CPrE 489
Lecture 3

Fall Semester 1997

Subnet Topologies

- Point-to-Point Topologies

  line, star, tree, ring, intersecting rings, complete, irregular
- Broadcast Subnets

  bus - carrier sense multiple access channel (CSMA)

  Satellite or radio - multiple access channel

  ring - with high-speed transceivers

Protocols

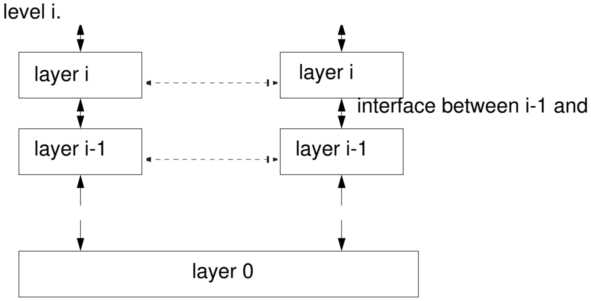
- An agent is a relatively independent entity that can perform an algorithm
- A protocol is family of algorithms which enable two or more agents to communicate. Each agent performs one of the algorithms in the family.
- Protocols are typically layered, that is, a high level communcation is enabled by uses the services of a lower level communication protocol.

Protocol Hierarchy

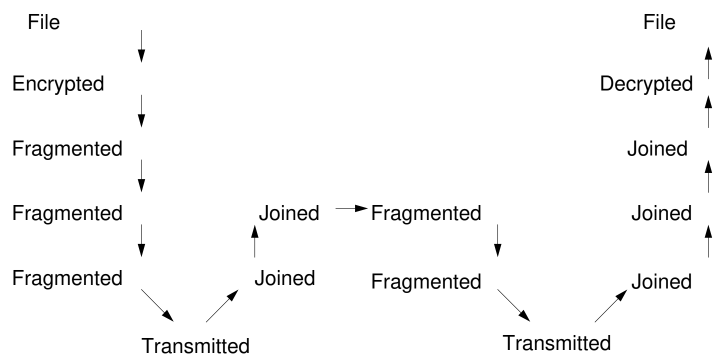
- Network Protocols are designed in layers or levels.

  Layer 0 is the physical medium

  The role of layer i > 0 at one site is to communicate with level i at another site by packaging its data for layer i-1. Level i-1 provides "services" to level i.



A Data Transfer Scenario



Services, Protocols, Interfaces

- Layer n services are those functions provided to communicate with a peer layer n agent.
- Interface between layers n-1 and n defines what primitive operations and services layer n-1 provides to layer n.
- Layer n protocol implements the layer n services.

Services

- Connection Oriented Service - Modeled after the telephone system

  A connection is established then used in a dialog. Ordered data stream.

  - reliable - file transfer or remote login
  - unreliable - digitized voice or video
- Connectionless Service - Modeled after the postal system

  No connection is esablished. Each data unit is on its own. Unordered data arrival.

  - with acknowledgments
  - reply expected - database query
  - unreliable
- Layering can accomplish:

  - providing a reliable service on top of an unreliable service
  - providing a connection oriented service on top of a connectionless one

Number of Transmissions

- Problem 14, page 75
- The probability of sending exactly $k + 1$ frames is $p^k(1-p)$.
- Thus, the expected number of frames is:

$$\sum_{k=0}^{\infty} (k+1)\, p^k (1-p) = \frac{1}{1-p}$$