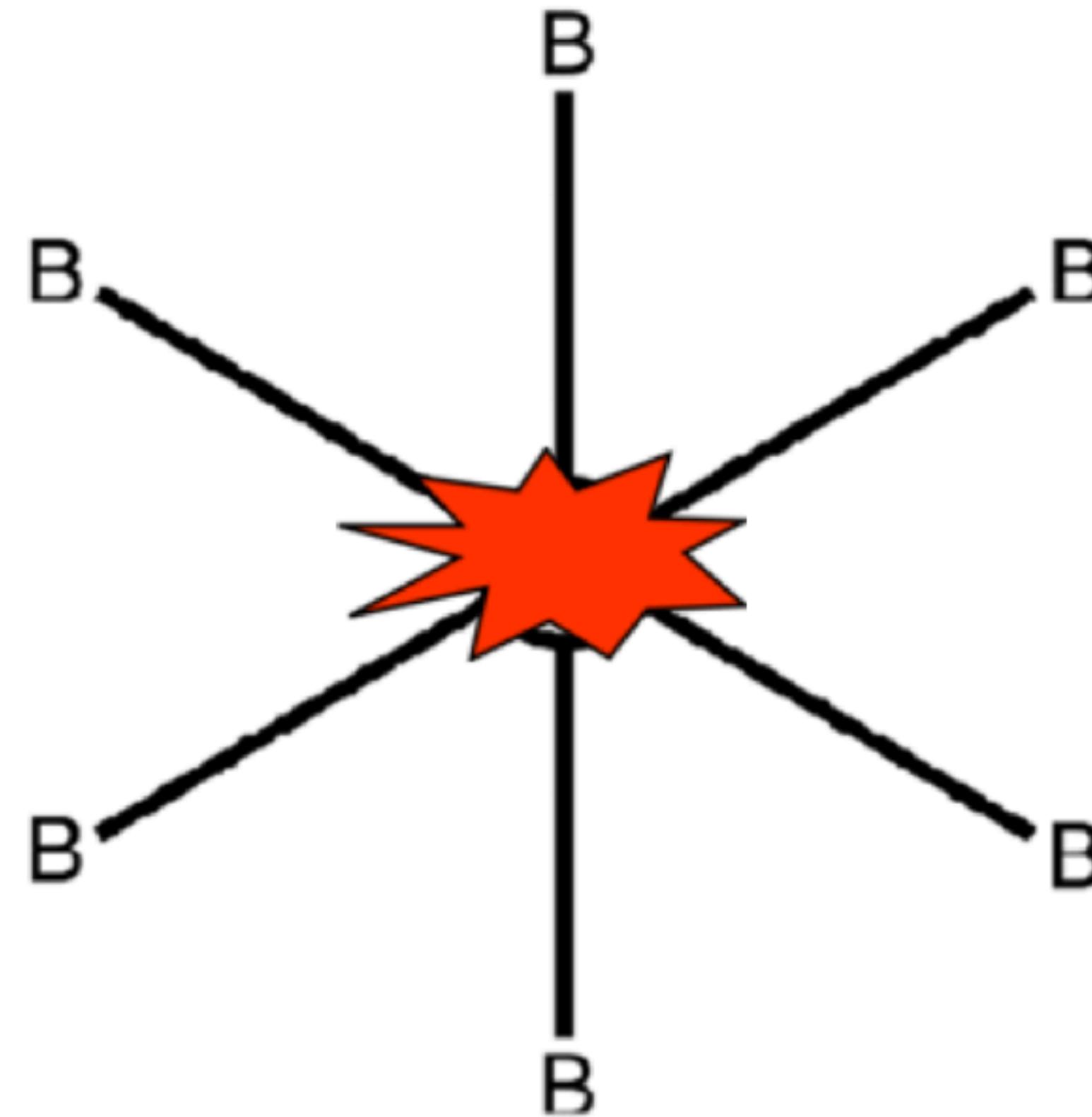
FIG. 1 – Centralized, Decentralized and Distributed Networks

In 1964, RAND scientist Paul Baran drew this famous diagram that shows 3 possible network topologies and their levels of vulnerability in case of a nuclear attack.

The distributed network was chosen for the military communication networks that set the foundation for the TCP/IP protocol which is at the core of the internet we use today.

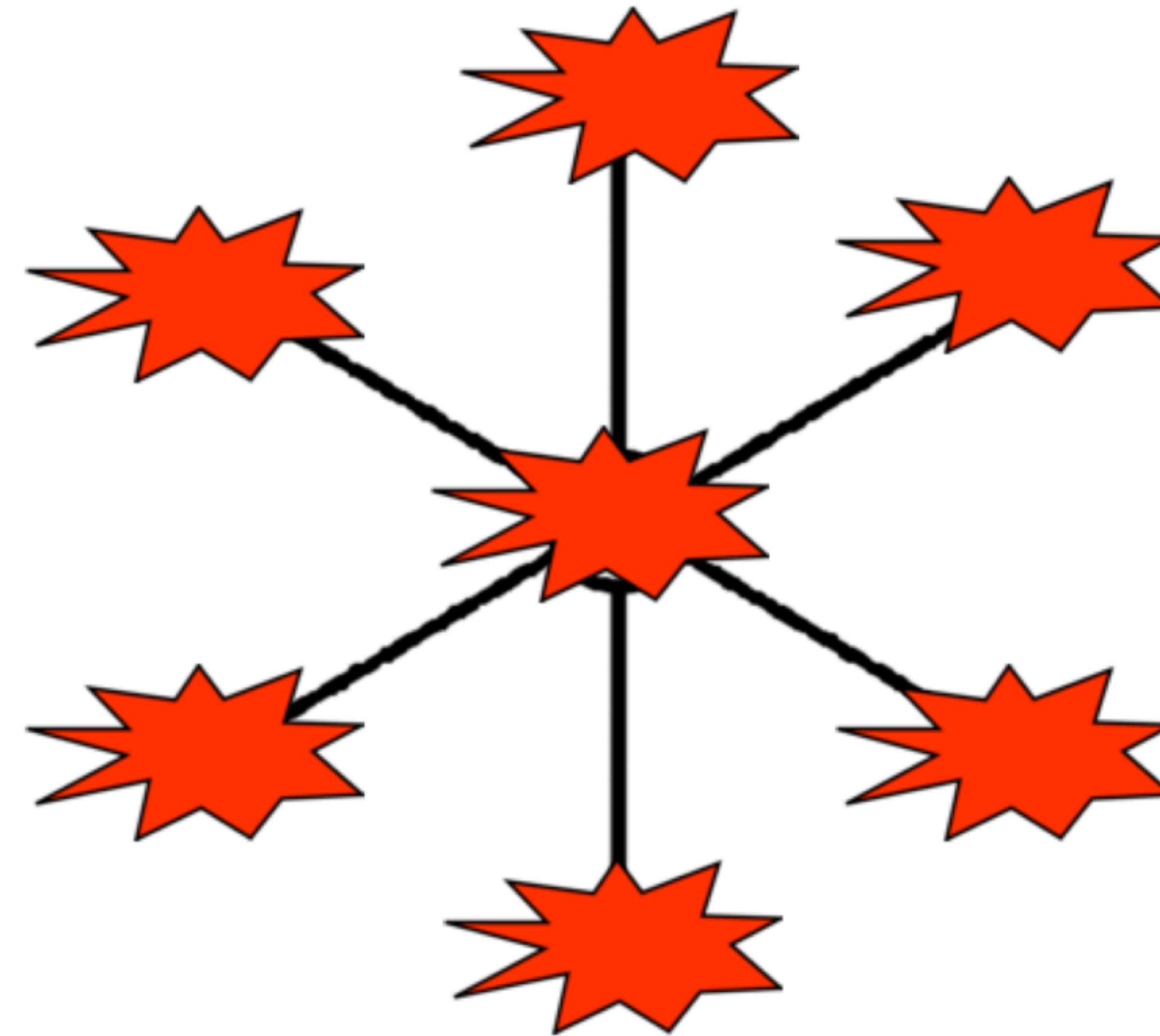


Centralized network



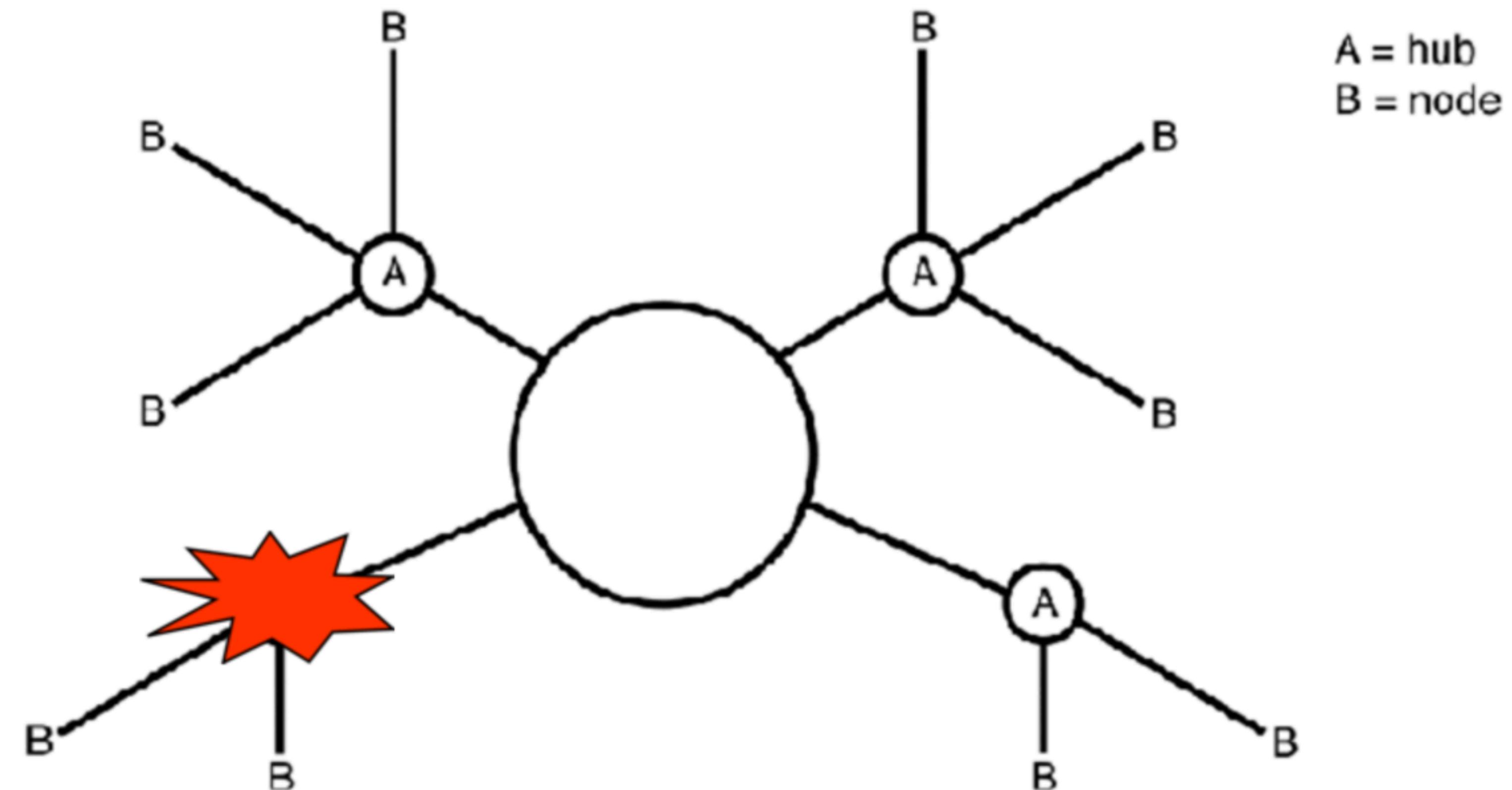
A = hub
B = node

Centralized network

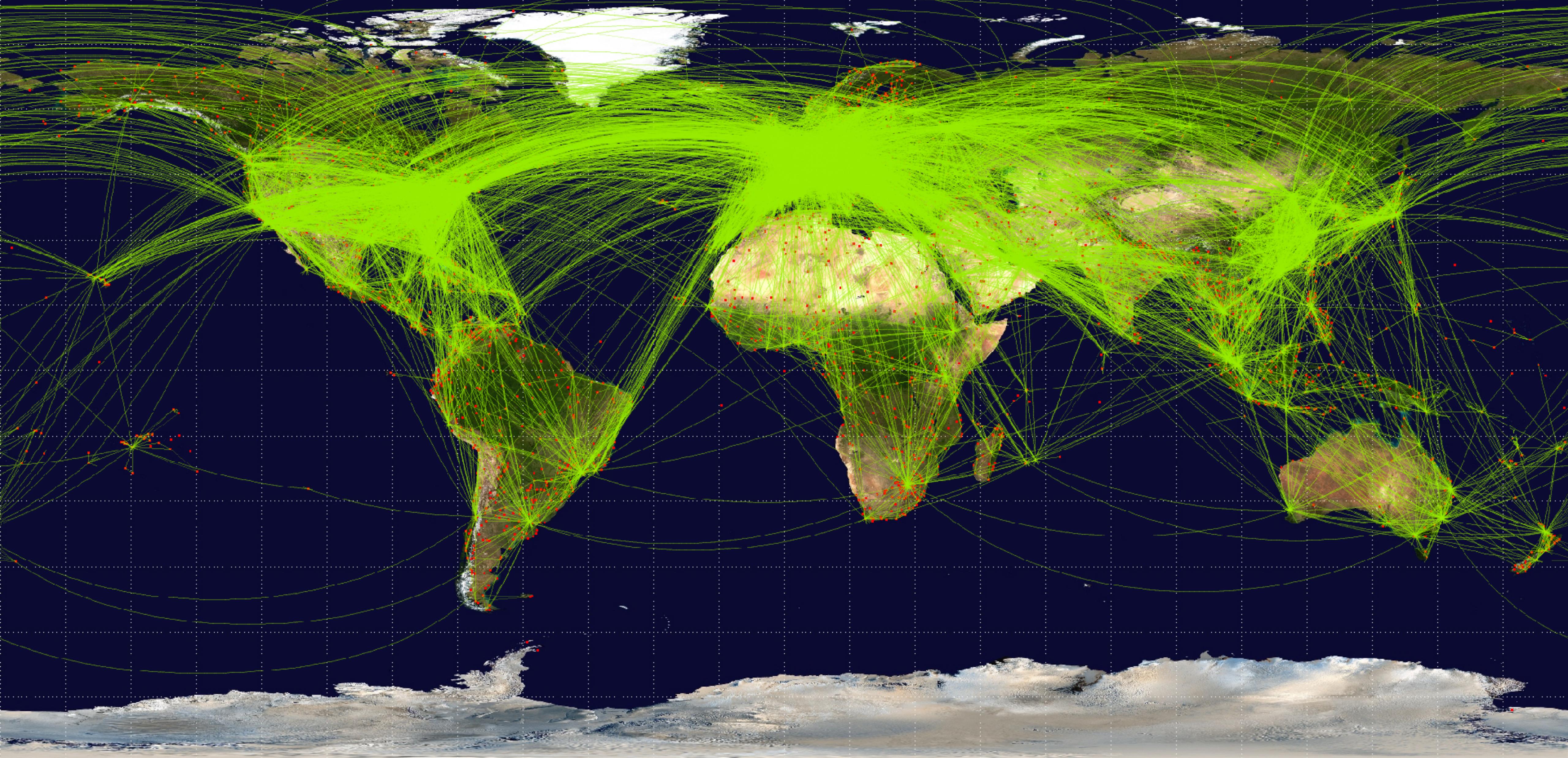


A = hub
B = node

Centralized network

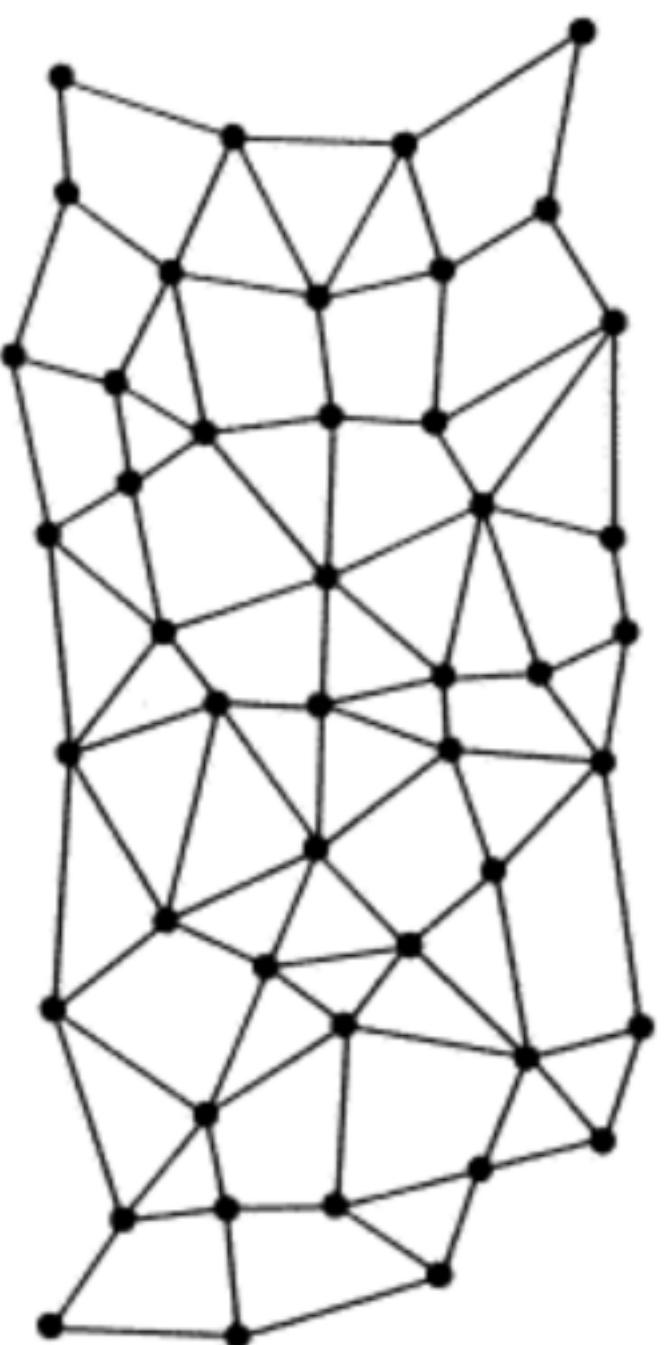


Decentralized network

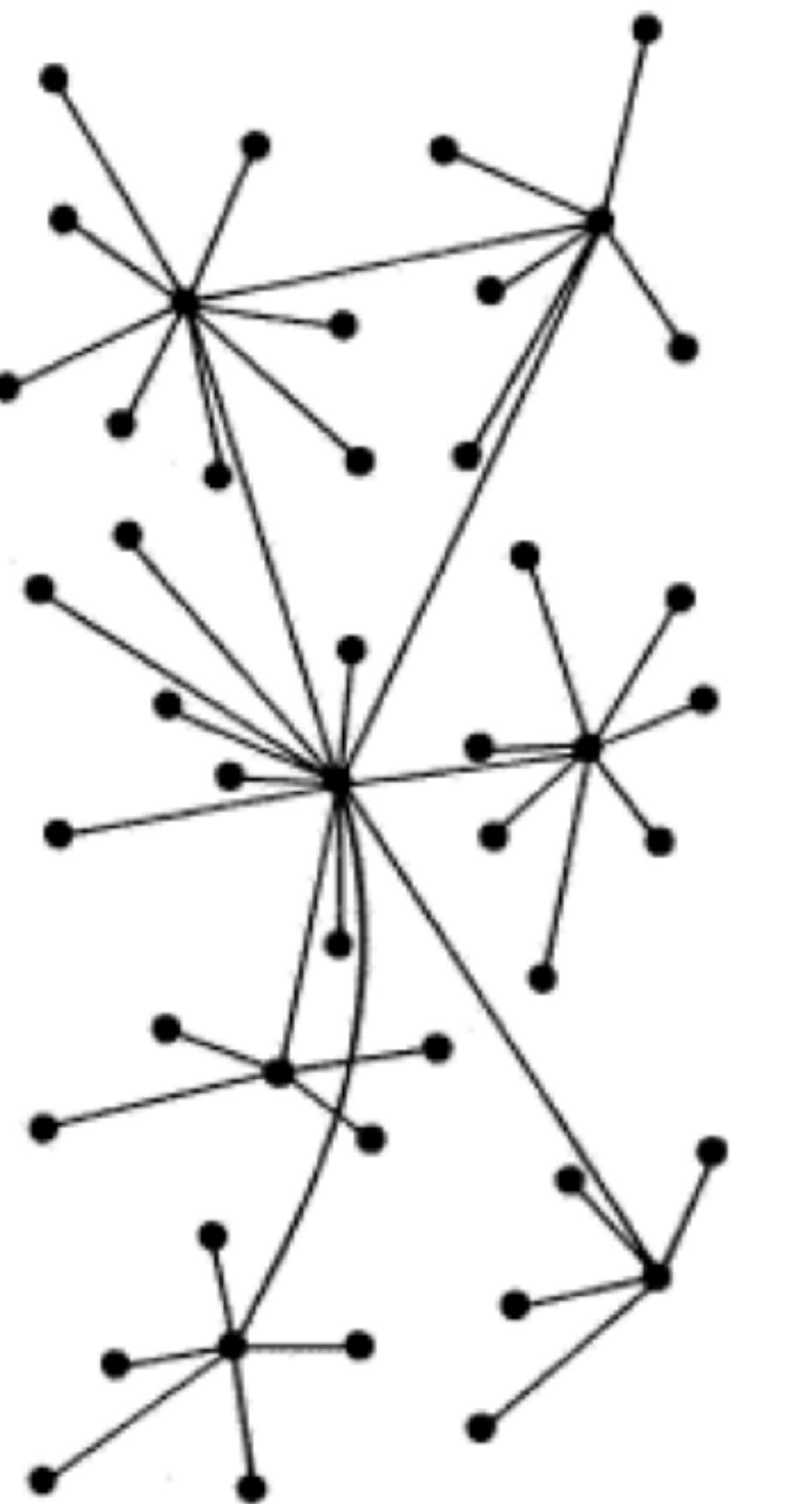


IRL Decentralized Network: Flight paths

What is a truly distributed network?

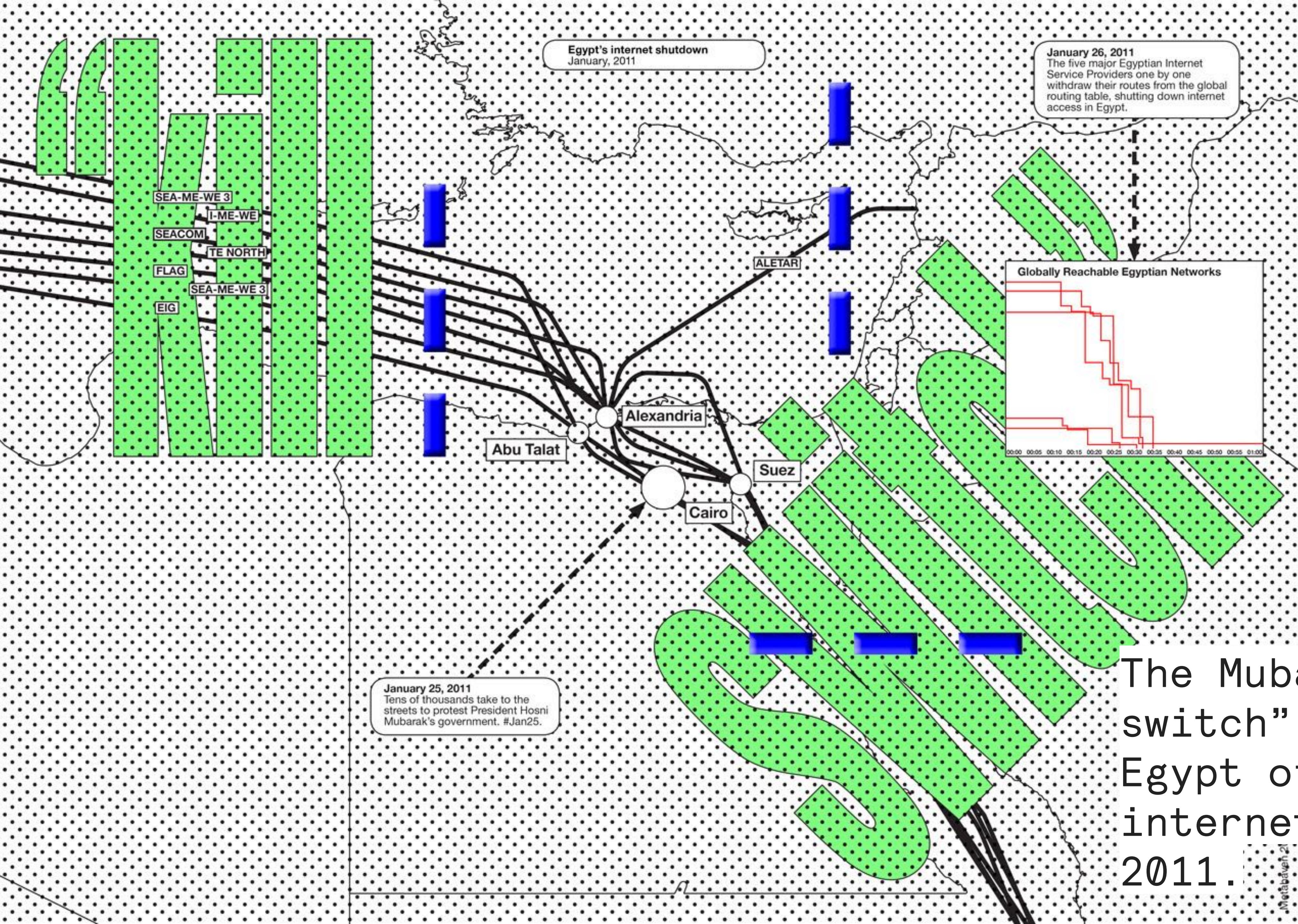


DISTRIBUTED
(C)



DECENTRALIZED
(B)





The Mubarak “kill switch” which took Egypt off the internet in January, 2011.

Communication on the internet happens via agreed upon standards. Sometimes we call these ‘protocols’.

Protocol

A way in which information is passed from one computer to another

- Email
- HTTP – hypertext transfer protocol
- FTP – file transfer protocol
- IP – internet protocol