Chapter 14

Multicasting And Multicast Routing Protocols
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- DVMRP
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INTRODUCTION
Figure 14-1

Unicasting
In unicast routing, the router forwards the received packet through only one of its interfaces.
In multicast routing, the router may forward the received packet through several of its interfaces.
Multicasting versus multiple unicasting

a. Multicasting
Figure 14-3:b

Multicasting versus multiple unicasting

b. Multiple unicasting
Emulation of multicasting through multiple unicasting is not efficient and may create long delays, particularly with a large group.
14.2 MULTICAST ROUTING
14.3
MULTICAST TREES
In a source-based tree approach, the combination of source and group determines the tree.
In the group-shared tree approach, the group determines the tree.
Figure 14-4

Multicast routing protocols

- Multicasting Protocols
  - Source-Based Tree
    - DVMRP
    - MOSPF
  - Group-Shared Tree
    - CBT
    - PIM
      - PIM-DM
      - PIM-SM
DVMRP
Reverse path forwarding

a. Packet is forwarded

b. Packet is discarded
In reverse path forwarding (RPF), the router forwards only the packets that have traveled the shortest path from the source to the router; all other copies are discarded.
RPF prevents the formation of loops.
Figure 14-6

Reverse path broadcasting

Net3 receives two copies of the packet
Figure 14-7

RPF versus RPB

R1 is the parent of Net1 and Net2.
R2 is the parent of Net3
RPB creates a shortest path broadcast tree from the source to each destination. It guarantees that each destination receives one and only one copy of the packet.
Figure 14-8

RPF, RPB, and RPM

a. RPF

b. RPB

c. RPM (after pruning)

d. RPM (after grafting)
RPM adds pruning and grafting to RPB to create a multicast shortest path tree that supports dynamic membership changes.
14.6 MOSPF
Figure 14-9

Unicast tree and multicast tree

a. Unicast tree for D

b. Unicast tree for B

c. Multicast tree for all routers
14.7

CBT
Figure 14-10

Shared-group tree with rendezvous router

Shared Tree
Figure 14-11

Sending a multicast packet to the rendezvous router

Legend
Unicast
Multicast

Shared Tree

Source

Member

Member

Member

Member

Member
In CBT, the source sends the multicast packet (encapsulated in a unicast packet) to the core router. The core router decapsulates the packet and forwards it to all interested hosts.
14.8

PIM
PIM-DM is used in a dense multicast environment, such as a LAN environment.
PIM-DM uses RPF and pruning/grafting strategies to handle multicasting. However, it is independent from the underlying unicast protocol.
Note

PIM-SM is used in a sparse multicast environment such as a WAN.
PIM-SM is similar to CBT but uses a simpler procedure.
14.9

MBONE
Figure 14-12

Logical tunneling
Figure 14-13

MBONE

[Diagram showing MBONE network with routers R1, R2, R3, R4, and multicast group address (SG) and unicast addresses (Router R1 and Router R2)]
Note

DVMRP supports MBONE