

Multicast Routing on the Internet

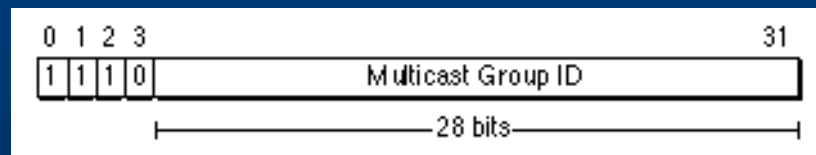
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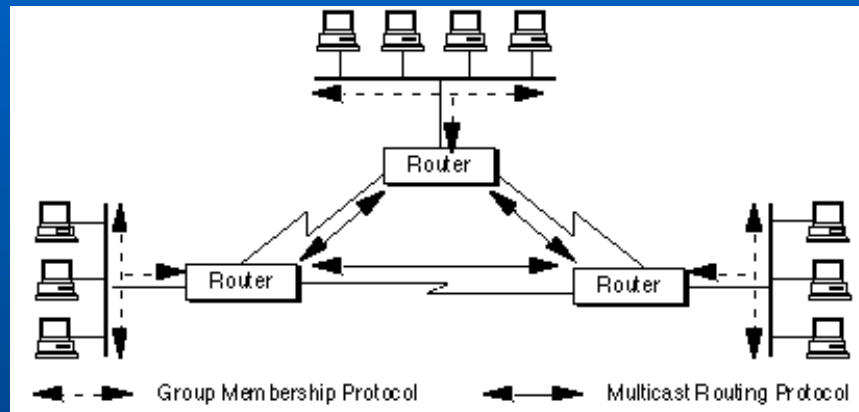
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What is multicast?

- Point-to-multipoint transmission
- Individual hosts are configured as members of different multicast groups
- Multicasting is not connection oriented
- An IP multicast group is identified by a Class D address

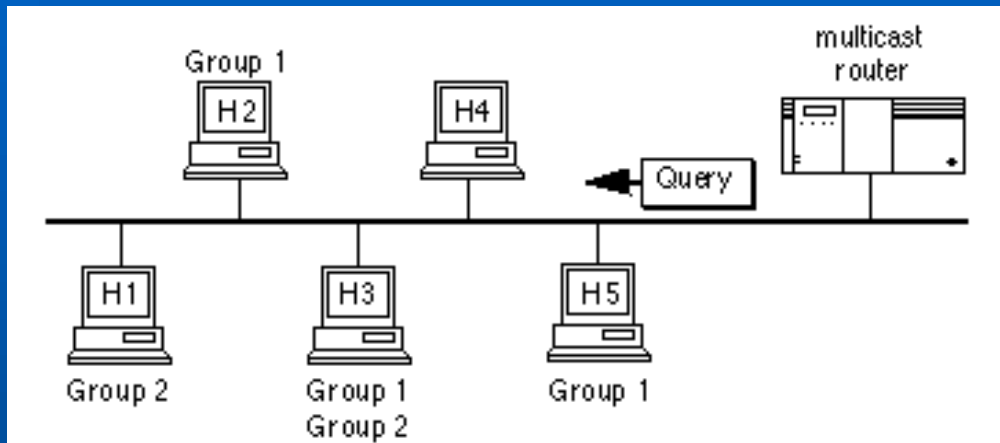


Multicast IP Delivery Service



- The Internet Management Protocol runs between host and their immediately neighboring multicast routers
- A Multicast Routing Protocol is responsible for the construction of multicast delivery trees and forwarding of multicast datagrams across an internetwork

Internet Group Management Protocol (IGMP)



- A multicast router periodically transmits Host Membership Query messages
- When a host wants to join a group, it immediately transmits a Host Membership Report for the group
- Election of the querier (The router with the lowest IP address)
- A Group-Specific Query Message
- A Leave Group message

Multicast forwarding algorithms

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- **Flooding**
 - **Spanning Trees**
 - **Reverse Path Broadcasting**
 - **Truncated Reverse Path Broadcasting**
 - ✓ *Reverse Path Multicasting*
 - ✓ *Core-Based Trees*

Multicast Routing Protocols

- **Distance Vector Multicast Routing protocol**
- **Multicast OSPF**
- **Protocol Independent Multicast (Dense and Sparse modes)**

Reverse Path Multicasting

- Every time a router receives a packet on one of its links, it checks whether this link belongs to the shortest path towards the source

yes

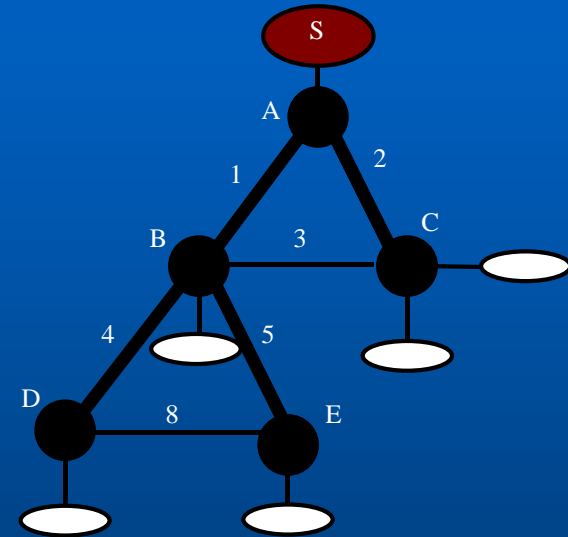
Forward the packet to all “downstream” neighbors

(RPB)

no

Discard the packet

“Poison reverse” the route



- The “parent” link – the interface over which a router expects to receive multicast packets from a particular source
- The “child” links – the outgoing links over which a router forwards multicast packets

Drawbacks of RPM

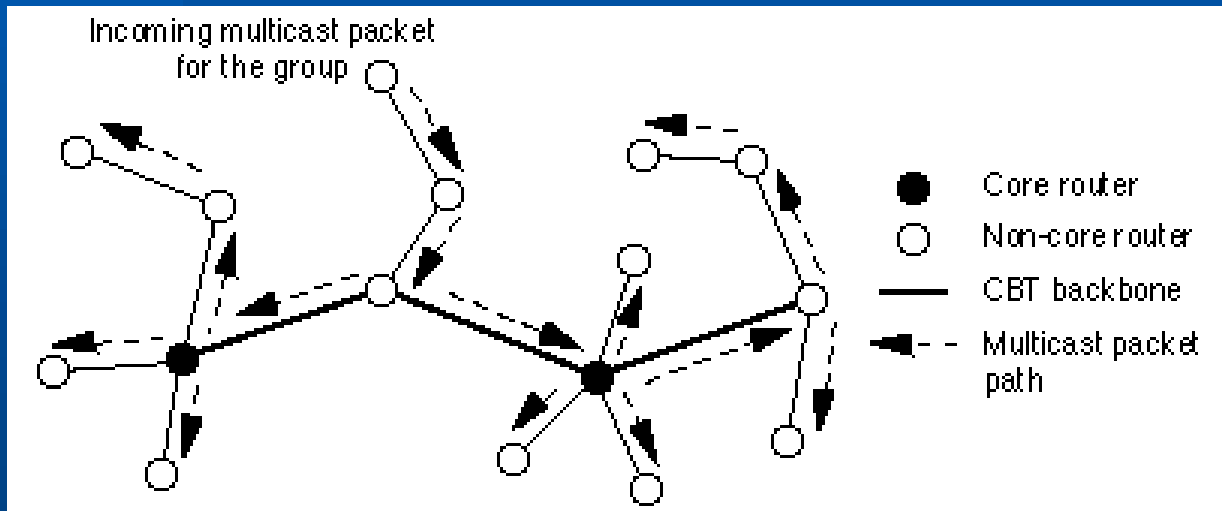
1. **The prune information in routers must be removed periodically and the next packet for a (source, group) is forwarded to all leaf routers**
2. **Relatively big memory space is required for maintaining state information for all (source, group) pairs -> it makes the algorithm not scalable**

Project goals

- **Simulation of unicast forwarding since in real life both unicast and multicast communication pattern are used in the same network**
- **Simulation of Reverse Path Multicasting using a special data structure to store the information**
- **Evaluation of the algorithm efficiency in the case of the large internetworks (up to 10000 nodes)**
- **Comparison with another multicast forwarding algorithm, Core-Based Trees, which was preliminary created to overcome the limitations of Reverse Path Multicasting**

Core-Based Trees

- A single router or a set of routers acts as the core
- A host that wishes to receive traffic for a multicast group is required to send a “join” message to one of the group’s core routers.



Result: a single delivery tree that is shared by all members of a group

Core-Based Trees

Benefits

- Efficient use of router resources (maintenance of information for each group, not for each (source, group) pair)
- Conserves network bandwidth

Limitations

- Traffic concentration near core routers
- Possible delays

Where can multicast be used?

- **Sharing audio and video (multiparty video-conferencing)**
- **Web caching (the temporary storage of web objects for later retrieval)**
- **Web clustering**

Thank you!

Any questions?..