

# Motivation

- ARPA funded early high-powered computer research.
- Early computers were large and expensive.
- Programs took a long time to run.
- ARPA couldn't afford to put every type of computer everywhere.
- Yet, most research groups needed access to the latest equipment.

# Definitions

- packet - a small self-contained parcel of data sent across a computer network.
- packet-switching network - a network that sends and receives individual packets of information.
- ARPAnet - the original computer network developed by ARPA in the late 1960s and early 1970s.

# Packet Switching

- Data is transmitted in small independent packets.
  - The source divides outgoing messages into small pieces or packets.
  - The destination receives the packets and reassembles them into the original message.
- Packets travel independently.
  - Each packet includes delivery information.
  - Individual packets may take different paths.
  - A packet can be sent again if it is lost.

# More Definitions

- internetworking - the technology of gluing together networks with possibly dissimilar technologies.
- router - a computer that is connected to two or more networks and forwards packets according to the information contained in its routing table.
- routing table - a table stored in a router telling it where to send a packet.

# How traceroute Works

- traceroute sends a packet from the source computer to the first router with TTL=1.
- The first router decreases TTL to 0, discards the packet, and sends a message to the source computer.
- traceroute then sends another packet to the same first router with TTL=2.
- The first router decreases TTL to 1 and sends it to the second router.
- The second router decreases TTL to 0, discards the packet, and sends a message to the source computer.
- The process is continued until the destination is reached.