

ZebOS®
Network Platform

PIM-SM Module

Overview

The ZebOS® Network Platform Protocol Independent Multicast-Sparse Mode (PIM-SM) Module is a multi-cast routing protocol module that uses the underlying unicast Routing Information Base (RIB) to find the best next-hop neighbor to reach the root of the multicast data-distribution tree, Rendezvous Point (RP) or source. It builds unidirectional-shared trees per group, and optionally creates shortest-path trees per source.

Source-Specific Multicast

The ZebOS PIM-SM module implements the Source-Specific Multicast (SSM) service model. The network layer service provided by SSM is a channel identified by an SSM destination IP address (G) and a source IP address (S). A source (S) transmits IP datagrams to an SSM destination address (G). A receiver can acquire these datagrams by subscribing to the channel (Source, Group, or S, G). Version 2 of the Multicast Listener Discovery (MLD) and Version 3 of the Internet Group Multicast Protocol (IGMP) support channel subscription. The inter-domain tree for forwarding IP multicast datagrams is rooted at the source S, and is constructed using the ZebOS PIM-SM module.

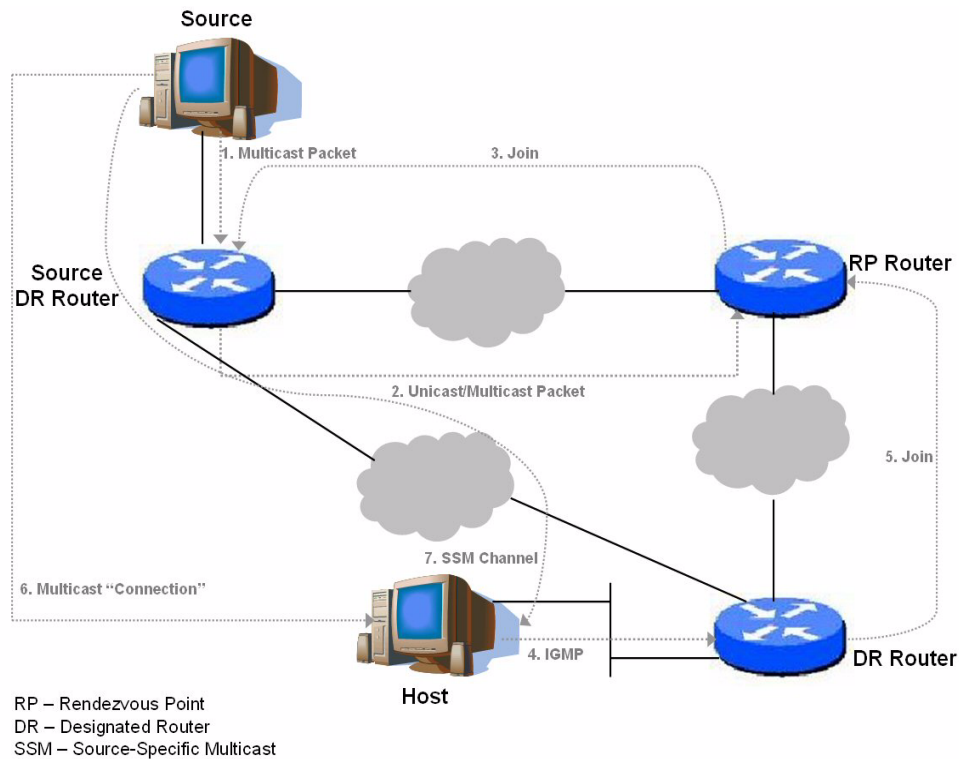
Both standard IP Multicast and SSM semantics can coexist on a single router running ZebOS PIM-SM. A range of multicast addresses (currently 232.0.0.0/8 for IPv4 and FF3x::/32 for IPv6) is reserved for SSM. The multicast group addresses in both data packets and PIM messages determines the choice of semantics. A non-default group range can apply SSM semantics via configuration in the ZebOS PIM-SM module.

Anycast Rendezvous Point

The ZebOS PIM-SM module implements Anycast Rendezvous Point by extending the register mechanism in PIM-SM. This means clients can retain the Anycast-RP functionality without using Multicast Source Discover Protocol (MSDP). The ZebOS PIM-SM Anycast-RP solution affords outcomes for both fast failover and shared-tree load balancing among any number of active RPs in a domain. ISP-based backbones utilize this mechanism to attain fast convergence when a PIM RP router fails.

The ZebOS PIM-SM module also supports Embedded-RP. This mechanism defines an address allocation policy in which the address of the Rendezvous Point is encoded in a multicast group address. For PIM-SM, it can be used as a specification for a group-to-RP mapping mechanism, which allows an easy deployment of scalable inter-domain multicast, and simplifies intra-domain multicast configuration as well.

ZebOS PIM-SM is fully integrated into the ZebOS Network Services Module (NSM) and other ZebOS protocol modules.



Topology of PIM-SM with Source-Specific Multicast

Features

- ZebOS PIM-SM is Virtual Router (VR) and Virtual Routing & Forwarding (VRF) aware *
 - Reverse Path Forwarding (RPF) algorithm
 - Static RP configuration
 - Static RP for multiple group range
 - Bootstrap Router (BSR) Mechanism
 - Rooted shared trees and source specific trees (multicast delivery trees) using periodic and triggered Join/Prune messages support
 - MLDv1/v2 and IGMPv1/v2/v3 support via ZebOS NSM
 - Neighbor Discovery
 - PIM-SM Management Information Base (MIB)
 - Last-hop binary switchover to Shortest-Path Tree (SPT)
 - Source Specific Multicast support
 - Anycast RP support using PIM-SM
 - Embedded RP
 - Support for more than 32 Instances
- * Requires Multiple Multicast FIB support

Benefits

- Stable, robust implementation of PIM-SM

- Interoperable with major router vendors
- Can be used in embedded equipment and on standard server platforms
- Delivers significant time-to-market advantages for customers
- Platform-independent implementation

Requirements

- ZebOS Network Services Module
- An IGP

Standards Support

- RFC 3569 — An Overview of Source-Specific Multicast (SSM)
- RFC 3956 — Embedding RP Address in an IPv6 Multicast Address
- RFC 4601 — Protocol Independent Multicast–Sparse Mode (PIM-SM)
- RFC 4610 — Anycast-RP using PIM-SM
- draft-ietf-ssm-arch-07 — Architecture for Source-Specific Multicast
- draft-ietf-pim-sm-bsr-11 — Bootstrap Router (BSR) Mechanism for PIM SM
- draft-ietf-pim-mib-v2-10 — Protocol Independent Multicast-Sparse Mode MIB
- draft-ietf-mboned-ssm-232.08 — Source-Specific Protocol Independent Multicast in 232/8
- draft-ietf-magma-igmpv3-and-routing-05 — IGMPv3/MLDv3 and Multicast Routing Protocol Interaction
- draft-holbrook-idmr-igmpv3-ssm-08 — Using IGMPv3 and MLDv2 for Source Specific Multicast

Standard Deliverables

- Source Code (written in ANSI-compliant C)
- Installation Guide
- Command Reference Guide
- Configuration Guide
- Developer Guide