PIMv6 Anycast RP Solution

Last Updated: December 19, 2011

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Information About the PIMv6 Anycast RP Solution
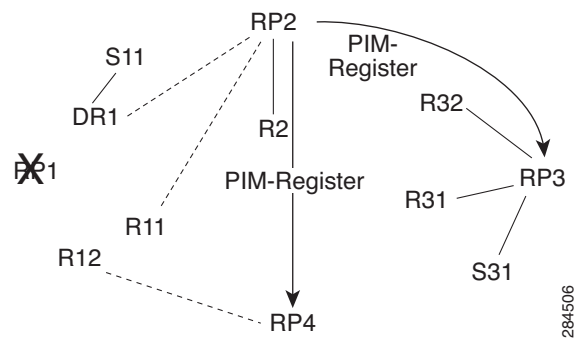
PIMv6 Anycast RP Solution

The anycast RP solution in IPv6 PIM allows an IPv6 network to support anycast services for the PIM-SM RP. It allows anycast RP to be used inside a domain that runs PIM only. This feature is useful when interdomain connection is not required.

Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Anycast RP is a mechanism that ISP-based backbones use to get fast convergence when a PIM RP router fails. To allow receivers and sources to rendezvous to the closest RP, the packets from a source need to get to all RPs to find joined receivers.

A unicast IP address is chosen as the RP address. This address is statically configured, or distributed using a dynamic protocol, to all PIM routers throughout the domain. A set of routers in the domain is chosen to act as RPs for this RP address; these routers are called the anycast RP set. Each router in the anycast RP set is configured with a loopback interface using the RP address. Each router in the Anycast RP set also needs a separate physical IP address to be used for communication between the RPs.

The RP address, or a prefix that covers the RP address, is injected into the unicast routing system inside of the domain. Each router in the anycast RP set is configured with the addresses of all other routers in the anycast RP set, and this configuration must be consistent in all RPs in the set.

PIMv6 Anycast RP Normal Operation

The following illustration shows PIMv6 anycast RP normal operation and assumes the following:

- RP1, RP2, RP3 and RP4 are members in the same anycast RP group.
- S11 and S31 are sources that use RP1 and RP3, respectively, based on their unicast routing metric.
- R11, R12, R2, R31 and R32 are receivers. Based on their unicast routing metrics, R11 and R12 join to RP1, R2 joins to RP2 and R31, and R32 joins to RP3, respectively.

The following sequence of events occurs when S11 starts sending packets:

- DR1 creates (S,G) states and sends a register to RP1. DR1 may also encapsulate the data packet in the register.
- Upon receiving the register, RP1 performs normal PIM-SM RP functionality, and forwards the packets to R11 and R12.
- RP1 also sends the register (which may encapsulate the data packets) to RP2, RP3, and RP4.
- RP2, RP3, and RP4 do not further forward the register to each other.
- RP2, RP3, and RP4 perform normal PIM-SM RP functionality, and if there is a data packet encapsulated, RP2 forwards the data packet to R2 and RP3 to R31 and R32, respectively.
- The previous five steps repeat for null registers sent by DR1.

PIMv6 Anycast RP Failover

The following illustration shows PIM anycast RP failover.

In failover, when RP1 is not reachable, the following occurs:

- Registers from DR1 will be routed transparently to RP2.
- R11 uses RP2 as the RP, and R12 uses RP4 as the RP.
- Registers from DR1 will be routed from RP2 to RP3 and RP4.

In this way, the loss of the RP (RP1 in this case) is transparent to DR1, R11, and R12, and the network can converge as soon as the IGP is converged.

How to Configure the PIMv6 Anycast RP Solution

Configuring PIMv6 Anycast RP

This task describes how to configure two PIMv6 anycast RP peers. Steps 1 through 8 show configuration for RP1, and steps 9 through 16 show configuration for RP2.

SUMMARY STEPS

1. **ipv6 pim** [**vrf** *vrf-name*] **rp-address** *ipv6-address* [*group-address-list*] [**bidir**]
2. **interface** *type number*
3. **ipv6 address** {*ipv6-address/prefix-length* | *prefix-name sub-bits* /*prefix-length*}
4. **no shut**
5. **interface** *type number*
6. **ipv6 address** {*ipv6-address/prefix-length* | *prefix-name sub-bits* /*prefix-length*}
7. **no shut**
8. **ipv6 pim anycast-RP** {*rp-address peer-address*}
9. **ipv6 pim** [**vrf** *vrf-name*] **rp-address** *ipv6-address* [*group-address-list*] [**bidir**]
10. **interface** *type number*
11. **ipv6 address** {*ipv6-address/prefix-length* | *prefix-name sub-bits* /*prefix-length*}
12. **no shut**
13. **interface** *type number*
14. **ipv6 address** {*ipv6-address/prefix-length* | *prefix-name sub-bits* /*prefix-length*}
15. **no shut**
16. **ipv6 pim anycast-RP** {*rp-address peer-address*}

DETAILED STEPS

	Command or Action	Purpose
Step 1	**ipv6 pim** [**vrf** *vrf-name*] **rp-address** *ipv6-address* [*group-address-list*] [**bidir**] **Example:** `Router# ipv6 pim rp-address 2001:DB8::1:1 acl_sparse1`	Configures the address of a PIM RP for a particular group range.
Step 2	**interface** *type number* **Example:** `Router(config-if)# interface Loopback4`	Specifies an interface type and number, and places the router in interface configuration mode.
Step 3	**ipv6 address** {*ipv6-address/prefix-length*	*prefix-name sub-bits* / *prefix-length*} **Example:** `Router(config-if)# ipv6 address 2001:DB8::4:4`	Configures an IPv6 address based on an IPv6 general prefix and enable IPv6 processing on an interface.
Step 4	**no shut** **Example:** `Router(config-if)# no shut`	

	Command or Action	Purpose
Step 5	**interface** *type number* **Example:** `Router(config-if)# interface Loopback5`	Specifies an interface type and number, and places the router in interface configuration mode.
Step 6	**ipv6 address** {*ipv6-address/prefix-length* | *prefix-name sub-bits / prefix-length*} **Example:** `Router(config-if)# ipv6 address 2001:DB8::1:1`	Configures an IPv6 address based on an IPv6 general prefix and enable IPv6 processing on an interface.
Step 7	**no shut** **Example:** `Router(config-if)# no shut`	

Step 8	**ipv6 pim anycast-RP** {*rp-address peer-address*}
	
	Example:
	`Router(config)# ipv6 pim anycast-rp 2001:DB8::1:1`
	`2001:DB8::3:3`	

Step 9	**ipv6 pim** [**vrf** *vrf-name*] **rp-address** *ipv6-address* [*group-address-list*] [**bidir**] **Example:** `Router# ipv6 pim rp-address 2001:DB8::1:1 acl_sparse1`	Configures the address of a PIM RP for a particular group range.
Step 10	**interface** *type number* **Example:** `Router(config-if)# interface Loopback4`	Specifies an interface type and number, and places the router in interface configuration mode.
Step 11	**ipv6 address** {*ipv6-address/prefix-length* | *prefix-name sub-bits / prefix-length*} **Example:** `Router(config-if)# ipv6 address 2001:DB8::3:3`	Configures an IPv6 address based on an IPv6 general prefix and enable IPv6 processing on an interface.
Step 12	**no shut** **Example:** `Router(config-if)# no shut`	

	Command or Action	Purpose
Step 13	**interface** *type number* **Example:** `Router(config-if)# interface Loopback5`	Specifies an interface type and number, and places the router in interface configuration mode.
Step 14	**ipv6 address** {*ipv6-address*/*prefix-length* | *prefix-name sub-bits* / *prefix-length*} **Example:** `Router(config-if)# ipv6 address 2001:DB8::1:1`	Configures an IPv6 address based on an IPv6 general prefix and enable IPv6 processing on an interface.
Step 15	**no shut** **Example:** `Router(config-if)# no shut`	
Step 16	**ipv6 pim anycast-RP** {*rp-address peer-address*} **Example:** `Router(config)# ipv6 pim anycast-rp 2001:DB8::1:1 2001:DB8::4:4`	

Configuration Examples for PIMv6 Anycast RP

Example: Configuring PIMv6 Anycast RP

```
RP1
Router1(config)#ipv6 pim rp-address 2001:DB8::1:1 acl_sparse1
Router1(config)# interface Loopback4
Router1(config-if)# ipv6 address 2001:DB8::4:4
Router1(config-if)# no shut

Router1(config)# interface Loopback5
Router1(config-if)# ipv6 address 2001:DB8::1:1
Router1(config-if)# no shut
Router1(config)# ipv6 pim anycast-rp 2001:DB8::1:1 2001:DB8::3:3

RP2 (Anycast RP peer)
Router2(config)# ipv6 pim rp-address 2001:DB8::1:1 acl_sparse1
Router2(config)# interface Loopback4
Router2(config-if)# ipv6 address 2001:DB8::3:3
Router2(config-if)# no shut

Router2(config)# interface Loopback5
Router2(config-if)# ipv6 address 2001:DB8::1:1
```

```
Router2(config-if)# no shut
Router2(config)# ipv6 pim anycast-rp 2001:DB8::1:1 2001:DB8::4:4

show ipv6 pim anycast-rp 2001:DB8::1:1

Anycast RP Peers For 2001:DB8::1:1   Last Register/Register-Stop received
  2001:DB8::3:3 00:00:00/00:00:00
  2001:DB8::4:4 00:00:00/00:00:00
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
IPv6 commands	Cisco IOS IPv6 Command Reference
Cisco IOS IPv6 features	Cisco_IOS_IPv6_Feature_Mapping

Standards and RFCs

Standard/RFC	Title
RFC 4610	*Anycast-RP Using Protocol Independent Multicast (PIM)*

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for the PIMv6 Anycast RP Solution

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1   Feature Information for the PIMv6: Anycast RP Solution

Feature Name	Releases	Feature Information
PIMv6: Anycast RP Solution	15.1(3)S Cisco IOS XE Release 3.4S	The anycast RP solution in IPv6 PIM allows an IPv6 network to support anycast services for the PIM-SM RP. It allows anycast RP to be used inside a domain that runs PIM only. The following commands were introduced or modified: **ipv6 pim anycast-RP**, **show ipv6 pim anycast-RP**.