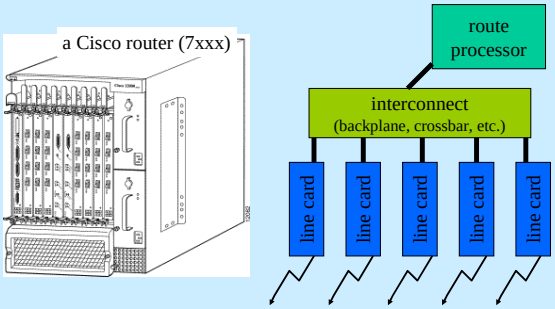
Basic Routing

CSci551: Computer Networks
SP2006 Thursday Section
John Heidemann

Forwarding vs. Routing

- forwarding
  - what's the next hop
- routing
  - getting the info needed compute the forwarding table

A Router and its components



Routing Algorithms

- distance vector
  - RIP, BGP, GGP
- link state
  - OSPF, ISIS, …

What makes routing hard?

- efficiency
- size of the routing
- convergence: make sure that everyone eventaully agreed
- distributed information
- links and routers may fail
  - recovery is not instantsteous
  - congestion…
- compatibility: many different networks, routing protocols, etc.
- commercial decisions
  - big technical implications

What Problems Do ISPs Face?

- (talked about first day of class and on prior slide)

Scaling to Big Networks?

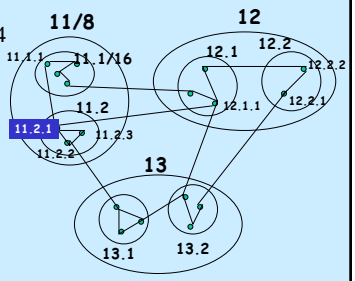
- Internet is O(10M) networks
- Approaches:
  - aggregation and hierarchy
- want to know only local information and how to find others, let others keep track of their local info,

Two Approaches

- Area hierarchy
  - approach used in the Internet
  - (semi-manual) aggregation
- Landmark hierarchy
  - not directly used
  - but has some interesting properties
  - will talk about later

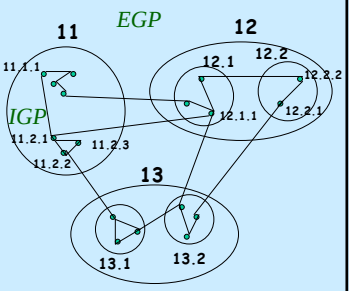
Example Area Hierarchy

ISPs (11, 12, 13)
ISP subnets (11.1, etc.)
customer nets 11.2.1/24
rtg table at 1.2.1.a:
11.2.2/24: 11.2.2.b
11.2.1/24: stays at us
11.2.3/24: 11.2.3.e
11.1/16: 11.1.1.c
12/8: 12.1.1.d
13/8: 11.2.2.b



Routing Protocols Classes

- Interior and Exterior Gateway Protocols



EGP History

- *Larger numbers of networks forces new protocols*
- Mid-80s: EGP
  - tree topologies only
- BGP-3
  - classful addressing only
- BGP-4
  - supports *extensions* via attributes