Announcements

• Feedback
• Project 1
• HW2
Multicast Solutions

• Application-layer
  – Redundancy across applications
  – Resources

• Network-layer
  – Coordination
Free-Riding Multicast

• Decouple
  – Group discovery
  – Forwarding

• Discovery
  – Augment BGP adverts with Group information
  – (destination prefix, G)
  – Bloom Filters
Bloom Filter

- Probabilistic data structure used for testing membership in a set
- Allows false positive

- Using bloom filters
  - Set(id)
  - Lookup(id)
    - May return true, even if id is not in the set

http://en.wikipedia.org/wiki/Bloom_filter
FRM Forwarding

• Border router at the source computes dissemination tree
  – Need to scan the entire BGP table
• Send (dissemination tree, pkt)
  – Dissemination tree encoded as a bloom filter
• Forward to the next hop on the tree
• Each intermediate router decodes the dissemination tree and forwards to next hop
• How to deal with false +ve?
Tradeoffs

• Minimal extension to BGP
• ISP Control
• No need to select the location of RP
• Centralized route construction
• State requirement
• Unorthodox packet forwarding
• Bandwidth overhead