

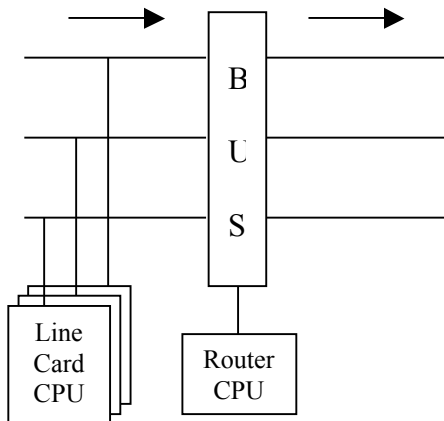
□ TO RECAP □

Priorities

- interoperability
- robustness (measure of up time, defined as percent of time to points can “talk” to each other)
- scalability
- flexibility (app’s)
- extensibility
- cost performance

Summary of functionality allocation to the router: We’d like the router to do everything that a host can’t do by itself (but no more).

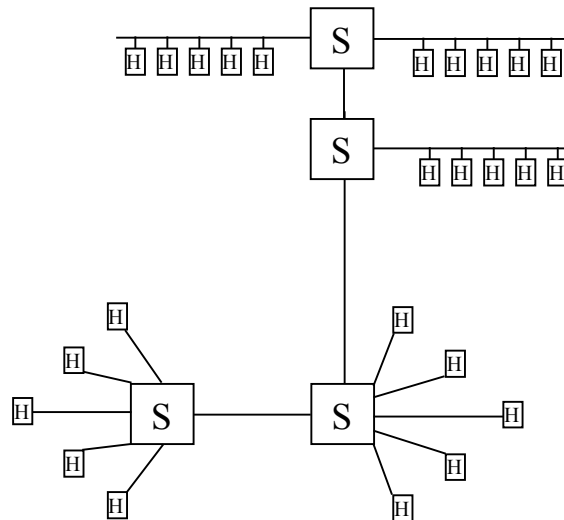
Router Internals



- queues
- ASIC
- forwarding

~30-40 ns to process each packet

Packet Switching Networks (2 styles)



Adoption Timeline for Various Technologies

- OO Programming ~30 yrs
- Relational DBMS ~10-20 yrs
- Bitmap displays ~15 yrs
- RISC processors ~5-10 yrs
- RAID disks ~5 yrs

We discussed why these different technologies took varying amounts of time to be adopted and how the reasons might apply to how to design a new Internet.

Internetworking Protocol (IP) - an interoperability layer

IP Header needs to have a destination addressing capability but what kind? The options are:

- global addressing
- local address realms
- names (i.e. text strings)

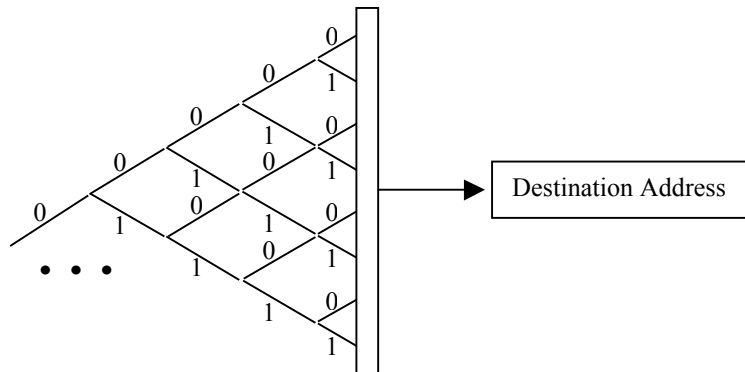
The different ideas have pros and cons. Global addressing uses a fixed number of bits (con). Names are extensible (pro) because they are variable length but would cause perturbation to the IP header length (con). Local addresses aren't reachable from anywhere (con/pro) but don't use up an address from the global pool (pro).

Router Packet Forwarding

CIDR (classless interdomain routine) allows for breaking up the 32-bit address into arbitrary sized pieces for the network part and the host part complicating the lookup.

A flat memory structure for all 4 billion possible addresses would require DRAM and would be too slow for router access requirements. We need a better way! We must significantly lower the number of entries by grouping them somehow.

Lookup is done bit-by-bit along (potentially unbalanced) binary trees as follows:



Subsections of the tree may all map to one destination address thereby decreasing the total destination addresses stored.