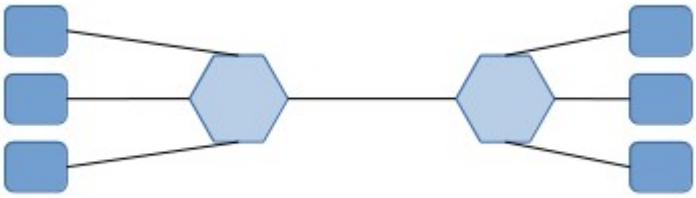
CSE 461 - Module 9: IP Routing



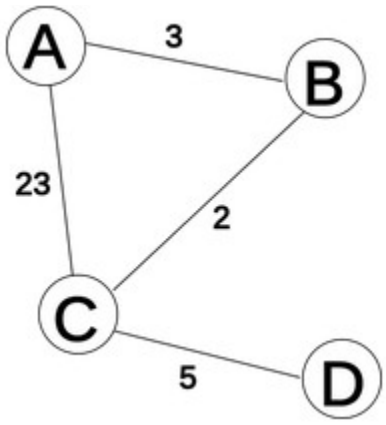
Comparison with Link Layer (Bridges)

	Learning Bridges	**Learning Bridges + Spanning Tree**	**IP Routers**
Basic Mechanism	Forwarding table	Forwarding table	Forwarding table
Destination Addresses	MAC	MAC	IP
Scale	10's?	10's?	100's
Assumed network topology	Loop free (tree)	Arbitrary	Arbitrary
Topology computation	None	Min-cost spanning tree	Min-cost spanning tree
Destinations	Individual network interface cards	Individual network interface cards	Aggregates of IP addresses
Action on lookup miss	Flood	Flood	Drop packet
Gathering forwarding table entries	Passive – learn from source fields of frames that come by	Passive – learn from source fields of frames that come by	Active – routers engage in a forwarding table maintenance protocol

DV – Distance Vector

- Distributed Bellman-Ford
  - Periodically tell each neighbor how far you are from every destination
  - When you hear from a neighbor, for each destination D, compare
    `distance to neighbor + neighbor's distance to D`
    with your currently recorded distance to D.
  - If going through that nieghbor is shorter than the path you already knew about
    - Enter the neighbor in your forwarding table as the next hop to reach D
    - Update your distance to D to be distance to neighbor + neighbor's distance to D
- Robustness? Convergence?
- Traffic pattern
  - Send message w/ all destinations to your neighbors

DV Issue – Count to infinity



- What are forwarding tables at A, B, C, and D?
- What happens if the link C-D goes down?
- Ad hoc approaches to the issue
  - Split horizon; poison reverse

Link State Routing

- Idea:
  - every router individually acquires information about the current state of all links in the network
  - each one then computes a minimum cost spanning tree rooted at itself
    - if all routers have the same link state information, they compute the same (or at least compatible) trees
  - it then uses the min-cost spanning tree to set its forwarding table
- Each router must tell every other router about the links its connected to
  - *Link state advertisements (LSAs)*
  - Flood them (why?)
    - Want reliability (why?)
      - Need sequence numbers
        - How do you use the sequence numbers?
- Traffic pattern
  - Send message about your directly connected links to everyone