Internet Routing

Review of Networking Principles
Principles of the Internet

- Edge vs. core (end-systems vs. routers)
  - Dumb network
  - Intelligence at the end-systems
- Different communication paradigms
  - Connection oriented vs. connection less
  - Packet vs. circuit switching
- Layered System
- Network of collaborating networks
The network core

- Mesh of interconnected routers
- **The fundamental question:** How is data transferred through net?
  - Circuit switching: Dedicated circuit per call: telephone net
  - Packet switching: Data sent through net in discrete “chunks”
Routing

- **Goal**
  Move pkts among routers from src to dst

- **Datagram network**
  - Destination address determines next hop
  - Routes may change during session

- **Virtual circuit network**
  - Each packet carries tag (virtual circuit ID), tag determines next hop
  - Fixed path determined at *call setup time*, remains fixed through call
  - Routers maintain per-call state
Internet protocol stack

- **Application**: supporting network applications
- **Transport**: host-host data transfer
- **Network**: uniform format of packets, routing of datagrams from source to destination
- **Link**: data transfer between neighboring network elements
- **Physical**: bits “on the wire”
Layering: Logical communication

Each layer:
- Distributed
- “Entities” implement layer functions at each node
- Entities perform actions, exchange messages with peers
Layering: Physical communication
Internet structure: Network of networks

- Roughly hierarchical
- National/international backbone providers (NBPs)
  - E.g., BBN/GTE, Sprint, AT&T, IBM, UUNet
  - Interconnect (peer) with each other privately, or at public Network Access Point (NAPs)
- Regional ISPs
  - Connect into NBPs
- Local ISP, company
  - Connect into regional ISPs