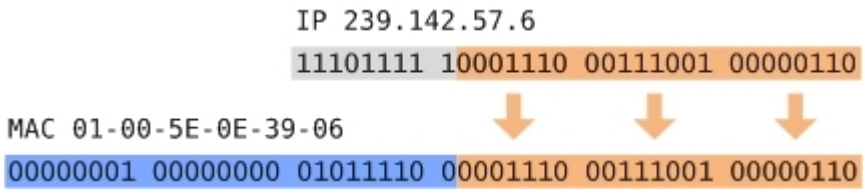
IPv4 Multicast

Layer 2 Addressing



Bits 1-24	Multicast OUI of 01-00-5E
Bit 25	Always set to zero
Bits 26-48	Carried over from lower 23 bits of IP address

Terminology

Reverse Path Forwarding (RPF) · Verifies that multicast traffic travels in the reverse direction of unicast traffic, away from the tree root

Internet Group Management Protocol (IGMP) · End hosts issue IGMP requests to local routers to join multicast groups

Cisco Group Management Protocol (CGMP) · A proprietary protocol used by switches to obtain multicast membership information for end hosts

IGMP Configuration

IGMP Support	`Router(config-if)# ip igmp [version {1|2|3}]`
IGMP Snooping	`Switch(config)# ip igmp snooping`

Protocol Independent Multicast

Dense Mode · The initial tree encompasses all multicast routers; after a period of time, routers without IGMP members prune back branches

Sparse Mode · The tree is grown from a central rendevous point out to the multicast source and recipients

Sparse-Dense Mode · Allows a PIM-enabled interface to function in either sparse or dense mode per group

PIMv1 · Provides automatic RP discovery with Auto-RP (Cisco proprietary)

PIMv2 · Automatic RP discovery is accomplished by the bootstrap router method (standards based)

PIM Configuration

```
ip multicast-routing
!
interface FastEthernet0/0
 ip pim {sparse-mode | dense-mode | sparse-dense-mode }
 ip pim version {1 | 2}
```

RP Configuration

Manual	`ip pim rp-address <IP>`
Auto-RP Mapping Agent	`ip pim send-rp-discovery scope <TTL>`
Auto-RP Candidate	`ip pim send-rp-announce <interface>`
BSR Candidate	`ip pim bsr-candidate <interface>`
BSR RP Candidate	`ip pim rp-candidate <interface>`

Ranges

224.0.0.0/24	Local network control
224.0.1.0/24	Internetwork control
232.0.0.0/8	Source-specific
233.0.0.0/8	GLOP (RFC 3180)
239.0.0.0/8	Admin-scoped

Common Groups

224.0.0.1	All hosts
224.0.0.2	All routers
224.0.1.39	Cisco RP Announce
224.0.1.40	Cisco RP Discovery

Distribution Trees

Shared · A common, static set of links which carry all multicast traffic; administratively constructed

Source-Rooted · Provide the shortest paths from the source to receivers

IGMP

IGMPv1 · End hosts send requests to local routers to receive multicast traffic for a particular group

IGMPv2 · Adds support for dynamic leave requests and querier election

IGMPv3 · Adds multicast source filtering capability

IGMP Snooping · A switch passively inspects IGMP requests to determine which hosts should receive layer two multicast traffic

IGMP Troubleshooting

```
show ip igmp
show ip igmp group
show ip igmp interface
show ip igmp snooping
ip igmp join-group
```

PIM Troubleshooting

```
show ip mroute
show ip pim interface
show ip pim neighbor
show ip pim rp [mapping]
show ip rpf <IP>
```