OVERVIEW

IP MULTICAST GLOSSARY OF TERMS

Basic Multicast: Interactive intra-domain multicast. Supports multicast applications within an enterprise campus. Also, provides an additional integrity in the network with the inclusion of a reliable multicast transport, PGM.

Bi-dir PIM: Bi-directional PIM is an extension to the PIM suite of protocols that implements shared sparse trees with bi-directional flow of data. In contrast to PIM-SM, Bidir-PIM avoids keeping source specific state in router and thus allows trees to scale to an arbitrary number of sources.

Broadcast: One-to-all transmission where the source sends one copy of the message to all nodes, whether they wish to receive it or not.

Cisco Group Management Protocol: Cisco developed protocol that allows Layer 2 switches to leverage IGMP information on Cisco routers to make Layer 2 forwarding decisions.

Designated Router: The router in a PIM-SM tree that instigates the Join/Prune message cascade upstream to the rendezvous point in response to IGMP membership information it receives from IGMP hosts.

Distribution Tree: Multicast traffic flows from the source to the multicast group over a distribution tree that connects all of the sources to all of the receivers in the group. This tree may be shared by all sources (a shared-tree), or a separate distribution tree can be built for each source (a source-tree). The shared-tree may be one-way or bi-directional.

Enhanced Multicast: Interactive inter-domain multicast. Supports inter-domain routing and source discovery across the Internet or across multiple domains comprising an enterprise.

Internet Group Management Protocol v2 (IGMPv2): Used by IP routers and their immediately connected hosts to communicate multicast group membership states.

Query: IGMP messages originating from the router(s) to elicit multicast group membership information from its connected hosts.

Report: IGMP messages originating from the hosts that are joining, maintaining or leaving their membership in a multicast group.

IGMP Snooping: IGMP Snooping requires the LAN switch to examine, or “snoop,” some layer 3 information in the IGMP packet sent from the host to the router. When the switch hears an IGMP Report from a host for a particular multicast group, the switch adds the host's port number to the associated multicast table entry. When it hears an IGMP Leave Group message from a host, it removes the host's port from the table entry.

Internet Group Management Protocol v3 (IGMPv3): IGMP is the protocol used by IPv4 systems to report their IP multicast group memberships to neighboring multicast routers.

Version 3 of IGMP adds support for “source filtering”, that is, the ability for a system to report interest in receiving packets *only* from specific source addresses, or from *all but* specific source addresses, sent to a particular multicast address.

IGMP Messages: IGMP messages are encapsulated in standard IP datagrams with an IP protocol # of 2 and the IP Router Alert option (RFC2113).

Multicast Routing Monitor (MRM): A management diagnostic tool that provides network fault detection and isolation in a large multicast routing infrastructure. It is designed to notify a network administrator of multicast routing problems in near real time.

Multicast: A routing technique that allows IP traffic to be sent from one source or multiple sources and delivered to multiple destinations. Instead of sending individual packets to each destination, a single packet is sent to a group of destinations known as a multicast group, which is identified by a single IP destination group address. Multicast addressing supports the transmission of a single IP datagram to multiple hosts.

Multicast-Lite: Minimum implementation level supporting one-to-many multicasting across the network, i.e., professor broadcasting lecture to many students on a non-interactive basis—no questions asked.

Multicast Source Discovery Protocol (MSDP): A mechanism to connect multiple PIM sparse-mode (SM) domains. MSDP allows multicast sources for a group to be known to all rendezvous point(s) in different domains. Each PIM-SM domain uses its own rendezvous points and does not need to depend on them in other domains. A rendezvous point runs MSDP over TCP to discover multicast sources in other domains. MSDP is also used to announce sources sending to a group. These announcements must originate at the domain's Rendezvous Point. MSDP depends heavily on MP-BGP for interdomain operation.

Multi-protocol Extensions for Border Gateway Protocol (MP-BGP): Also known as BGP+, MP-BGP represents multicast extensions to the BGP Unicast inter-domain protocol. It adds capabilities to BGP to enable multicast routing policy throughout the Internet and to connect multicast topologies within and between BGP autonomous systems. That is, MP-BGP is an enhanced BGP that carries IP multicast routes. MP-BGP carries two sets of routes, one set for unicast routing and one set for multicast routing. The routes associated with multicast routing are used by Protocol Independent Multicast (PIM) to build multicast data distribution trees.

Pragmatic General Multicast (PGM): PGM is a reliable multicast transport protocol for applications that require ordered, duplicate-free, multicast data delivery from multiple sources to multiple receivers. PGM guarantees that a receiver in a multicast group either receives all data packets from transmissions and retransmissions, or can detect unrecoverable data packet loss. PGM is intended as a solution for multicast applications with basic reliability requirements.

Protocol Independent Multicast (PIM): A multicast routing architecture defined by the IETF that enables IP multicast routing on existing IP networks. Its key point is its independence from any underlying Unicast protocol such as OSPF or BGP.

- **SM = Spare Mode** (RFC 2362): Relies upon an explicitly joining method before attempting to send multicast data to receivers of a multicast group.
- **DM = Dense Mode** (Internet Draft Spec): Actively attempts to send multicast data to all potential receivers (flooding) and relies upon their self-pruning (removal from group) to achieve desired distribution.

Prune: Multicast routing terminology indicating that the multicast-enabled router has sent the appropriate multicast messages to remove itself from the multicast tree for a particular multicast group. It will stop receiving the multicast data addressed to that group, and therefore cannot deliver the data to any connected hosts until it rejoins the group.

Rendezvous Point: The multicast router that is the root of the PIM-SM shared multicast distribution tree.

Source Tree: A multicast distribution path that directly connects the source's and receivers' Designated Routers (or the rendezvous point) to obtain the shortest path through the network. Results in most efficient routing of data between source and receivers, but may result in unnecessary data duplication throughout network if built by anyone other than the rendezvous point.

Unicast: Point-to-point transmission requiring the source to send an individual copy of a message to each requester.

Unidirectional Link Routing Protocol (UDLR): A routing protocol that provides a way to forward multicast packets over a physical unidirectional interface (such as a satellite link of high bandwidth) to stub networks that have a back channel.

- **UDLR Tunnel:** Uses a back channel (another link) so the routing protocols believe the one-way link is bi-directional. The back channel itself is a special, unidirectional, generic route encapsulation (GRE) tunnel through which control traffic flows in the opposite direction of the user data flow.

This feature allows IP and its associated unicast and multicast routing protocols to believe the unidirectional link is logically bi-directional. This solution accommodates all IP unicast and multicast routing protocols without changing them. However, it does not scale and no more than 20 tunnels should feed into the upstream router. The purpose of the unidirectional GRE tunnel is to move control packets from a downstream node to an upstream node.

- **IGMP Unidirectional Link Routing:** Cisco other UDLR solution is to use IP multicast routing with IGMP, which has been enhanced to accommodate UDLR. This solution scales very well for many satellite links.

URL Rendezvous Directory (URD): URD is a Multicast-Lite solution that directly provides the network with information about the specific source of a content stream. It enables the network to quickly establish the most direct distribution path from the source to the receiver, thus significantly reducing the time and effort required in receiving the streaming media. URD allows an application to identify the source of the content stream through a web page link or web directly. When that information is sent back to the application it is then conveyed back to the network using URD.

In this feature, a URD-capable web page provides information about the source, the group, and the application (via media-type) on a web page. An interested host will click on the web page pulling across the information in an http transaction. The last-hop router to receiver would intercept this transaction, sent to a special port allocated by IANA. The last-hop router is also URD capable and uses the information to initiate the PIM Source, Group (S, G) join on behalf of the host.

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

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