

# IPv6 BGP Prefix–Based Outbound Route Filtering Configuration Example

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## Contents

### Introduction

#### Prerequisites

- Requirements
- Components Used
- Conventions

#### Configure

- Network Diagram
- Sample Configurations
- Scenario 1: Filter Routes Based on Prefix–list with Expressions

#### Verify

- Verify IPv6 BGP Prefix–Based Outbound Route Filtering Configured in Send Mode
- Verify IPv6 BGP Prefix–Based Outbound Route Filtering Configured in Receive Mode
- Verify Scenario 1: Filter Routes Based on Prefix–list with Expressions

#### Related Information

## Introduction

This document provides a sample configuration using IPv6 that helps you to configure BGP Prefix–Based Outbound Route Filtering. This feature uses BGP outbound route filter (ORF) send and receive capabilities that minimize the number of BGP updates sent between peer routers. The configuration of this feature can help in filtering out unwanted routing updates at the source.

## Prerequisites

### Requirements

Make sure that you meet these requirements before you attempt this configuration:

- Have an understanding of BGP routing protocol and its operation
- Have an understanding of the IPv6 Addressing scheme

### Components Used

This document is not restricted to specific software and hardware versions.

The configurations in this document are based on the Cisco 7200 Series Router with Cisco IOS® Software Release 15.0(1).

### Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

# Configure

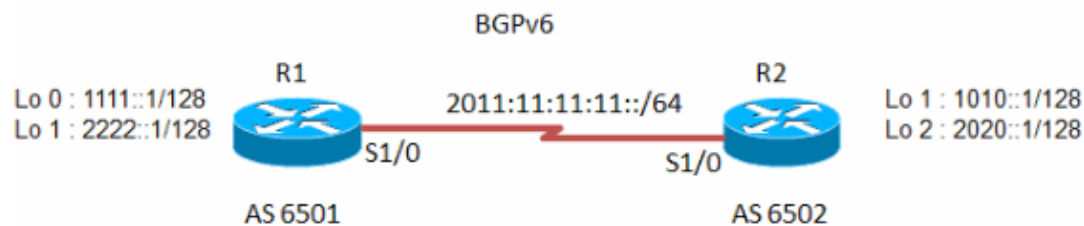
In this example, router R1 is configured to advertise–prefix based ORF send capabilities to router R2. On the other end router R2 is configured to advertise the prefix–based ORF receive capabilities to router R1. Before the BGP Prefix–Based Outbound Route Filtering feature can be enabled to send or receive prefix–based ORF announcements, BGP peering sessions must be up and running and BGP ORF capabilities must be enabled on each participating router before a router.

This document uses the **neighbor orf prefix–filter** command in order to enable the ORF prefix list capability on the router. This command was introduced in Cisco IOS Software Release 12.0(11)ST.

**Note:** Use the Command Lookup Tool (registered customers only) in order to find more information on the commands used in this document.

## Network Diagram

This document uses this network setup:



## Sample Configurations

This document uses these configurations:

- Router R1
- Router R2

```
Router R1
!
hostname R1
!
ipv6 unicast-routing
ipv6 cef
!
!
interface Loopback1
 no ip address
 ipv6 address 1111::1/128
!
!
interface Loopback2
 no ip address
 ipv6 address 2222::1/128
!
```

```

!
interface Serial1/0
  no ip address
  ipv6 address 2011:11:11:11::1/64
  serial restart-delay 0
!
!
router bgp 6501
  no synchronization
  no bgp default ipv4-unicast
  bgp router-id 1.1.1.1
  bgp log-neighbor-changes
  neighbor 2011:11:11:11::2 remote-as 6502
  neighbor 2011:11:11:11::2 ebgp-multihop 255
  no auto-summary
  !
  address-family ipv6
    neighbor 2011:11:11:11::2 activate
    neighbor 2011:11:11:11::2 capability orf prefix-list send
    neighbor 2011:11:11:11::2 prefix-list FILTER_IPv6 in
  exit-address-family
!
!
ipv6 prefix-list FILTER_IPv6 seq 10 permit 1111::1/128
ipv6 prefix-list FILTER_IPv6 seq 20 permit 2222::1/128
!
!
end

```

### Router R2

```

!
hostname R2
!
!
no ip domain lookup
ipv6 unicast-routing
ipv6 cef
!
interface Loopback1
  no ip address
  ipv6 address 1010::1/128
  !
!
interface Loopback2
  no ip address
  ipv6 address 2020::1/128
  !
!
interface Serial1/0
  no ip address
  ipv6 address 2011:11:11:11::2/64
  serial restart-delay 0
!
!
router bgp 6502
  no synchronization
  bgp router-id 2.2.2.2
  bgp log-neighbor-changes
  neighbor 2011:11:11:11::1 remote-as 6501
  neighbor 2011:11:11:11::1 ebgp-multihop 255
  no auto-summary
  !
  address-family ipv6

    network 1010::1/128

```

```

network 2020::1/128
neighbor 2011:11:11:11::1 activate
neighbor 2011:11:11:11::1 capability orf prefix-list receive
neighbor 2011:11:11:11::1 prefix-list R2_list in
exit-address-family
!
ipv6 prefix-list R2_list seq 10 permit 1010::1/128
ipv6 prefix-list R2_list seq 20 permit 2020::1/128
!
end

```

## Scenario 1: Filter Routes Based on Prefix-list with Expressions

In this scenario, a loopback address **1000::1/45** is configured in R1 under interface loopback 0 . A prefix-list is created in order to allow any routes that are greater than prefix-length ::/64.

**Note:** The configuration of router R2 remains the same as previously given and R1 configuration changes as shown here. The IP addresses on these routers remains the same.

Router R1
<pre> !--- Output omitted.  ! interface Loopback0 no ip address ipv6 address 1000::1/45 !  !--- Output omitted.  router bgp 6501 no synchronization bgp router-id 1.1.1.1 bgp log-neighbor-changes neighbor 2011:11:11:11::2 remote-as 6502 neighbor 2011:11:11:11::2 ebgp-multihop 255 no auto-summary ! address-family ipv6 <b>network 1000::1/45</b> network 1111::1/128 network 2222::1/128 neighbor 2011:11:11:11::2 activate <b>neighbor 2011:11:11:11::2 prefix-list IPV6-LONG in</b>  !--- Applies the prefix-list and filters !--- the incoming updates from the neighbor 2011:11:11:11::2.  exit-address-family ! <b>ipv6 prefix-list IPV6-LONG description Match any prefix longer than /64</b> <b>ipv6 prefix-list IPV6-LONG seq 1 permit ::/0 ge 64</b>  !--- seq 1 permit ::/0 ge 64 permits anything !--- that is ge /64 subnet mask.  ! end </pre>

# Verify

Use this section to confirm that your configuration works properly.

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

These **show** commands are used to verify the configuration:

- **show running-config | beg bgp**
- **show bgp ipv6 unicast neighbors**

## Verify IPv6 BGP Prefix-Based Outbound Route Filtering Configured in Send Mode

In Router R1:

```
show running-config | beg bgp

router bgp 6501
no synchronization
bgp router-id 1.1.1.1
bgp log-neighbor-changes
neighbor 2011:11:11:11::2 remote-as 6502
neighbor 2011:11:11:11::2 ebgp-multihop 255
no auto-summary
!
address-family ipv6
neighbor 2011:11:11:11::2 activate
neighbor 2011:11:11:11::2 capability orf prefix-list send

!--- Indicates that the neighbor 2011:11:11:11::2
!--- is configured with the prefix-based
!--- ORF feature in send mode.
```

```
show bgp ipv6 unicast neighbors

R1#show bgp ipv6 unicast neighbors 2011:11:11:11::2
BGP neighbor is 2011:11:11:11::2, remote AS 6502, external link
  BGP version 4, remote router ID 2.2.2.2
  Session state = Established, up for 01:30:36
  Last read 00:00:44, last write 00:00:42, hold time is 180, keepalive interval is 60 seconds
BGP multisession with 2 sessions (2 established), first up for 01:31:26
Neighbor sessions:
  2 active, is multisession capable
Neighbor capabilities:
  Route refresh: advertised and received(new) on session 1, 2
  Four-octets ASN Capability: advertised and received on session 1, 2
  Address family IPv4 Unicast: advertised and received
  Address family IPv6 Unicast: advertised and received

!--- Output omitted.

For address family: IPv6 Unicast
  Session: 2011:11:11:11::2 session 2
  BGP table version 1, neighbor version 1/0
  Output queue size : 0
  Index 2
  session 2 member
```

```

2 update-group member
AF-dependant capabilities:
  Outbound Route Filter (ORF) type (128) Prefix-list:

!--- Shows that the neighbor 2011:11:11:11::2
!--- is configured with the prefix-based
!--- ORF feature in send mode.

      Send-mode: advertised
      Receive-mode: received
Outbound Route Filter (ORF): sent;
Incoming update prefix filter list is FILTER_IPv6

Prefix activity:
  Sent      Rcvd
  ----      ----
Prefixes Current:      2      4
Prefixes Total:        0      0
Implicit Withdraw:     1      0
Explicit Withdraw:     1      0
Used as bestpath:     n/a     0
Used as multipath:     n/a     0

Local Policy Denied Prefixes:
  Outbound  Inbound
  - - - - -  - - - - -

!--- Output omitted.

```

## Verify IPv6 BGP Prefix-Based Outbound Route Filtering Configured in Receive Mode

In Router R2:

```

show running-config | beg bgp

router bgp 6502
no synchronization
bgp router-id 2.2.2.2
bgp log-neighbor-changes
neighbor 2011:11:11:11::1 remote-as 6501
neighbor 2011:11:11:11::1 ebgp-multihop 255
no auto-summary
!
address-family ipv6
network 1010::1/128
network 2020::1/128
neighbor 2011:11:11:11::1 activate
neighbor 2011:11:11:11::1 capability orf prefix-list receive

!--- Indicates that the neighbor 2011:11:11:11::1
!--- is configured with the prefix-based
!--- ORF feature in receive mode.

```

```

show bgp ipv6 unicast neighbors

R2#show bgp ipv6 unicast nei 2011:11:11:11::1
BGP neighbor is 2011:11:11:11::1, remote AS 6501, external link
  BGP version 4, remote router ID 1.1.1.1
  Session state = Established, up for 01:47:11
  Last read 00:00:44, last write 00:00:32, hold time is 180, keepalive interval is 60 seconds
  multisession with 2 sessions (2 established), first up for 01:48:02
  Neighbor sessions:

```

```

    2 active, is multisession capable
Neighbor capabilities:
Route refresh: advertised and received(new) on session 1, 2
Four-octets ASN Capability: advertised and received on session 1, 2
Address family IPv4 Unicast: advertised and received
Address family IPv6 Unicast: advertised and received
Multisession Capability: advertised and received

!--- Output omitted.

For address family: IPv6 Unicast
Session: 2011:11:11:11::1 session 2
BGP table version 3, neighbor version 3/0
Output queue size : 0
Index 3
session 2 member
3 update-group member
AF-dependant capabilities:
    Outbound Route Filter (ORF) type (128) Prefix-list:

!--- Shows that the neighbor 2011:11:11:11::1
!--- is configured with the prefix-based
!--- ORF feature in receive mode.

    Send-mode: received
    Receive-mode: advertised
    Outbound Route Filter (ORF): received (2 entries)
Incoming update prefix filter list is R2_list

```

	Sent	Rcvd
Prefix activity:	----	----
Prefixes Current:	2	5
Prefixes Total:	0	0
Implicit Withdraw:	0	0
Explicit Withdraw:	2	0

```

!--- Output omitted.

```

## Verify Scenario 1: Filter Routes Based on Prefix-list with Expressions

Issue the **show ipv6 route bgp** command in router R1 in order to display the current contents of the IPv6 BGP routing table.

show ipv6 route bgp	
In router R1:	
R1#show ipv6 route bgp	
IPv6 Routing Table - default - 9 entries	
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route	
B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP	
I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary	
D - EIGRP, EX - EIGRP external, ND - Neighbor Discovery	
O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2	
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2	
B	1010::1/128 [20/0]
	via 2011:11:11:11::2
B	2020::1/128 [20/0]
	via 2011:11:11:11::2
!--- In this ouput, 1000::1/45 is not	

```
!--- displayed because the network is lesser  
!--- than ::/64 prefix and its filtered.
```

Use the **show ipv6 prefix-list** command in order to display information about an IPv6 prefix list or IPv6 prefix list entries.

```
show ipv6 prefix-list  
  
In router R1:  
  
R1#show ipv6 prefix-list detail  
  
Prefix-list with the last deletion/insertion: IPV6-LONG  
ipv6 prefix-list IPV6-LONG:  
  Description: Match any prefix longer than /64  
  count: 1, range entries: 1, sequences: 1 - 1, refcount: 3  
  seq 1 permit ::/0 ge 64 (hit count: 14, refcount: 1)  
  
R1#show ipv6 prefix-list summary  
  
Prefix-list with the last deletion/insertion: IPV6-LONG  
ipv6 prefix-list IPV6-LONG:  
  Description: Match any prefix longer than /64  
  count: 1, range entries: 1, sequences: 1 - 1, refcount: 3  
  
R1#show ipv6 prefix-list IPV6-LONG  
  
ipv6 prefix-list IPV6-LONG: 1 entries  
  seq 1 permit ::/0 ge 64
```

## Related Information

- [BGP Support Page](#)
- [IP Version 6 Support Page](#)
- [BGP Case Studies](#)
- [Technical Support & Documentation – Cisco Systems](#)

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