Multicast

Outline
Multicast for LS
Multicast for DV
Protocol Independent Multicast

Process Groups
• Any set of processes that want to cooperate
• Processes can join/leave either implicitly or explicitly
• A process can belong to many groups
• Groups can be either open or closed
• Use multicast rather than point-to-point messages
  – group name (address) provides a useful level of indirection
• Example uses
  – data dissemination (e.g., news)
  – replicated servers
Multicast Routing: LS

- Each host on a LAN periodically announces the groups it belongs to using IGMP
- Augment update message (LSP) to include set of groups that have members on a particular LAN
- Each router uses Dijkstra’s algorithm to compute shortest-path spanning tree for each source/group pair
- Each router caches tree for currently active source/group pairs

Multicast Routing: DV

- Reverse Path Broadcast
  - Each router already knows that shortest path to S goes through router N
  - When receive multicast packet from S, forward on all outgoing links (except one it arrived on), iff packet arrived from N
  - Eliminate duplicate broadcast packets by letting only “parent” for LAN (relative to S) forward
    - shortest path to S (learn from distance vector)
    - smallest address to break ties
DV (cont)

- **Reverse Path Multicast**
  - Goal: prune networks that have no hosts in group G
  - Step 1: determine if LAN is a leaf w/ no members in G
    - leaf if parent is only router on the LAN
    - determine if any hosts are members of G using IGMP
  - Step 2: propagate “no members of G here” information
    - augment (destination, cost) update sent to neighbors with set of groups for which this network is interested in receiving multicast packets
    - only happens when multicast address becomes active

Protocol Independent Multicast

- PIM: sparse mode (PIM-SM) and dense mode
- Routers join/leave groups: Join/Prune messages
- Rendezvous Point (RP) for each group
- Shared trees and source-specific trees
PIM

RP = Rendezvous point
Shared tree
Source-specific tree for source R1