The Internet L13 - The Universal Network
Networking and the Internet, L&S 160E Spring 2010

Wednesday, April 14, 2010
2:08 PM

- GSI Kris Fallon has new office hours, see e-mail
- Mon. April 26th, 7:30, in Kroeber
  - A talk related to what we are doing
  - Eugene Factor?
    - Issues related to networks, biology
  - Link on website
- When we use term networks, we throw the term around a lot
  - TV networks
  - Social networks
    - Online
    - A place where you virtually connect and contact people
    - A cluster of people semi-related to us who know us.
    - Does it mirror what goes on in real life? Or does it mediate relationships?
      - **The meat of the issue**
  - Business networks
    - Specify further
  - Cultural networks
  - Governmental networks
  - Computer networks
  - Biological networks
    - Microcosm/macrocosm
    - Different systems are composed of a network, down to the cells
      - Neurons in brain
      - Food chain
    - Between species, interconnections
    - Taxonomy
      - Hierarchical networking
  - Manufacturing networks
    - Toyota Parts System
      - Need networking between each part
  - Telecommunications Network
  - Transportation networks
    - All the things we use to get around expand, connect
  - Postal system
  - Chain of command in the jail system
  - Terrorist network
- Networks a meaphor for how the world is interconnected
  - "Netwar is about the Zapatistas more than the Fidelistas, Hamas more than the Palestine Liberation Organization (PLO), the American Christian Patriot movement more than the Ku Klux Klan, and the Asian Triads more than the Costa Nostra."
- Outline
  - Basic networks
  - Protocol, the rules that govern networks

- History of the Internet (briefly)
- Two Internet protocols (TCP/IP, DNS)
- Connections to Heidegger
- Internet as a Post-Modern technology

Basic Networks

Wednesday, April 14, 2010
2:28 PM

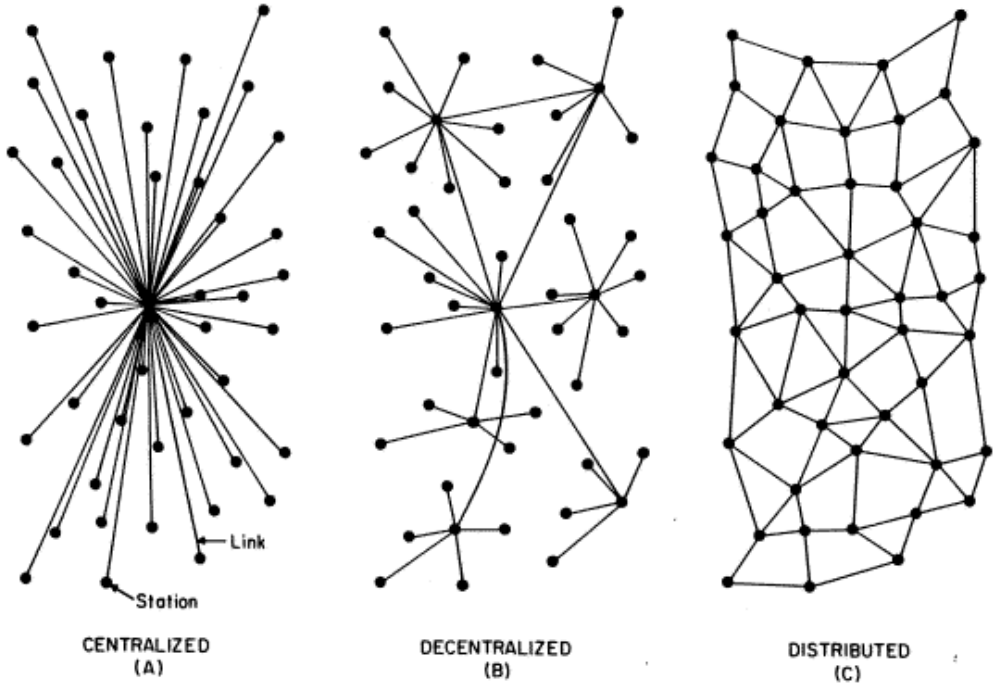
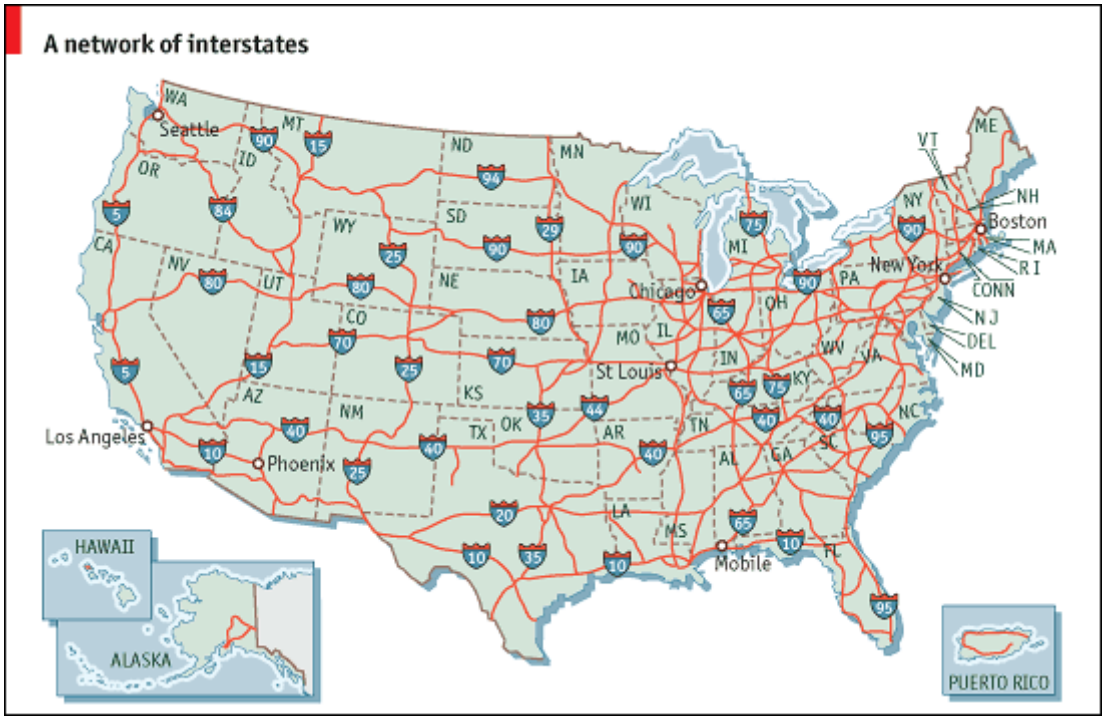
- 3 basic Network Types
  - Centralized
  - Decentralized
  - Distributed
  - 

FIG. 1 — Centralized, Decentralized and Distributed Networks

- Components of Networks:
  - Node, Link, Hub
  - Kris is connected to his wife, his son, and Kris T.
    - Connected to P. Goldberg, who is a superhub of sorts
- Centralized Networks
  - Single hub, many nodes
  - Hierarchical
  - Rigid
  - Efficient
  - Tough
  - Examples
    - Government
    - Military

        - Schools
        - Organizations
    - Information flows to the top, and then goes down
        - If a captain wanted to relay information to another captain, he would have to go to the top and then the information would go back down
    - NY org chart
- Decentralized Network
    - Several hubs, many nodes
    - Flexibility, Centralization
    - Examples: Airline networks
        - To go to
- Distributed network
    - No hubs, many nodes/links
    - Horizontal rather than vertical
    - Robust, flexible
    - Rhizomatic structure
    - No one is more important in this type of network
    - Example: A network of Interstates
    - 

        - No predefined paths
            - Only lines connecting other lines
        - Decentralized for:
            - Efficient mobilization
            - In case of nuclear attack

Protocol

Wednesday, April 14, 2010
2:44 PM

- The rules that govern networks
- Consist of several different layers
- Both enables and controls connection
- Example: Telephone call has a set of rules
    - Need a telephone, a cord, another person to telephone
    - Money
    - A number
    - When you dial
        - You have to dial a specific way
            - Cell phones, you can dial whatever
            - In Cal, you dial 9+xxxx
            - In landline, you dial 1+(xxx)xxx-xxxx
    - Identify yourself
        - To someone you know, just say hi
        - To AT&T, you dial a number of options
- **To take advantage of the capability, you have to follow the protocol**
- Question: What about non-communication networks?
    - From reading: "If you drive in the white lines, and stop at the red lights, you will get to where you go." Is this an analog?
    - You have to follow the rules or you can't use the network
    - One of the things that P. Dreyfus mentioned when we talk about worlds, we talked about standing distance
        - There are rules
        - Going to a career fair, you have to behave accordingly
    - **So the protocol enables use of the network**
- According to Galloway:
    - Observations about Protocol
    - Protocol facilitates relationships between interconnected, but autonomous entities
    - Protocol's virtues include robustness, contingency, interoperability, flexibility, and heterogeneity
    - Goal of prot. Is to accommodate everything
    - While protocol is universal, it is always achieved through negotiation (futre protocols will be different)
    - Protocol is a system for maintaining organization and control in a network

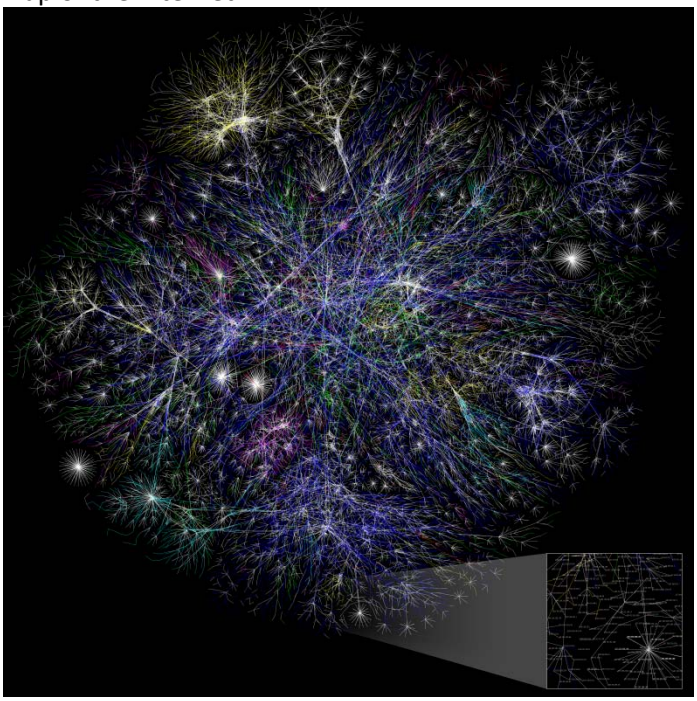
Brief History of the Internet

Wednesday, April 14, 2010
2:56 PM

- 1960's: early R&D of packet switching network
    - RAND corp., sponsored by DARPA

    - Big thing down to small things, sends them out to reach destination
    - DARPA wanted this b/c if missiles are launched, then we would have to launch missiles
        - To counter the effects of taking out the chain of command
        - Distributed network model
            - UCLA, Stanford, MIT, Univ. of Utah
    - Before this, there was a mainframe model
        - Terminals trade info to a mainframe that houses information and processes it.
- 1968's: ARPANET connects 4 hosts, 50kbs
- 1972: First e-mail developed
    - @ system
- 1973: TCP/IP developed
    - To process packets ofinfo
- 1981: NSF creates CSNET, 213 hosts, 56 kbs
- 1983: ARPANET officially adopts TCP/IP, DNS system developed
- 1984-88: NSFNet, T1 1.5 mbps
- 1990: Upgrade to T3 lines, ARPANET disbanded
- 1990: Tim Berners-Lee formulates HTTP and HTML
    - Just a system that works
- 1993: Mosaic browser developed
    - Later Netscape, then Mozilla Firefox
- 1994-1995: NSF hands over control of Internet, allows commercialization
- 1995: Public IPO of Netscape
- 2000: burst of the dot-com bubble
- Map of the Internet
    - We can connect via any number of networks
    - Operates in a decentralized way, but is a distributed network

Map of the Internet



Internet Protocols

Wednesday, April 14, 2010
3:11 PM

- Internet protocols have many layers
  - Network Interface layer
    - How the computer physically connects
  - Internet Layer
    - IP
    - ARP
  - Transport layer
    - TCP
    - UDP
    - ICMP
    - OSPF
  - Application layer
    - DNS
    - Bittorrent
      - Perfect example of a use of a specific protocol
      - Aggregating slices of a file so nobody is responsible for sending out a file to people
        - Seeding (distributing) and leeching (receieving)
    - FTP
      - File directory
    - POP3/IMAP
      - email
    - SSH/SSL
      - Secure connections
- TCP/IP
  - Set up, enable packet switching
    - Maintains connections by synchronizing
  - TCP
    - Sets up a 'circuit' between two computers
    - Monitors transmission to ensure complete communication
  - IP
    - Fragments messages into packets
    - Routes packets across the Internet
  - **Together, TCP/IP is what enables distributed networking**
  - As long as any message can be sent, it will be sent thru TCP/IP
    - Data agnostic
    - Galloway loves this model
    - RFC states, "Be conservative in what you do, be liberal in what you accept"
- DNS
  - Domain Name Service
  - Resolves numeric address and language address
  - Google -> 216.239.21.59

    - Hierarchically distributed over Root servers which point to lower domains
    - Virtually all Internet applications use names, not addresses
    - Galloway doesn't like this model
    - It is not exactly information agnostic
- The Internet
    - A network of networks
        - Ted Stevens: Its not a big truck, it's a series of tubes
    - Interent provides basica data transfer services
    - IP used to send datagrams between end points
    - TCP used for reliable communication (build on IP)
    - DNS provides human-readble names for Internet hosts
    - Together, DNS and TCP/IP provide contrasting usability. Vertical/Horizontal

Connections to Heidegger

Wednesday, April 14, 2010
3:50 PM

- Quote from bottom of pg. 16, top of 17
- "Unlocking, transforming, storing, distributing, and switching about are ways of revealing."
    - Unlocking: What are we classifying?
    - Transforming: Binary
    - Store up: servers
        - Database
    - Distribution: TCP/IP
- Setting this up
    -

COAL	Processing/Mining	Energy
X	Process of describing	10

- Igor says: why are talking about Blake…?
- Dreyfus says: Heidegger would have been happy about the Internet
    - Heidegger needs something that is always switched around, not destructive
- Content on Internet is equivocal
- Q: Does the Internet distract us from our true purpose as world-revealers?
- Google
    - "Our mission is to organize the world's information and make it universally accessible and useful"
    - Who controls the info? Who can access it?
- The more information there is, the more we rely upon it, the more critically we need to access that info
- Net Neutrality
    - ISPs and how they should manage information
    - Galloway likes the TCP/IP model because it basically sets net neutrality
    - Comcast is charging people and companies to transmit and receive data
    - To what extent should ISPs have access to controlling information?
- Big companies now have access to info
    - To what extent should these companies have access to that info?

- Dreyfus
  - Something important about Heidegger: He's operating on a totally different level
    - When he goes from Coal to Hydroelectric power
      - The effects of technology on humans don't interest him
  - Is it better or worse that we now have something that makes us all cogs in this whole system of information?
  - Is getting all these efficient tools and information a good thing or a bad thing?
    - Now we can discuss it on two levels: practical, ontologically
  - Beware of this thing that looks so convenient turning us into Gestand
- What does this do to our understanding of being, dwelling, and wonder?
  - Could it be that the Internet reveals for us?
  - Or is that the access to info so great that world revealing becomes less significant?
    - What's special about you becomes something different?
    - That the saving power would be that you have substance