

Multicast Network Communications

A Layer-2 and 3 addressing scheme that sends messages to IP multicast group addresses

RFC 1112

Host Extensions for IP Multicasting

Address Range

224.0.0.0 - 239.255.255.255

<http://www.iana.org/assignments/multicast-addresses>

224.0.0.0 - 224.0.0.18	Use by network protocols
224.0.0.1	All hosts on this subnet
224.0.0.2	All routers on this subnet
224.0.0.19 - 224.0.0.255	Unassigned
224.0.1.0 - 224.0.1.255	Multicast applications
224.0.1.1	NTP Network Time Protocol
224.0.1.8	NIS+
224.0.1.80 - 224.0.1.255	Unassigned
239.0.0.0 - 239.255.255.255	Private multicast domain

Managed by the Internet Address Number Authority (IANA)

Converting Layer-3 IP Multicast addresses to Layer-2 MAC Addresses

48-bit multicast MAC addresses always have a 24-bit prefix of '01-00-5e', the OUI.

The remaining 24-bits start with a high order bit of '0' then append the lower 23-bits of the IP Address (Layer-3).

Host multicast subscription protocols

(Protocols that enable a host to query, or inform, a router that they want to be forwarded multicast group traffic)

IGMPv1 - Internet Group Management Protocol Version 1 -

Supports three processes; *Query* (Sends out an all host multicast per interface - 224.0.0.1, every 60 seconds), *Joining* (Unsolicited report) and *Leaving* (timeout - 3 minutes).

IGMPv2 - Internet Group Management Protocol Version 2 - A new query type called the *Group-Specific Query* allows routers to communicate only to a selected multicast host. The Leave process allows hosts to remove themselves from the multicast group immediately. [RFC2236](#).

IGMP packets are always sent with a TTL of 1, and are supposed to be forwarded.

CGMP - Cisco Group Management Protocol - used by switches and routers. It uses **two** MAC addresses.

GDA - Group Destination Address and Group Source Address. The GDA is the multicast destination address, the MAC multicast address. The GSA is the source address of the host. Only hosts that have joined the group still use IGMP.

>int e4/0

>ip cgmp

Routing Multicast Traffic

Multicast routing uses two types of trees - **Source** and **Shared**. *Source trees* use the source of the tree. And use the shortest path tree, SPT, to the receivers. *Shared trees* use multiple sources for a multicast group forward their data to a shared root or **rendezvous point (RP)**. All recipients of a multicast group receive the data from a rendezvous point. Multicast data, without a rendezvous point, is sent in a bidirectional shared tree.

Multicast Delivery Attributes

Reverse Path Forwarding (RPF) - A process based on the upstream interface that the packet came in from an interface that leads to the source.

This avoids loops by discarding packets and decreases overhead.

Time-to-Live (TTL) - TTL counter and TTL thresholds are used to limit the scope of the multicast.

every time a packet hops a router. If a packets TTL counter reaches 0, the packet is discarded. A TTL value on an outgoing router interface, thus determines the scope of the multicast.

Multicast Routing Protocols

Distance Vector Multicast Routing Protocol

Features a 32 hop-count maximum.

Multicast Open Shortest Path Tree

Protocol Independent Multicast

forwarding. Understands

all the PIM neighbors.

fails the RPF check.

neighbor, A

report to the

Sparse

tree.

Distribution trees are built based on the position of the root. Think upside down when planning the routing for the network. You must know where your sources or RPs will be located.

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multicast group.