
AX8600R Software Manual

Configuration Command Reference Vol. 3
For Version 12.1

AX86R-S006X

Alaxala

■ Relevant products

This manual applies to the models in the AX8600R series of devices. It also describes the functionality of version 12.1 of the software for the AX8600R series of devices.

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■ Reading and storing this manual

Before you use the equipment, carefully read the manual and make sure that you understand all safety precautions.

After reading the manual, keep it in a convenient place for easy reference.

■ Notes

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■ Editions history

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Preface

Applicable products and software versions

This manual applies to the models in the AX8600R series of devices. It also describes the functionality of version 12.1 of the software for the AX8600R series of devices.

Before you operate the equipment, carefully read the manual and make sure that you understand all instructions and cautionary notes. After reading the manual, keep it in a convenient place for easy reference.

Corrections to the manual

Corrections to this manual might be contained in the *Release Notes* and *Manual Corrections* that come with the software.

Intended readers

This manual is intended for system administrators who wish to configure and operate a network system that uses the Device.

Readers must have an understanding of the following:

- The basics of network system management

Manual URL

You can view this manual on our website at:

<http://www.alaxala.com/en/>

Reading sequence of the manuals

The following shows the manuals you need to consult according to your requirements determined from the following workflow for installing, setting up, and starting regular operation of the Device.

- **Unpacking the Device and the basic settings for initial installation**

Quick Start Guide

(AX86R-Q001X)

- **Determining the hardware setup requirements and how to handle the hardware**

Hardware Instruction Manual

(AX86R-H001X)

- **Understanding the software functions, configuration settings, and operation commands**

▽ First, see the following guides to check the functions or capacity limits.

- | | | |
|--------------------------------------|----------------------|------------------------|
| - Capacity limits | - Filters and QoS | - IP packet forwarding |
| - Basic operations (e.g. logging in) | - Network management | - Unicast routing |
| - Ethernet | | - Multicast routing |

Configuration Guide Vol. 1

(AX86R-S001X)

Configuration Guide Vol. 2

(AX86R-S002X)

Configuration Guide Vol. 3

(AX86R-S003X)

▽ If necessary, see the following references.

- **Learning the syntax of commands and the details of command parameters**

Configuration Command Reference Vol. 1

(AX86R-S004X)

Configuration Command Reference Vol. 2

(AX86R-S005X)

Configuration Command Reference Vol. 3

(AX86R-S006X)

Operation Command Reference Vol. 1

(AX86R-S007X)

Operation Command Reference Vol. 2

(AX86R-S008X)

Operation Command Reference Vol. 3

(AX86R-S009X)

- **Understanding system messages and logs**

Message and Log Reference

(AX86R-S010X)

- **Understanding MIBs**

MIB Reference

(AX86R-S011X)

- **How to troubleshoot when a problem occurs**

Troubleshooting Guide

(AX86R-T001X)

Conventions: The terms "Device" and "device"

The term Device (upper-case "D") is an abbreviation for the following:

AX8600R series device

The term device (lower-case "d") might refer to a Device, another type of device from the current vendor, or a device from another vendor. The context decides the meaning.

Abbreviations used in the manual

AC	Alternating Current
ACK	ACKnowledge
ARP	Address Resolution Protocol
AS	Autonomous System
AUX	Auxiliary
BCU	Basic Control Unit

BEQ	Best Effort Queueing
BGP	Border Gateway Protocol
BGP4	Border Gateway Protocol - version 4
BGP4+	Multiprotocol Extensions for Border Gateway Protocol - version 4
bit/s	bits per second (can also appear as bps)
BOOTP	Bootstrap Protocol
BPDU	Bridge Protocol Data Unit
CC	Continuity Check
CCM	Continuity Check Message
CFM	Connectivity Fault Management
CFP	C Form-factor Pluggable
CIDR	Classless Inter-Domain Routing
CoS	Class of Service
CRC	Cyclic Redundancy Check
CSMA/CD	Carrier Sense Multiple Access with Collision Detection
DA	Destination Address
DC	Direct Current
DCE	Data Circuit terminating Equipment
DHCP	Dynamic Host Configuration Protocol
DHCPv6	Dynamic Host Configuration Protocol for IPv6
DNS	Domain Name System
DR	Designated Router
DSAP	Destination Service Access Point
DSCP	Differentiated Services Code Point
DTE	Data Terminal Equipment
E-mail	Electronic mail
EAP	Extensible Authentication Protocol
EAPOL	EAP Over LAN
EFM	Ethernet in the First Mile
ETH-AIS	Ethernet Alarm Indicator Signal
ETH-LCK	Ethernet Locked Signal
FAN	Fan Unit
FCS	Frame Check Sequence
GSRP	Gigabit Switch Redundancy Protocol
HMAC	Keyed-Hashing for Message Authentication
IANA	Internet Assigned Numbers Authority
ICMP	Internet Control Message Protocol
ICMPv6	Internet Control Message Protocol version 6
ID	Identifier
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IETF	the Internet Engineering Task Force
IGMP	Internet Group Management Protocol
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IPX	Internetwork Packet Exchange
ISO	International Organization for Standardization
ISP	Internet Service Provider
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LLC	Logical Link Control
LLDP	Link Layer Discovery Protocol
LLQ	Low Latency Queueing
LSA	Link State Advertisement
MA	Maintenance Association
MAC	Media Access Control
MC	Memory Card
MD5	Message Digest 5
MDI	Medium Dependent Interface
MDI-X	Medium Dependent Interface crossover
MEG	Maintenance Entity Group
MEP	Maintenance association End Point/Maintenance entity group End Point
MIB	Management Information Base
MIP	Maintenance domain Intermediate Point
MP	Maintenance Point

MRU	Maximum Receive Unit
MTU	Maximum Transfer Unit
NAK	Not AcKnowledge
NAS	Network Access Server
NBMA	Non-Broadcast Multiple-Access
NDP	Neighbor Discovery Protocol
NIF	Network Interface
NLA ID	Next-Level Aggregation Identifier
NSAP	Network Service Access Point
NSSA	Not So Stubby Area
NTP	Network Time Protocol
OAM	Operations,Administration,and Maintenance
OSPF	Open Shortest Path First
OUI	Organizationally Unique Identifier
PA	Protocol Accelerator
packet/s	packets per second (can also appear as pps)
PAD	PADding
PC	Personal Computer
PDU	Protocol Data Unit
PID	Protocol IDentifier
PIM	Protocol Independent Multicast
PIM-SM	Protocol Independent Multicast-Sparse Mode
PIM-SSM	Protocol Independent Multicast-Source Specific Multicast
PQ	Priority Queueing
PRU	Packet Routing Unit
PS	Power Supply
PSINPUT	Power Supply Input
QoS	Quality of Service
RA	Router Advertisement
RADIUS	Remote Authentication Dial In User Service
RDI	Remote Defect Indication
RFC	Request For Comments
RIP	Routing Information Protocol
RIPng	Routing Information Protocol next generation
RMON	Remote Network Monitoring MIB
RPF	Reverse Path Forwarding
RR	Round Robin
RQ	ReQuest
SA	Source Address
SD	Secure Digital
SFD	Start Frame Delimiter
SFP	Small Form factor Pluggable
SFP+	Small Form factor Pluggable Plus
SFU	Switch Fabric Unit
SMTP	Simple Mail Transfer Protocol
SNAP	Sub-Network Access Protocol
SNMP	Simple Network Management Protocol
SNPA	Subnetwork Point of Attachment
SOP	System Operational Panel
SPF	Shortest Path First
SSAP	Source Service Access Point
TA	Terminal Adapter
TACACS+	Terminal Access Controller Access Control System Plus
TCP/IP	Transmission Control Protocol/Internet Protocol
TLV	Type, Length, and Value
TOS	Type Of Service
TPID	Tag Protocol Identifier
TTL	Time To Live
UDP	User Datagram Protocol
URL	Uniform Resource Locator
uRPF	unicast Reverse Path Forwarding
VLAN	Virtual LAN
VPN	Virtual Private Network
VRF	Virtual Routing and Forwarding/Virtual Routing and Forwarding Instance
RRRP	Virtual Router Redundancy Protocol
WAN	Wide Area Network

WFQ	Weighted Fair Queueing
WWW	World-Wide Web

Conventions: KB, MB, GB, and TB

This manual uses the following conventions: 1 KB (kilobyte) is 1024 bytes. 1 MB (megabyte) is 1024^2 bytes. 1 GB (gigabyte) is 1024^3 bytes. 1 TB (terabyte) is 1024^4 bytes.

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Chapter

1. Reading the Manual

Command description format
Command mode list
Specifiable values for parameters

Command description format

Each command is described in the following format:

Function

Describes the purpose of the command.

Syntax

Defines the input format of the command. The format is governed by the following rules:

1. Parameters for setting values or character strings are enclosed in angle brackets (<>).
2. Characters that are not enclosed in angle brackets (<>) are keywords that must be typed exactly as they appear.
3. {A|B} indicates that either A or B must be selected.
4. Parameters or keywords enclosed in square brackets ([]) are optional and can be omitted.
5. For details on the parameter input format, see *Specifiable values for parameters*.

Input mode

Indicates the mode required to enter the command. The name of a sub-mode of a configuration command mode corresponds to the name displayed on the command prompt.

Parameters

Describes in detail the parameters that can be set by the command. The default value and the values that can be specified for each parameter are described.

Default behavior

If there are default values for parameters, or a default behavior when a command is not entered, related information is provided here.

Impact on communication

If a setting has an impact on communication, such as interruptions to communication, that impact is described here.

When the change is applied

Describes whether set commands reflected in the running configuration are immediately effective, or whether they take effect only after temporarily stopping operation, such as by restarting the device.

Notes

Provides cautionary information on using the command.

Related commands

Describes the commands that must be set in order to use the applicable command.

Command mode list

The following table lists the command modes.

Table 1-1: Command mode list

No.	Prompt displayed for the command mode	Description	Command for mode transition
1	(config)	Global configuration mode	# configure
2	(config-line)	Configures remote login and console.	(config)# line vty (config)# line console
3	(config-view)	Configures view.	(config)# parser view
4	(config-if)	Configures a management port.	(config)# interface mgmt
		Configures an AUX port.	(config)# interface async
		Configures an Ethernet interface.	(config)# interface gigabitethernet (config)# interface tengigabitethernet (config)# interface hundredgigabitethernet
		Configures a port channel interface.	(config)# interface port-channel
		Configures a loopback interface.	(config)# interface loopback
		Configures a null interface.	(config)# interface null
5	(config-if-range)	Configures multiple Ethernet interfaces.	(config)# interface range gigabitethernet (config)# interface range tengigabitethernet (config)# interface range hundredgigabitethernet
		Configures multiple port channel interfaces.	(config)# interface range port-channel
6	(config-subif)	Configures an Ethernet subinterface.	(config)# interface gigabitethernet (config)# interface tengigabitethernet (config)# interface hundredgigabitethernet (When specified in the subinterface index)
		Configures a port channel subinterface.	(config)# interface port-channel (When specified in the subinterface index)
7	(config-subif-range)	Configures multiple Ethernet subinterfaces.	(config)# interface range gigabitethernet (config)# interface range tengigabitethernet (config)# interface range hundredgigabitethernet (When specified in the subinterface index)
		Configures multiple port channel subinterfaces.	(config)# interface range port-channel (When specified in the subinterface index)
8	(config-adv-acl)	Configures an Advance filter.	(config)# advance access-list
9	(config-ext-nacl)	Configures an IPv4 packet filter.	(config)# ip access-list extended
10	(config-std-nacl)	Configures an IPv4 address filter.	(config)# ip access-list standard
11	(config-ipv6-acl)	Configures an IPv6 filter.	(config)# ipv6 access-list
12	(config-ext-macl)	Configures a MAC filter.	(config)# mac access-list extended

No.	Prompt displayed for the command mode	Description	Command for mode transition
13	(config-adv-qos)	Configures Advance QoS flow.	(config)# advance qos-flow-list
14	(config-ip-qos)	Configures IPv4 QoS flow.	(config)# ip qos-flow-list
15	(config-ipv6-qos)	Configures IPv6 QoS flow.	(config)# ipv6 qos-flow-list
16	(config-mac-qos)	Configures MAC QoS flow.	(config)# mac qos-flow-list
17	(config-msg-list)	Configures message type output conditions.	(config)# message-list <group name>
18	(config-ip-pbr)	Configures IPv4 policy-based routing.	(config)# ip policy-list
19	(config-ipv6-pbr)	Configures IPv6 policy-based routing.	(config)# ipv6 policy-list
20	(config-router)	Configures RIP.	(config)# router rip
		Configures OSPF.	(config)# router ospf
		Configures BGP4/BGP4+.	(config)# router bgp
21	(config-router-af)	Configures RIP for each VRF.	(config)# router rip (config-router)# address-family ipv4 vrf
		Configures BGP4 for each VRF. (config-router-af) (ipv4 vrf) mode	(config)# router bgp (config-router)# address-family ipv4 vrf
		Configures BGP4+ global network. (config-router-af) (ipv6) mode	(config)# router bgp (config-router)# address-family ipv6
		Configures BGP4+ for each VRF. (config-router-af) (ipv6 vrf) mode	(config)# router bgp (config-router)# address-family ipv6 vrf
22	(config-route-map)	Configures route-map.	(config)# route-map
23	(config-rtr-rip)	Configures RIPng.	(config)# ipv6 router rip
24	(config-rtr)	Configures OSPFv3.	(config)# ipv6 router ospf
25	(config-vrf)	Configures config-vrf.	(config)# vrf definition
26	(<Command mode>-TPL)	Configures the template. template mode <Command mode>: Optional command mode	(config)# template
27	(<Command mode>-TPL-INS)	Configures the insert position command. insert mode <Command mode>: Optional command mode	(<Command mode>-TPL)# insert
28	(<Command mode>-TPL-REP)	Configures the replace position command. replace mode <Command mode>: Optional command mode	(<Command mode>-TPL)# replace

Specifiable values for parameters

The following table describes the values that can be specified for parameters.

Table 1-2: Specifiable values for parameters

Parameter type	Description	Input example
Name	Alphabetic characters can be used for the first character, and alphanumeric characters, hyphens (-), underscores (_), and periods (.) can be used for the second and subsequent characters.	neighbor <u>office1</u> peer-group
Host name	Alphabetic characters can be used for the first character, and alphanumeric characters, hyphens (-), and periods (.) can be used for the second and subsequent characters.	ip host <u>telnet-host</u> 192.168.1.1
Access list name, QoS flow list name, policer entry name, Name of policy-based routing list, QoS queue list name	Alphabetic characters can be used for the first character, and alphanumeric characters, hyphens (-), underscores (_), and periods (.) can be used for the second and subsequent characters.	ip access-list standard <u>inbound1</u> ip access-list standard <u>10</u>
Template name	Alphabetic characters can be used for the first character, and alphanumeric characters, hyphens (-), and underscores (_) can be used for the second and subsequent characters.	template <u>tmpl-01-01</u>
Template parameter	Alphanumeric characters, hyphens (-), and underscores (_) can be used.	template tmpl <u>\$param-01-01</u>
IPv4 address, Subnet mask	Specify these items in decimal format, separating 1-byte decimal values by a period (.).	192.168.0.14 255.255.255.0
Wildcard mask	The same input format as IPv4 addresses. The set bits in an IPv4 address represent an arbitrary value.	255.255.0.0
IPv6 address	Specify this item in hexadecimal format, separating 2-byte hexadecimal values by colons (:).	2001:db8:1234:5678:9abc:def0:1234:5678 fe80::1
add/remove specification	Add to or delete from the information when multiple interfaces have been specified. The add specification adds information to the current information. The remove specification deletes information from the current information.	monitor session 1 source interface add gigabitethernet 1/1 monitor session 1 source interface remove gigabitethernet 1/1

Any character string

Alphanumeric characters and special characters can be specified for parameters. Some special characters, however, cannot be used. Character codes are listed in the following table. Characters other than alphanumeric characters in the following list of character codes are special characters.

Table 1-3: List of character codes

Character	Code	Character	Code	Character	Code	Character	Code	Character	Code	Character	Code
Space	0x20	0	0x30	@	0x40	P	0x50	`	0x60	p	0x70
!	0x21	1	0x31	A	0x41	Q	0x51	a	0x61	q	0x71
"	0x22	2	0x32	B	0x42	R	0x52	b	0x62	r	0x72
#	0x23	3	0x33	C	0x43	S	0x53	c	0x63	s	0x73
\$	0x24	4	0x34	D	0x44	T	0x54	d	0x64	t	0x74
%	0x25	5	0x35	E	0x45	U	0x55	e	0x65	u	0x75
&	0x26	6	0x36	F	0x46	V	0x56	f	0x66	v	0x76
'	0x27	7	0x37	G	0x47	W	0x57	g	0x67	w	0x77
(	0x28	8	0x38	H	0x48	X	0x58	h	0x68	x	0x78
)	0x29	9	0x39	I	0x49	Y	0x59	i	0x69	y	0x79
*	0x2A	:	0x3A	J	0x4A	Z	0x5A	j	0x6A	z	0x7A
+	0x2B	;	0x3B	K	0x4B	[	0x5B	k	0x6B	{	0x7B
,	0x2C	<	0x3C	L	0x4C	\	0x5C	l	0x6C	|	0x7C
-	0x2D	=	0x3D	M	0x4D	]	0x5D	m	0x6D	}	0x7D
.	0x2E	>	0x3E	N	0x4E	^	0x5E	n	0x6E	~	0x7E
/	0x2F	?	0x3F	O	0x4F	_	0x5F	o	0x6F	---	---

Notes

- To enter a question mark (? , or 0x3F), press **Ctrl + V**, and then type a question mark. You cannot copy and paste any specification string that includes a question mark.

Special characters that cannot be specified

Table 1-4: Special characters that cannot be specified

Character name	Character	Code
Double quotation mark	"	0x22
Dollar sign	\$	0x24
Single quotation mark	'	0x27

Character name	Character	Code
Semicolon	;	0x3B
Backslash	\	0x5C
Grave accent mark	`	0x60
Left curly bracket	{	0x7B
Right curly bracket	}	0x7D

Example of specification string

access-list 10 remark "mail:xx@xx %tokyo"

How to specify an interface

The following table describes how to specify the parameters *<interface type>* and *<interface number>* that correspond to the interface type group.

Table 1-5: How to specify an interface

Interface type group	Interface name specified for <i><interface type></i>	Interface number specified for <i><interface number></i>
Ethernet interface	gigabitethernet	<i><nif no.>/<port no.></i>
	tengigabitethernet	<i><nif no.>/<port no.></i>
	hundredgigabitethernet	<i><nif no.>/<port no.></i>
Ethernet subinterface	gigabitethernet	<i><nif no.>/<port no.>.<subinterface index></i>
	tengigabitethernet	<i><nif no.>/<port no.>.<subinterface index></i>
	hundredgigabitethernet	<i><nif no.>/<port no.>.<subinterface index></i>
Port channel interface	port-channel	<i><channel group number></i>
Port channel subinterface	port-channel	<i><channel group number>.<subinterface index></i>
Loopback interface	loopback	0 or <i><loopback id></i>
Null interface	null	0
Management port	mgmt	0
AUX port	async	1

Specification of multiple interfaces

Use this method to specify the same information for multiple interfaces at the same time. You can specify the interface names and interface numbers that correspond to the following interface type groups from among the groups shown in *Table 1-5: How to specify an interface*.

- Ethernet interface
- Ethernet subinterface
- Port channel interface
- Port channel subinterface

When specifying multiple interfaces, you can specify interfaces that belong to the same interface type group at the same time, but you cannot specify interfaces that belong to different interface groups at the same time.

Syntax

```
interface range <interface type> <interface number>
```

You can specify no more than 16 input formats, separating each by a comma (,).

Input example

```
interface range gigabitethernet 1/1-3
interface range gigabitethernet 1/1-3, tengigabitethernet 3/1
interface range port-channel 2.10-20, port-channel 3.100, port-channel 5.200
```

Range of <sfu no.> values

The following table lists the range of <sfu no.> values.

Table 1-6: Range of <sfu no.> values

No.	Model	Range of values
1	All models	1 to 4

Range of <pru no.> values

The following table lists the range of <pru no.> values.

Table 1-7: Range of <pru no.> values

No.	Model	Range of values
1	AX8616R	1 to 4
2	AX8632R	1 to 8

Range of <nif no.> and <port no.> values

The following table lists the range of <nif no.> values.

Table 1-8: Range of <nif no.> values

No.	Model	Range of values
1	AX8616R	1 to 16
2	AX8632R	1 to 32

The following tables list the range of <port no.> values for each NIF.

Table 1-9: Range of <port no.> values

No.	NIF name	Range of values
1	NL1G-12T	1 to 12
2	NL1G-12S	1 to 12
3	NLXG-6RS	1 to 6
4	NMCG-1C	1

Range of values that can be set for <channel group number>

The following table lists the range of <channel group number> values.

Table 1-10: Range of <channel group number> values

No.	Model	Range of values
1	AX8616R	1 to 192

No.	Model	Range of values
2	AX8632R	1 to 384

Range of <subinterface index> values

The range of <subinterface index> values is from 1 to 65535.

Range of values that can be set for <vlan id>

The following table lists the range of <vlan id> values.

Table 1-11: Range of <vlan id> values

No.	Range of values
1	1 to 4095

How to specify <interface id list> and the range of specifiable values

In <interface id list>, you can specify several interfaces of the following Ethernet types by using hyphens (-) and commas (,). You can also specify a single interface by omitting what is inside the brackets []. The range of permitted values is the same as the range of <nif no.> and <port no.> values in the above tables.

- For gigabit Ethernet interfaces
gigabitethernet <nif no.>/<port no.> [- <port no.>]
- For 10 gigabit Ethernet interfaces
tengigabitethernet <nif no.>/<port no.> [- <port no.>]
- For 100 gigabit Ethernet interfaces
hundredgigabitethernet <nif no.>/<port no.> [- <port no.>]

Example of a range specification that uses a hyphen (-) and comma (,):

gigabitethernet 1/1-2,gigabitethernet 1/5,tengigabitethernet 3/1

Range of values that can be set for <vrf id>

The following table lists the range of <vrf id> values.

Table 1-12: Range of <vrf id> values

No.	Range of values
1	1 to 1024

Specifiable values for <message type>

The following table lists the values that can be specified for <message type>.

Table 1-13: Range of <message type> values

No.	Specifiable values
1	BCU
2	SFU
3	PRU
4	NIF
5	PS

No.	Specifiable values
6	FAN
7	KEY
8	CONFIGERR
9	CMDRSP
10	SOFTWARE
11	CONFIG
12	ACCESS
13	NTP
14	SOP-KEY
15	SOP-RSP
16	SNMP
17	PORT
18	ChGr
19	CFM
20	IP
21	PBR
22	DHCP
23	VRRP
24	RIP
25	RIPng
26	OSPF
27	OSPFv3
28	BGP4
29	BGP4+
30	UNICAST
31	PIM-IPv4
32	IGMP
33	PIM-IPv6
34	MLD
35	MULTI-IPv4
36	MULTI-IPv6
37	MULTI-INFO

Chapter

2. IPv4, ARP, and ICMP

- arp
- arp dynamic-limit
- arp max-send-count
- arp send-interval
- arp timeout
- arp-limit
- ip address
- ip conflict-detection
- ip icmp rate-limit unreachable
- ip mtu
- ip proxy-arp
- ip redirects
- ip source-route
- ip subnet-broadcast
- vrf forwarding

arp

Creates a static ARP table. If a product that does not support ARP is connected, an IPv4 address cannot be converted to a physical address. You need to create a static ARP table in advance.

Syntax

To set or change information:

```
arp <ip address> interface <interface type> <interface number> <mac address>
```

To delete information:

```
no arp <ip address> [interface <interface type> <interface number>]
```

Input mode

(config)

Parameters

<ip address>

Specifies a next-hop IPv4 address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

<interface type> <interface number>

Specifies an interface for which static ARP is set.

1. Default value when this parameter is omitted:

To set or change information:

This parameter cannot be omitted.

To delete information:

This parameter cannot be omitted if there are multiple static ARP entries that have the same next-hop IPv4 address.

2. Range of values:

For *<interface type>* and *<interface number>*, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

- * Ethernet interface
- * Ethernet subinterface
- * Port channel interface
- * Port channel subinterface

<mac address>

Specifies the destination MAC address (in a canonical format).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0000.0000.0000 to ffff.ffff.ffff

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. When static ARP entries that have the same next-hop IPv4 address are configured for different VRFs, the *<interface type> <interface number>* parameter is used to identify the VRFs. Therefore, when deleting information for multiple static ARP entries that have the same next-hop IPv4 address, you cannot omit the *<interface type> <interface number>* parameter.

Related commands

`maximum routes`

arp dynamic-limit

Specifies the number of NDP entries that can be learned on the corresponding interface.

Syntax

To set or change information:

```
arp dynamic-limit <count>
```

To delete information:

```
no arp dynamic-limit
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<count>

Specifies the maximum number of ARP entries for each interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 2147483646

Default behavior

On the corresponding interface, the number of entries is not limited.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the number of NDP entries exceeds the maximum value that was set by this command, a system warning message is output, and the NDP entry is not learned.
2. If the number of ARP entries has not reached the maximum value that was set by this command, but exceeds the capacity limit of the entire Device or the capacity limit of the VRF, a warning system message is also output. The new ARP entry is not registered until an old ARP entry is deleted.
3. Static ARP entries have priority over dynamically-learned ARP entries, and can be registered beyond the maximum value specified by this command. However, we recommend against such registration.

If you set more static ARP entries than the maximum value specified by the command, dynamically-learned ARP entries cannot be registered on the corresponding interface. In addition, the system warning message will remain.
4. Even if you use the command to re-specify a maximum value that is smaller than the current

setting, the ARP entries that have been registered based on the previous maximum value are not deleted. For example, if there are 50 ARP entries and the maximum value is changed to 30, the difference of 20 entries will not be deleted. If you re-specify a smaller value, we recommend that you use the `clear arp-cache` operation command to delete the ARP entries.

Related commands

`arp`

arp max-send-count

Specifies the maximum number of times an ARP request packet is sent.

Syntax

To set or change information:

```
arp max-send-count <count>
```

To delete information:

```
no arp max-send-count
```

Input mode

(config-if)

Parameters

<count>

Specifies the maximum number of times an ARP request packet is sent.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 10 (times)

Default behavior

The maximum number of times an ARP request packet is sent is set to 1.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

arp send-interval

Specifies the retry interval for sending an ARP request packet.

Syntax

To set or change information:
`arp send-interval <seconds>`

To delete information:
`no arp send-interval`

Input mode

(config-if)

Parameters

<seconds>

Specifies the retry interval for sending an ARP request packet.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
1 to 10 (seconds)

Default behavior

The retry interval for sending an ARP request packet is set to 2 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

arp timeout

Specifies the aging time for an ARP cache table.

Syntax

To set or change information:

```
arp timeout <seconds>
```

To delete information:

```
no arp timeout
```

Input mode

(config-if)

Parameters

<seconds>

Specifies the aging time for an ARP cache table.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

60 to 86400 (seconds)

Default behavior

14400 seconds (four hours) is set as the aging time for an ARP cache table.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

arp-limit

Specifies the maximum number of ARP entries for each VRF.

Syntax

To set or change information:

```
arp-limit <count>
```

To delete information:

```
no arp-limit
```

Input mode

(config-vrf)

Parameters

<count>

Specifies the maximum number of ARP entries for each VRF.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 2147483646

Default behavior

The number of ARP entries for each VRF is not limited. It must not exceed the capacity limit of the entire Device.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the number of ARP entries exceeds the maximum value set by the command, the next time an attempt is made to register an ARP entry, a warning system message is output. The new ARP entry is not registered until an old ARP entry in the VRF is deleted.
2. If the number of ARP entries has not reached the maximum value set by this command, but the capacity limit of the entire Device has been exceeded, a warning system message is also output. Then the new ARP entry is registered after an old ARP entry is deleted.
3. Static ARP entries have priority over dynamically-learned ARP entries, and can be registered beyond the maximum value specified by this command. If you register more static ARP entries than the maximum value specified by the command, dynamically-learned ARP entries cannot be registered for the VRF. Because the warning system message remains, we recommend against such registration.
4. Even if you use this command to re-specify a maximum value smaller than the current setting, the ARP entries that have been registered based on the previous maximum value are not deleted. For example, if the VRF has 50 ARP entries and you use the command to set the maximum value to 30, the difference of 20 entries is not deleted. If you re-specify a smaller value, we recommend that you use the `clear arp-cache` operation command to delete the ARP entries.

5. Static ARP entries are included in the number of learned IPv4 unicast route entries. Therefore, registration of static ARP entries in excess of the maximum number of IPv4 routes that the VRF can handle results in the following situation:

- A system warning message remains.
- If addition of routes is suppressed by the setting of the maximum number of IPv4 routes that the VRF can handle, IPv4 unicast routes are not registered.

We recommend that when operating the system, you ensure that the number of static ARP entries does not exceed the maximum number of IPv4 routes that the VRF can handle.

Related commands

```
arp
maximum routes (VRF)
```

ip address

Specifies the local IPv4 address.

Syntax

To set or change information:

```
ip address <ip address> <subnet mask> [directed-broadcast] [secondary]
```

To delete information:

```
no ip address <ip address>
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<ip address>

Specifies the local IPv4 address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

<subnet mask>

Specifies the subnet mask.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Subnet mask: 128.0.0.0 to 255.255.255.255 (bits must be contiguous)

directed-broadcast

Enables forwarding of subnet broadcast IPv4 packets.

Set this parameter for each local IPv4 address to specify whether broadcast IPv4 packets directed to a subnet can be forwarded to the local IPv4 address.

Use this parameter to determine whether to permit the forwarding of packets for each subnet.

If you set `no ip subnet-broadcast` for the input side of packet forwarding to prohibit the forwarding of subnet broadcast IPv4 packets, subnet broadcast IPv4 packets are not forwarded.

You cannot set this parameter for a management port.

1. Default value when this parameter is omitted:

Subnet broadcast IPv4 packets are not forwarded.

2. Range of values:

None

secondary

If you specify this parameter, the IPv4 address is set as a secondary address.

You cannot set this parameter for a management port.

1. Default value when this parameter is omitted:

The IPv4 address is set as a primary address. Even if a multihomed interface is in use, you need to specify one primary address.

2. Range of values:

None

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
interface mgmt
ip subnet-broadcast
```

ip conflict-detection

Specifies whether to use Address Conflict Detection.

If this functionality is enabled, it checks whether any other devices on the network are using the same address before the IPv4 address is put to use.

Syntax

To set information:

```
ip conflict-detection
```

To delete information:

```
no ip conflict-detection
```

Input mode

(config)

Parameters

None

Default behavior

Address Conflict Detection is not used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ip icmp rate-limit unreachable

Specifies the interval for sending an ICMP error message. You can separately specify the `df` parameter to set the interval for sending code 4 ICMP error messages (code 4 means that fragmentation is impossible because the DF flag has been set). You can also use this parameter to separately specify the interval for sending ICMP error messages for any other code.

Syntax

To set or change information:

```
ip icmp rate-limit unreachable [df] <milli seconds>
```

To delete information:

```
no ip icmp rate-limit unreachable [df]
```

Input mode

(config)

Parameters

`df`

Sets the interval for sending an ICMP code 4 error message.

1. Default value when this parameter is omitted:

The interval for sending ICMP error messages for codes other than code 4 is used.

2. Range of values:

None

<milli seconds>

Sets the minimum time between ICMP error messages. If you specify 0, the interval between the sending of ICMP error packets is not limited to the specified or default interval for the sending of error messages.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 2147483647 (milliseconds)

Default behavior

The default interval for sending any type of ICMP error message is set to 500 milliseconds.

However, keep the following in mind:

- If you set `ip icmp rate-limit unreachable` without setting `ip icmp rate-limit unreachable df`, the interval for sending an ICMP error message for code 4 is the same as the interval for sending error messages for other codes.
- If you set only `ip icmp rate-limit unreachable df`, the interval for sending an ICMP error message for codes other than code 4 is set to 500 milliseconds.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ip mtu

Specifies the MTU length of IP packets sent on the interface.

Syntax

To set or change information:

```
ip mtu <length>
```

To delete information:

```
no ip mtu
```

Input mode

```
(config-if)
```

Ethernet interface or port channel interface

```
(config-subif)
```

Ethernet subinterface or port channel subinterface

Parameters

<length>

Specifies the IP MTU length (the maximum length of an IP packet, excluding the MAC header) sent on the interface. In actual operation, this value is compared with the value obtained by subtracting 18 from the frame length specified in the port MTU setting, and then the smaller value is used as the IP MTU length of the interface.

For details about the frame length set in port MTU information, see *mtu* in the manual *Configuration Command Reference Vol. 1 For Version 12.1*.

Use the `show ip interface`, `show ipv6 interface`, or `show ip-dual interface` operation command to check the IP MTU length in use.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

128 to 9216 (bytes)

Default behavior

The frame length (bytes) set in the port MTU information is used as the IP MTU length. However, the upper limit is 9216.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. For the Ethernet IP MTU length, the frame length set in the port MTU information is compared with the IP MTU value, and the smaller value is used as the Ethernet IP MTU length. Therefore, to set a value larger than 1500 for the IP MTU length, in the port MTU information, check the `ip mtu` settings as well as the `mtu` settings.
2. This setting also takes effect for IPv6. For IPv6, the protocol specification defines that the MTU length must be 1280 or larger. Therefore, to use IPv6, do not specify a value smaller

than 1280 for the MTU length.

Related commands

`mtu`

ip proxy-arp

Proxy ARP replies are enabled.

Syntax

To set information:

```
ip proxy-arp enable
```

To delete information:

```
no ip proxy-arp
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

enable

Proxy ARP replies are enabled.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

Proxy ARP replies are disabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ip redirects

By using the `no ip redirects` command, suppresses forwarding of subnet broadcast IPv4 packets.

If a virtual interface of the VRRP is configured for the same interface and is in the Master state, ICMP Redirect messages are not sent, irrespective of how you specify this command.

Syntax

To set information:

```
no ip redirects
```

To delete information:

```
ip redirects
```

Input mode

(`config-if`)

Ethernet interface, port channel interface, or management port

(`config-subif`)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

ICMP Redirect messages are sent.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ip source-route

By using the `no ip source-route` command, suppresses forwarding of IPv4 packets that have the Source Route option specified.

Syntax

To set information:

```
no ip source-route
```

To delete information:

```
ip source-route
```

Input mode

(`config-if`)

Ethernet interface or port channel interface

(`config-subif`)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

IPv4 packets that have the Source Route option specified are forwarded.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ip subnet-broadcast

By using the `no ip subnet-broadcast` command, suppresses forwarding of subnet broadcast IPv4 packets.

Use this command to not forward, to the interface on which the packets were received, broadcast IPv4 packets that are addressed to a subnetwork of a network that is subject to management by the Device. There is no dependence on the broadcast address. If the `directed-broadcast` parameter of the `ip address` command is not set for the output-side IP address for packet forwarding, forwarding of subnet broadcast IPv4 packets is disabled.

Syntax

To set information:

```
no ip subnet-broadcast
```

To delete information:

```
ip subnet-broadcast
```

Input mode

```
(config-if)
```

Ethernet interface or port channel interface

```
(config-subif)
```

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

Subnet broadcast IPv4 packets are forwarded.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip address
```

vrf forwarding

Specifies the VRF for an interface.

Syntax

To set or change information:

```
vrf forwarding <vrf id>
```

To delete information:

```
no vrf forwarding
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrf id>

Specifies a VRF ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

See *Specifiable values for parameters*.

Default behavior

The interface belongs to the global network.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. You cannot change or delete the VRF ID for an interface for which an IPv4 address or IPv6 address has been set. You need to first delete the IPv4 address or IPv6 address, and then change or delete the VRF ID. This precaution also applies when you specify a VRF for an interface that does not have a VRF specification, which requires you to change the VRF from the global network. To delete the IPv6 address, you need to delete both the `ipv6 enable` command and the `ipv6 address` command.

Related commands

```
ip address  
ipv6 address  
ipv6 enable
```


Chapter

3. IPv6, NDP, and ICMPv6

- ipv6 address
- ipv6 enable
- ipv6 icmp error-interval
- ipv6 icmp nodeinfo-query
- ipv6 nd dynamic-limit
- ipv6 nd onlink-check
- ipv6 nd stale-time
- ipv6 nd warning-threshold
- ipv6 neighbor
- ipv6 redirects
- ipv6 source-route
- nd-limit
- vrf forwarding

ipv6 address

Specifies the local IPv6 address.

Syntax

To set or change information:

```
ipv6 address { <ipv6 address>[/<prefixlen>] | <ipv6 prefix>[/<prefixlen>] }
ipv6 address <ipv6 address> link-local
```

To delete information:

```
no ipv6 address { <ipv6 address>[/<prefixlen>] | <ipv6 prefix>[/<prefixlen>]
}
no ipv6 address <ipv6 address>
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<ipv6 address>

Specifies the local IPv6 address.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify an IPv6 global address or IPv6 link-local address in colon notation.

<ipv6 prefix>

Specifies the IPv6 prefix. Specify this parameter to automatically set the interface ID. To set the interface ID automatically, you must set the prefix length to 64.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify the prefix in the format of an IPv6 address that has all bits of the interface ID set to 0. Note that you cannot specify `fe80::0`.

/<prefixlen>

Specifies the prefix length.

1. Default value when this parameter is omitted:
64
2. Range of values:
1 to 128

link-local

Overwrites the link-local address that is automatically generated by the `ipv6 enable` command.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the IPv6 address of an interface that is configured to use router advertisements is changed, the interface resends the RA packets.

Related commands

`interface mgmt`

ipv6 enable

Specify this command when using IPv6 addresses.

This command automatically generates a link address.

Syntax

To set information:

`ipv6 enable`

To delete information:

`no ipv6 enable`

Input mode

`(config-if)`

Ethernet interface, port channel interface, or management port

`(config-subif)`

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

IPv6 addresses cannot be used.

Specify `ipv6 enable` to use IPv6 addresses.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`ipv6 address`

ipv6 icmp error-interval

Specifies the sending interval of ICMPv6 error messages.

Syntax

To set or change information:

```
ipv6 icmp error-interval <milli seconds>
```

To delete information:

```
no ipv6 icmp error-interval
```

Input mode

(config)

Parameters

<milli seconds>

Specifies (in milliseconds) the minimum time between ICMP error messages. If you specify 0, the interval between the sending of ICMP error packets is not limited to the specified or default interval for sending error messages.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 2147483647

Default behavior

The interval for sending ICMPv6 error messages is set to 100 milliseconds.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 icmp nodeinfo-query

Responds to queries from terminals.

Syntax

To set information:

```
ipv6 icmp nodeinfo-query
```

To delete information:

```
no ipv6 icmp nodeinfo-query
```

Input mode

(config)

Parameters

None

Default behavior

Does not respond to a query from a terminal.

Specify `ipv6 icmp nodeinfo-query` to respond to queries from terminals.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 nd dynamic-limit

Specifies the number of NDP entries that can be learned on the corresponding interface.

Syntax

To set or change information:

```
ipv6 nd dynamic-limit <count>
```

To delete information:

```
no ipv6 nd dynamic-limit
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<count>

Specifies the maximum number of NDP entries for each interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 2147483646

Default behavior

The number of entries is not limited on the corresponding interface.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the number of NDP entries exceeds the maximum value set by this command, a system warning message is output, and the NDP entry is not learned.
2. If the number of NDP entries has not reached the maximum value set by this command, but exceeds the capacity limit of the entire Device or the capacity limit of the VRF, a warning system message is also output. Then, the new NDP entry is not registered until an old NDP entry is deleted.
3. Static NDP entries have priority over dynamically-learned NDP entries, and can be registered beyond the maximum value specified by the command. However, we recommend against such registration.

If you set more static NDP entries than the maximum value specified by the command, dynamically-learned NDP entries cannot be registered on the corresponding interface. Further, the system warning message remains.
4. Even if you use the command to re-specify a maximum value that is smaller than the current

setting, the NDP entries that have been registered based on the previous maximum value are not deleted. For example, if there are 50 NDP entries and the maximum value is changed to 30, the difference of 20 entries is not deleted. If you re-specify a smaller value, we recommend that you use the `clear ipv6 neighbors` operation command to delete the NDP entries.

Related commands

`ipv6 neighbor`

ipv6 nd onlink-check

By using the `no ipv6 nd onlink-check` command, disables the consistency check for the prefix of the interface receiving NDP neighbor-search packets and the prefix of the source address of the packet. If this command is specified, neighbor-search packets whose prefixes are inconsistent are not discarded.

Syntax

To set information:

```
no ipv6 nd onlink-check
```

To delete information:

```
ipv6 nd onlink-check
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

The consistency of the prefixes is checked, and neighbor-search packets whose prefixes are inconsistent are discarded.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Neighbor solicitation packets, neighbor advertisement packets, and router solicitation packets are subject to the prefix-consistency check. However, if the source address of a router solicitation packet is an unspecified address, the packet is not checked.
2. When neighbor solicitation packets and router solicitation packets are discarded due to the prefix check, no reply is made to neighbor advertisement packets and router advertisement packets.

Related commands

None

ipv6 nd stale-time

Specifies the period of non-communication from when the validity time of the information about the reachability of neighboring nodes elapses to when such information is discarded.

Syntax

To set or change information:

```
ipv6 nd stale-time <milli seconds>
```

To delete information:

```
no ipv6 nd stale-time
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<milli seconds>

Specifies (in milliseconds) the period of time until information about the reachability of a neighboring node is discarded.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 in decimal.

Default behavior

After the state of non-communication continues for 600000 milliseconds (10 minutes) after the valid time elapses, the information is discarded.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 nd warning-threshold

Specifies threshold values for issuing system messages that notify that the number of NDP entries has exceeded or returned to a certain level for each interface.

Syntax

To set or change information:

```
ipv6 nd warning-threshold <higher> recover <lower>
```

To delete information:

```
no ipv6 nd warning-threshold
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<higher>

Specifies the threshold value for when a system message that notifies that the number of entries has exceeded a certain level is issued.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 2147483646

recover <lower>

Specifies the threshold value for when a system message that notifies that the number of entries has recovered to a certain level is issued.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 2147483646

Default behavior

Warnings regarding the number of NDP entries are not made for the interface.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. For the threshold specified by this command, set a value that is smaller than the value specified by the `ipv6 nd dynamic-limit` command. Setting a larger value causes NDP entries to be deleted before the threshold specified by this command is reached, so no related

system message is issued.

2. If the number of NDP entries is returned to a normal state through NDP entries being deleted because of the interface going down, no system message about the solution is issued. (This is an exceptional case.)

Related commands

`ipv6 nd dynamic-limit`

ipv6 neighbor

Creates a static NDP table. If a product that does not support NDP is connected, an IPv6 address cannot be converted to a physical address. You need to create a static NDP table in advance.

Syntax

To set or change information:

```
ipv6 neighbor <ipv6 address> interface <interface type> <interface number>
<mac address> [proxy]
```

To delete information:

```
no ipv6 neighbor <ipv6 address> [interface <interface type> <interface
number>]
```

Input mode

(config)

Parameters

<ipv6 address>

Specifies a next-hop IPv6 address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

<interface type> <interface number>

Specifies the interface for which static NDP will be set.

1. Default value when this parameter is omitted:

To set or change information:

This parameter cannot be omitted.

To delete information:

This parameter cannot be omitted if there are multiple static NDP entries that have the same next-hop IPv6 address.

2. Range of values:

For *<interface type>* and *<interface number>*, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

- * Ethernet interface
- * Ethernet subinterface
- * Port channel interface
- * Port channel subinterface

<mac address>

Specifies the destination MAC address (in a canonical format).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0000.0000.0000 to feff.ffff.ffff

Note, however, that a multicast MAC address (address whose first-byte lower bit is set to 1) cannot be set.

proxy

Uses the specified next-hop IPv6 address as Proxy NDP.

1. Default value when this parameter is omitted:

The specified next-hop IPv6 address is not used as Proxy NDP.

2. Range of values:

None

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

maximum routes

ipv6 redirects

By using the `no ipv6 redirects` command, suppresses forwarding of the ICMPv6 Redirect messages. If a virtual interface of the VRRP is configured for the same interface and in the Master state, ICMP Redirect messages are not sent irrespective of how this command is specified.

Syntax

To set information:

```
no ipv6 redirects
```

To delete information:

```
ipv6 redirects
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

ICMPv6 Redirect messages are sent.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 source-route

Enables packet processing for IPv6 routing header type 0.

Syntax

To set information:

```
ipv6 source-route
```

To delete information:

```
no ipv6 source-route
```

Input mode

(config)

Parameters

None

Default behavior

Discards IPv6 routing header type 0 packets sent to the Device.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. This command is effective only for IPv6 packets sent to the Device. If a routing header is added to IPv6 packets to be forwarded, the packets will be forwarded regardless of whether this command is set.

Related commands

None

nd-limit

Specifies the maximum number of NDP entries for a VRF.

Syntax

To set or change information:

```
nd-limit <count>
```

To delete information:

```
no nd-limit
```

Input mode

(config-vrf)

Parameters

<count>

Specifies the maximum number of NDP entries for each VRF.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 2147483646

Default behavior

The number of NDP entries for each VRF is not limited. It must not exceed the capacity limit of the entire Device.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the number of NDP entries exceeds the maximum value set by this command, the next time an NDP entry is registered, a warning system message is output. The new NDP entry is not registered until an old NDP entry in the VRF is deleted.
2. If the number of NDP entries has not reached the maximum value set by the command, but exceeds the capacity limit of the entire Device, a warning system message is output. Then, the new NDP entry is not registered until an old NDP entry is deleted.
3. Static NDP entries have priority over dynamically-learned NDP entries, and can be registered beyond the maximum value specified by the command. If you register more static NDP entries than the maximum value specified by the command, dynamically-learned NDP entries cannot be registered for the VRF. Because the warning system message remains, we recommend against such registration.
4. Even if you use the command to re-specify a maximum value smaller than the current setting, the NDP entries that have been registered based on the previous maximum value are not deleted. For example, if the VRF has 50 NDP entries and you use the command to set the maximum value to 30, the difference of 20 entries is not deleted. If you re-specify a smaller value, we recommend that you use the `clear ipv6 neighbor` operation command to delete the NDP entries.

5. Static NDP entries are included in the number of learned IPv6 unicast route entries. If addition of routes is suppressed by the setting of the maximum number of routes, and if the number of registered static NDP entries exceeds the maximum number of IPv6 routes that the VRF can handle, IPv6 unicast routes cannot be registered. Because the warning system message remains, we recommend against such registration.

Related commands

```
ipv6 neighbor  
maximum routes
```

vrf forwarding

See 2. *IPv4, ARP, and ICMP vrf forwarding.*

Chapter

4. Loopback Interface

- interface loopback
- ip address (loopback)
- ipv6 address (loopback)
- vrf forwarding (loopback)

interface loopback

Moves to the loopback interface level.

Syntax

To set information:

```
interface loopback 0
interface loopback <loopback id>
```

To delete information:

```
no interface loopback 0
no interface loopback <loopback id>
```

Input mode

(config)

Parameters

0

Specifies a loopback interface for the global network.

In this case, you cannot specify a VRF ID by using the `vrf forwarding` command.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

<loopback id>

Specifies a loopback interface ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 1024

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip address
ipv6 address
vrf forwarding (loopback)
```

ip address (loopback)

Specifies an IP address for a loopback interface.

Syntax

To set or change information:
`ip address <ip address>`

To delete information:
`no ip address`

Input mode

(config-if)

Loopback interface

Parameters

<ip address>

Specifies an IPv4 address for a loopback interface. You can specify only one IPv4 address. Even if you specify multiple addresses, only the last specified address is applied.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If a value other than 0 is specified for the `interface loopback` command, you need to specify a VRF ID by using the `vrf forwarding (loopback)` command before you specify an IP address in this command.

Related commands

`interface loopback`
`vrf forwarding (loopback)`

ipv6 address (loopback)

Specifies an IPv6 address for a loopback interface.

You can specify this command regardless of the `ipv6 enable` command setting.

Syntax

To set or change information:

```
ipv6 address <ipv6 address>
```

To delete information:

```
no ipv6 address
```

Input mode

(config-if)

Loopback interface

Parameters

<ipv6 address>

Specifies an IPv6 address for a loopback interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv6 global address in colon notation. You can specify only one IPv6 address. Even if you specify multiple addresses, only the last specified address is applied. An IPv6 link-local address cannot be specified.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. To set an IPv6 address with this command when a value other than 0 is specified for the `interface loopback` command, you need to specify a VRF ID by using the `vrf forwarding` command.

Related commands

```
interface loopback  
vrf forwarding
```

vrf forwarding (loopback)

Specifies the VRF for the loopback interface.

Syntax

To set or change information:
`vrf forwarding <vrf id>`

To delete information:
`no vrf forwarding`

Input mode

(config-if)
 Loopback interface

Parameters

<vrf id>

Specifies a VRF ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

See *Specifiable values for parameters*.

Default behavior

If a value other than 0 is specified for the loopback interface ID, this command must be specified.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If you specify 0 in the `interface loopback` command, then you cannot specify a VRF ID by using this command. If you specify a value other than 0, you need to specify a VRF ID in this command.
2. You cannot change or delete the VRF ID for a loopback interface for which an IPv4 address or IPv6 address has been set. You need to first delete the IPv4 address or IPv6 address, and then change or delete the VRF ID.
3. Only one loopback interface can belong to a VRF. Therefore, a VRF ID that has already been specified for another loopback interface cannot be specified in this command.

Related commands

`interface loopback`

Chapter

5. VRF

```
import inter-vrf
import multicast inter-vrf
ipv6 import inter-vrf
ipv6 import multicast inter-vrf
ipv6 maximum routes
maximum routes
vrf definition
```

import inter-vrf

Applies a filter to control which IPv4 routes are imported from another VRF or global network.

Syntax

To set or change information:

```
import inter-vrf <route map>
```

To delete information:

```
no import inter-vrf
```

Input mode

(config-vrf)

Parameters

<route map>

Specifies the route-map that applies the filter criteria.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

IPv4 routes are not imported from another VRF or global network.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

route-map

import multicast inter-vrf

Applies a filter to control which multicast routes are imported from another VRF or global network.

Syntax

To set or change information:

```
import multicast inter-vrf <route map>
```

To delete information:

```
no import multicast inter-vrf
```

Input mode

(config-vrf)

Parameters

<route map>

Specifies the route-map that applies the filter criteria.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Multicast routes are not imported from another VRF or global network.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Only `permit` can be used for the specified route-map.
2. The route-map can use only the `match ip address` command (with `access-list` specified) and the `match vrf` command.
3. If the route-map referenced by this command is not set, you can request forwarding from another VRF or global network.

To prevent multicast forwarding to unwanted VRFs or the global network, always set the `route-map` parameter first, and then set the `import multicast inter-vrf` command.
4. For <access list name> specified by the `match ip address` command, only the access list specified by the `ip access-list standard` command applies.
5. If the access list specified by <access list name> of `access-list` of the `match ip address` command is not specified, the default value (224.0.0.0/4) is used.
6. If you specify a wildcard mask for the access list, specify the mask as a bit string that has consecutive bits set, starting from the most significant bit.

Related commands

```
match ip address  
match vrf  
route-map
```

ipv6 import inter-vrf

Applies a filter to control which IPv6 routes are imported from another VRF or global network.

Syntax

To set or change information:

```
ipv6 import inter-vrf <route map>
```

To delete information:

```
no ipv6 import inter-vrf
```

Input mode

(config-vrf)

Parameters

<route map>

Specifies the route-map that applies the filter criteria.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

IPv6 routes are not imported from another VRF or global network.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

route-map

ipv6 import multicast inter-vrf

Applies a filter to control which multicast routes are imported from another VRF or global network.

Syntax

To set or change information:

```
ipv6 import multicast inter-vrf <route map>
```

To delete information:

```
no ipv6 import multicast inter-vrf
```

Input mode

(config-vrf)

Parameters

<route map>

Specifies the route-map that applies the filter criteria.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Multicast routes are not imported from another VRF or global network.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Only `permit` can be used for the specified route-map.
2. The specified route-map can use only the `match ipv6 address` command (with `access-list` specified) and the `match vrf` command.
3. If the route-map referenced by this command is not set, you can request forwarding from another VRF or global network.

To prevent multicast forwarding to unwanted VRFs or the global network, always set the `route-map` parameter first, and then set the `ipv6 import multicast inter-vrf` command.

4. For access-list of the `match ipv6 address` command, you can use only an access list specified by the following command:

- `ipv6 access-list` command

For details, see 2. *Access Lists* in the manual *Configuration Command Reference Vol. 2 For Version 12.1*.

5. For the address specified in <access list name> of the access-list of the `match ipv6 address` command, specify the source IPv6 address of the access list.

6. If the access list specified by *<access list name>* of the access-list of the `match ipv6 address` command is not specified, the default value (`ff00::/8`) is used.

Related commands

```
ipv6 access-list  
match ipv6 address  
match vrf  
route-map
```

ipv6 maximum routes

Specifies the maximum number of IPv6 routes that can the corresponding VRF can accommodate.

Syntax

To set or change information:

```
ipv6 maximum routes <limit> {<warn threshold> | warn-only}
```

To delete information:

```
no ipv6 maximum routes
```

Input mode

(config-vrf)

Parameters

<limit>

Specifies the maximum number of IPv6 routes.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 4294967295 (in decimal)

{<warn threshold> | warn-only}

<warn threshold>

Specifies the threshold (in percent) for outputting a system message.

When the proportion of the number of routes learned by the corresponding VRF to the maximum number of routes exceeds this threshold, a system message is output.

Additionally, when this parameter is specified, if the number of routes learned by the corresponding VRF exceeds the maximum number of routes specified for <limit>, the device suppresses addition of subsequently-learned routes.

warn-only

When the number of routes learned at the corresponding VRF exceeds the specified maximum number of routes, a system message is output, but the addition of routes is not stopped.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <warn threshold>, specify a value from 1 to 100 (in decimal).

Default behavior

There is no limit on the maximum number of IPv6 routes in the corresponding VRF.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Note that, when you change the *<limit>* to a smaller value after specifying *<warn threshold>*, if the number of routes learned at that point already exceeds the maximum number of routes after the change, the number of routes is not immediately reduced to the *<limit>* value.

To forcibly reduce the number of routes to the *<limit>* value, execute the `clear ipv6 route [vrf <vrf id>] *` operation command.

Notes

1. The following routes are also included in the number of learned routes.
 - Static NDP
 - Link local routes (2 routes: the network route and the own-address route)
 - Internally-generated routes (2 routes in the case of the global network, and 4 routes in the case of VRF)

Related commands

None

maximum routes

Specifies the maximum number of IPv4 routes that the corresponding VRF can accommodate.

Syntax

To set or change information:

```
maximum routes <limit> {<warn threshold> | warn-only}
```

To delete information:

```
no maximum routes
```

Input mode

(config-vrf)

Parameters

<limit>

Specifies the maximum number of IPv4 routes.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 4294967295 (in decimal)

{<warn threshold> | warn-only}

<warn threshold>

Specifies the threshold (in percent) for outputting a system message.

When the proportion of the number of routes learned by the corresponding VRF to the maximum number of routes exceeds this threshold, a system message is output.

Additionally, when this parameter is specified, if the number of routes learned by the corresponding VRF exceeds the maximum number of routes specified for <limit>, the device suppresses subsequently learned routes to be added.

warn-only

When the number of routes learned at the corresponding VRF exceeds the specified maximum number of routes, a system message is output, but the addition of routes is not stopped.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <warn threshold>, specify a value from 1 to 100 (in decimal).

Default behavior

There is no limit on the maximum number of IPv4 routes in the corresponding VRF.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Note that, when you change the *<limit>* to a smaller value after specifying *<warn threshold>*, if the number of routes learned at that point already exceeds the maximum number of routes after the change, the number of routes is not immediately reduced to the *<limit>* value.

To forcibly reduce the number of routes to the *<limit>* value, execute the `clear ip route [vrf <vrfid>] *` operation command.

Notes

1. The following routes are also included in the number of learned routes.
 - Static ARP
 - Internally-generated routes (5 routes in the case of the global network, and 6 routes in the case of VRF)

Related commands

None

vrf definition

Configures VRF-related operation information.

After this command is entered, the mode changes to `config-vrf` mode.

Syntax

To set information:

```
vrf definition {<vrf id> | global}
```

To delete information:

```
no vrf definition {<vrf id> | global}
```

Input mode

(config)

Parameters

{<vrf id> | global}

Sets VRF or global network operation information.

<vrf id>

Sets operation information for a specified VRF.

global

Sets global network operation information.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <vrf id>, specify a VRF ID.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

vrf forwarding

Chapter

6. Null Interface

interface null

interface null

Enables the null interface.

Syntax

To set information:

```
interface null 0
```

To delete information:

```
no interface null 0
```

Input mode

(config)

Parameters

None

Default behavior

The null interface is disabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Configuring (enabling) the null interface does not count towards the capacity limit (maximum number of interfaces).

Related commands

```
ip route  
ipv6 route
```


Chapter

7. uRPF

```
ip urpf  
ip verify unicast source reachable-via  
ipv6 verify unicast source reachable-via
```

ip urpf

Performs uRPF functions.

Syntax

To set information:

```
ip urpf [allow-default-v4] [allow-default-v6]
[except-unspecified-address-v4] [except-unspecified-address-v6]
```

To delete information:

```
no ip urpf
```

Input mode

(config)

Parameters

allow-default-v4

Sets the default route for route searching in an IPv4 uRPF (Strict mode). When no default route is set for route searching, if a packet matches the default route, the packet is regarded as having no matching route, and is discarded.

1. Default value when this parameter is omitted:
The default route is not subject to route searching.
2. Range of values:
None

allow-default-v6

Sets the default route for route searching in an IPv6 uRPF (Strict mode). When no default route is set for route searching, if a packet matches the default route, the packet is regarded as having no matching route, and is discarded.

1. Default value when this parameter is omitted:
The default route is not subject to route searching.
2. Range of values:
None

except-unspecified-address-v4

uRPF inspection is not performed on IPv4 packets for which the source IPv4 address is an unspecified address (0.0.0.0).

1. Default value when this parameter is omitted:
uRPF inspection is performed on IPv4 packets for which the source IP address is an unspecified address (0.0.0.0).
2. Range of values:
None

except-unspecified-address-v6

uRPF inspection is not performed on IPv6 packets for which the source IPv6 address is an unspecified address (: :).

1. Default value when this parameter is omitted:
uRPF inspection is performed on IPv6 packets for which the source IPv6 address is an

unspecified address (: :).

2. Range of values:

None

Default behavior

The uRPF functionality cannot be used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. This setting also takes effect for IPv6.
2. If this setting is deleted, all the uRPF statistics of the Device are cleared to 0.
3. In the `maximum-paths` command, if 9 or more is set as the number of multipaths, you cannot set this command. Before setting this command, change the number of multipaths to 8 or less.

When you change the number of multipaths from 9 or more to 8 or less, a certain amount of time is necessary for the routing information to be applied in the hardware, and during that time, the uRPF might not operate properly. Therefore, if you change the number of multipaths from 9 or more to 8 or less, we recommend that you restart the Device before setting this command.

4. Use the `allow-default-v4` parameter and the `allow-default-v6` parameter of this command in Strict mode. If you use these parameters in Loose mode, even if the route corresponds to a default route in the uRPF route search, the packet is discarded in the same way as when no routing information exists.

If you use a uRPF that targets default routes in Loose mode, use the following static routes as default routes.

For an IPv4 uRPF:

Static route 0.0.0.0/1 and static route 128.0.0.0/1

For an IPv6 uRPF:

Static route ::/1 and static route 8000::/1

Related commands

```
ip verify unicast source reachable-via
ipv6 verify unicast source reachable-via
ip route static maximum-paths
maximum-paths (OSPF/OSPFv3)
maximum-paths (BGP4/BGP4+)
ipv6 route static maximum-paths
```

ip verify unicast source reachable-via

Performs IPv4 uRPF.

Syntax

To set information:

```
ip verify unicast source reachable-via { rx | any }
```

To delete information:

```
no ip verify unicast source reachable-via
```

Input mode

(config-if)
(config-subif)

Parameters

{ rx | any }

Sets the uRPF operating mode.

rx

Strict mode

any

Loose mode

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

IPv4 uRPF is not performed.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. This command is valid only if the `ip urpf` command is set.
2. If the `ipv6 verify unicast source reachable-via` command is already set on the same interface, you cannot change the operating mode.
3. You can set this command for the following IPv4 or IPv6 interfaces:
 - Ethernet interface and port channel interface
 - Ethernet subinterface and port channel subinterface

However, you cannot set this command for a management port or AUX port.

Related commands

```
ip urpf
ipv6 verify unicast source reachable-via
```

ipv6 verify unicast source reachable-via

Performs IPv6 uRPF.

Syntax

To set information:

```
ipv6 verify unicast source reachable-via { rx | any }
```

To delete information:

```
no ipv6 verify unicast source reachable-via
```

Input mode

```
(config-if)
(config-subif)
```

Parameters

```
{ rx | any }
```

Sets the uRPF operating mode.

```
rx
```

Strict mode

```
any
```

Loose mode

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

IPv6 uRPF is not performed.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. This command is valid only if the `ip urpf` command is set.
2. If the `ip verify unicast source reachable-via` command is already set on the same interface, you cannot change the operating mode.
3. You can set this command for the following IPv4 or IPv6 interfaces:
 - Ethernet interface and port channel interface
 - Ethernet subinterface and port channel subinterface

However, you cannot set this command for a management port or AUX port.

Related commands

```
ip urpf
ip verify unicast source reachable-via
```


Chapter

8. Policy-based Routing

default
ip policy-list
ip policy-list rearrange
ipv6 policy-list
ipv6 policy-list rearrange
policy-based-routing suspend-update
policy-interface

default

Specifies the default operation for the case where none of the next-hops in the policy-based routing list can be forwarded, and for the case where next-hops are not set in the policy-based routing list.

If this command is set in the `config-ip-pbr` mode, it applies to the specified IPv4 policy-based routing list.

If this command is set in the `config-ipv6-pbr` mode, it applies to the specified IPv6 policy-based routing list.

Syntax

To set or change information:

```
default {permit | deny}
```

To delete information:

```
no default
```

Input mode

```
(config-ip-pbr)
```

```
(config-ipv6-pbr)
```

Parameters

```
{permit | deny}
```

Specifies default operation for target policy-based routing lists.

permit

The target packet is forwarded according to the routing protocol.

deny

The target packet is discarded.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The target packet is forwarded according to the routing protocol.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip policy-list
```

```
ipv6 policy-list
```

ip policy-list

Sets IPv4 policy-based routing lists.

Syntax

To set information:

```
ip policy-list <policy list name>
```

To delete information:

```
no ip policy-list <policy list name>
```

Input mode

(config)

Parameters

<policy list name>

Specifies policy-based routing list names for IPv4 policy-based routing lists.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specifies the policy-based routing list name with 31 or fewer characters.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. You can delete IPv4 policy-based routing lists if they are not being applied to access lists.

Related commands

```
permit (advance access-list)
permit (ip access-list extended)
policy-interface
default
ip policy-list rearrange
```

ip policy-list rearrange

Resets the priority of next-hops set in the IPv4 policy-based routing list to equal intervals.

Syntax

To change information:

```
ip policy-list rearrange <policy list name> [<starting priority> [<increment
priority>]]
```

Input mode

(config)

Parameters

<policy list name>

Specifies policy-based routing list names for IPv4 policy-based routing lists.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify the policy-based routing list name by using 31 or fewer characters.

For details, see *Specifiable values for parameters*.

<starting priority>

Specifies the priority to be assigned to the highest-priority next-hop.

The first next-hop in the IPv4 policy-based routing list is set.

1. Default value when this parameter is omitted:

10 (in decimal)

2. Range of values:

1 to 4294967294 (in decimal)

<increment priority>

Specifies the interval for the priority to be assigned to the next-hop.

The second and subsequent next-hops in the IPv4 policy-based routing list are set. Resets the priority by incrementing the value specified in *<increment priority>*, starting from the value specified in *<starting priority>*.

1. Default value when this parameter is omitted:

10 (in decimal)

2. Range of values:

1 to 100 (in decimal)

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Make the setting so that the post-reset priority of the second and subsequent next-hops in the IPv4 policy-based routing list is 4294967294 or less.

Related commands

```
ip policy-list  
policy-interface
```

ipv6 policy-list

Sets IPv6 policy-based routing lists.

Syntax

To set information:

```
ipv6 policy-list <policy list name>
```

To delete information:

```
no ipv6 policy-list <policy list name>
```

Input mode

(config)

Parameters

<policy list name>

Specifies policy-based routing list names for IPv6 policy-based routing lists.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify the policy-based routing list name by using 31 or fewer characters.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. You can delete IPv6 policy-based routing lists if they are not being applied to access lists.

Related commands

```
permit (advance access-list)
permit (ipv6 access-list)
policy-interface
default
ipv6 policy-list rearrange
```

ipv6 policy-list rearrange

Resets the priority of next-hops set in the IPv6 policy-based routing list to equal intervals.

Syntax

To change information:

```
ipv6 policy-list rearrange <policy list name> [<starting priority>
[<increment priority>]]
```

Input mode

(config)

Parameters

<policy list name>

Specifies policy-based routing list names for IPv6 policy-based routing lists.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify the policy-based routing list name by using 31 or fewer characters.
For details, see *Specifiable values for parameters*.

<starting priority>

Specifies the priority to be assigned to the highest-priority next-hop.

The first next-hop in the IPv6 policy-based routing list is set.

1. Default value when this parameter is omitted:
10 (in decimal)
2. Range of values:
1 to 4294967294 (in decimal)

<increment priority>

Specifies the interval for the priority to be assigned to the next-hop.

The second and subsequent next-hops in the IPv6 policy-based routing list are set. Resets the priority by incrementing the value specified in *<increment priority>*, starting from the value specified in *<starting priority>*.

1. Default value when this parameter is omitted:
10 (in decimal)
2. Range of values:
1 to 100 (in decimal)

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Make the setting so that the post-reset priority of the second and subsequent next-hops in the IPv6 policy-based routing list is 4294967294 or less.

Related commands

```
ipv6 policy-list  
policy-interface
```

policy-based-routing suspend-update

Sets the period of time for suppressing the selection of next-hops in policy-based routing.

Syntax

To set or change information:

```
policy-based-routing suspend-update switch-over <seconds>
```

To delete information:

```
no policy-based-routing suspend-update
```

Input mode

(config)

Parameters

switch-over

Specifies next-hop selection suppression after a BSU switchover.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

<seconds>

Specifies (in seconds) the period of time for suppressing next-hop selection.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 3600 (in decimal)

Default behavior

The period of time for suppressing next-hop selection is set to 200 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. When next-hop selection is being suppressed, if the period of time is changed by using this configuration command, the suppression period will be updated to the new suppression period.

Related commands

```
ip policy-list
ipv6 policy-list
```

policy-interface

Sets the next hop in the policy-based routing list

If you set the command in `config-ip-pbr` mode, the setting applies to the specified IPv4 policy-based routing list.

If you set the command in `config-ipv6-pbr` mode, the setting applies to the specified IPv6 policy-based routing list.

Syntax

To set or change information:

For `config-ip-pbr` mode:

```
[<priority>] policy-interface <interface type> <interface number>
next-hop <ip address>
```

For `config-ipv6-pbr` mode:

```
[<priority>] policy-interface <interface type> <interface number>
next-hop <ipv6 address>
```

To delete information:

```
no <priority>
```

Input mode

```
(config-ip-pbr)
(config-ipv6-pbr)
```

Parameters

<priority>

Specifies the priority of next-hops set for the policy-based routing list. The lower the value, the higher the priority.

1. Default value when this parameter is omitted:

If no next-hops for policy-based routing exist, the value is 10.

If the next-hop setting is configured, the value is the maximum value for the specified priority, plus 10.

Note, however, that if the maximum value that was set for the priority is greater than 4294967284, the value cannot be omitted.

2. Range of values:

1 to 4294967294 (in decimal)

<interface type> <interface number>

Specifies the destination interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<interface type>* and *<interface number>*, you can specify interface names and numbers that correspond to the following interface type groups.

For details, see *How to specify an interface* in *Specifiable values for parameters*.

* Ethernet interface

- * Ethernet subinterface
- * Port channel interface
- * Port channel subinterface

`next-hop <ip address>`

Specifies a next-hop address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

Specify the host address of a network that is connected to the specified destination interface. Note that you cannot specify direct broadcast to a network that is connected to a specified destination interface.

`next-hop <ipv6 address>`

Specifies a next-hop address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv6 address.

Specify the host address of a network that is connected to the specified destination interface.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Before setting this command, set the interface and IP address that correspond to the next-hop.
2. If you change the settings of the interface and IP address that correspond to the next-hop and that were set by this command, delete or change the settings of this command first.

Related commands

```
interface port-channel
interface gigabitethernet
interface tengigabitethernet
interface hundredgigabitethernet
ip policy-list
ip policy-list rearrange
ipv6 policy-list
ipv6 policy-list rearrange
```


Chapter

9. RA

ipv6 hop-limit
ipv6 nd link-mtu
ipv6 nd managed-config-flag
ipv6 nd no-advertise-link-address
ipv6 nd ns-interval
ipv6 nd other-config-flag
ipv6 nd prefix
ipv6 nd ra-interval
ipv6 nd ra-lifetime
ipv6 nd reachable-time
ipv6 nd router-preference
ipv6 nd suppress-ra

ipv6 hop-limit

Specifies the initial value for the hop limit used by terminals that receive router advertisements when they send packets.

Syntax

To set or change information:

```
ipv6 hop-limit <hop limit>
```

To delete information:

```
no ipv6 hop-limit
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<hop limit>

Specifies the hop limit.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 255 in decimal.

Default behavior

The initial value is set to 64.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 nd link-mtu

Specifies the MTU value of the link-mtu information to be sent in router advertisements. If the specified value exceeds the MTU length of the relevant interface, router advertisements are not forwarded through the interface.

Syntax

To set or change information:
`ipv6 nd link-mtu <mtu>`

To delete information:
`no ipv6 nd link-mtu`

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<mtu>

Specifies the MTU value.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 0 or 1280 to 9216 in decimal.

Default behavior

The MTU length of the relevant interface is used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`mtu`

ipv6 nd managed-config-flag

Sets a flag in router advertisements that tells terminals to perform address auto-configuration by using a method such as DHCPv6 rather than using router advertisements. Address auto-configuration by router advertisements is performed regardless of whether this flag is set.

Syntax

To set information:

```
ipv6 nd managed-config-flag
```

To delete information:

```
no ipv6 nd managed-config-flag
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

Does not set a flag in router advertisements that tells terminals to perform address auto-configuration by using a method such as DHCPv6 rather than using router advertisements.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 nd other-config-flag
```

ipv6 nd no-advertise-link-address

Prohibits the link-layer addresses associated with the IP addresses of routers from being included in router advertisements.

Syntax

To set information:

```
ipv6 nd no-advertise-link-address
```

To delete information:

```
no ipv6 nd no-advertise-link-address
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

The link-layer addresses associated with the IP addresses of routers are included in router advertisements.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 nd ns-interval

Sets the interval for sending control packets, during communication, that are used by terminals that receive router advertisements to check the reachability of neighboring nodes.

Syntax

To set or change information:

```
ipv6 nd ns-interval <milli seconds>
```

To delete information:

```
no ipv6 nd ns-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<milli seconds>

Sets the interval (milliseconds) for sending control packets used to check the reachability.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 or 1000 to 4294967295 in decimal.

Default behavior

The initial value is set to 0 (no control packets are sent).

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 nd ra-interval
ipv6 nd ra-lifetime
ipv6 nd reachable-time
```

ipv6 nd other-config-flag

Sets a flag that allows terminals to automatically obtain information other than IPv6 addresses by using methods other than router advertisements.

Syntax

To set information:

```
ipv6 nd other-config-flag
```

To delete information:

```
no ipv6 nd other-config-flag
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

Does not set a flag in router advertisements that allows terminals to automatically obtain information other than IPv6 addresses by using methods other than router advertisements.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 nd managed-config-flag
```

ipv6 nd prefix

Specifies the IPv6 prefix or information related to the prefix to be sent in router advertisements.

You can set a maximum of seven entries per interface.

Syntax

To set or change information:

```
ipv6 nd prefix <ipv6 prefix>/<prefixlen> [{<valid lifetime> | infinite}
{<preferred lifetime> | infinite}] [off-link] [no-autoconfig]
ipv6 nd prefix <ipv6 prefix>/<prefixlen> no-advertise
```

To delete information:

```
no ipv6 nd prefix <ipv6 prefix>/<prefixlen>
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<ipv6 prefix>

Sets the IPv6 prefix to be sent in router advertisements.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify the IPv6 global prefix.

Note: Set to 0 all the bits that follow the bits specified for *<prefixlen>* of *<ipv6 prefix>*.

<prefixlen>

Specifies the prefix length.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 128 in decimal. Usually, specify 64.

no-advertise

Prevents the prefix information from being sent.

1. Default value when this parameter is omitted:

Sends the prefix information.

2. Range of values:

None

{<valid lifetime> | infinite}

Specifies the value (in seconds) of the valid address lifetime (expiration time of the advertised prefix information) to be sent by router advertisement.

Specifying *infinite* has the same meaning as specifying 4294967295 in decimal for *<valid lifetime>*.

1. Default value when this parameter is omitted:

2592000 (30 days)

2. Range of values:

For *<valid lifetime>*, specify in decimal either 0 or a value in the range from the maximum advertisement interval to 4294967295.

Note: Use the `ipv6 nd ra-interval` command to specify the maximum advertisement interval.

{*<preferred lifetime>* | *infinite*}

Specifies the value (in seconds) of the recommended address lifetime (time elapsed before the advertised prefix information is no longer used for communication) to be sent by router advertisement.

Specifying *infinite* has the same meaning as specifying 4294967295 in decimal for *<preferred lifetime>*.

1. Default value when this parameter is omitted:

604800 (7 days)

2. Range of values:

For *<preferred lifetime>*, specify in decimal either 0 or a value in the range from the maximum advertisement interval to 4294967295.

Furthermore, specify a value for *<preferred lifetime>* that is equal to or less than *<valid lifetime>*. If the value specified for *<valid lifetime>* is greater than the *<preferred lifetime>* value, the preferred address lifetime value sent by router advertisements is the same as the *<valid lifetime>* value.

Note: Use the `ipv6 nd ra-interval` command to specify the maximum advertisement interval.

off-link

Specifies that the prefix sent by router advertisement does not exist in the same link.

1. Default value when this parameter is omitted:

Specifies that the prefix exists in the link.

2. Range of values:

None

no-autoconfig

Does not set a flag for using prefix information sent by router advertisement. Unless this flag is set, terminals that received router advertisements do not use prefix information. Usually, do not set this parameter.

1. Default value when this parameter is omitted:

A flag for using prefix information is set.

2. Range of values:

None

Default behavior

The following initial values are set.

- IPv6 prefix = relevant interface prefix

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`ipv6 nd ra-interval`

ipv6 nd ra-interval

Specifies the minimum and maximum intervals for sending router advertisements.

Actual router advertisements will be sent at a variable interval in the range between the minimum and maximum intervals you specified.

Syntax

To set or change information:

```
ipv6 nd ra-interval <min interval> <max interval>
```

To delete information:

```
no ipv6 nd ra-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<min interval>

Specifies the minimum interval (in seconds) for sending router advertisements.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 3 to 1350 in decimal.

Note: For *<min interval>*, specify a value that is equal to or less than (*<max interval>* × 0.75). If the specified value is greater than (*<max interval>* × 0.75), an error occurs.

<max interval>

Specifies the maximum interval (in seconds) for sending router advertisements.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 4 to 1800 in decimal.

Default behavior

The following initial values are set.

- Minimum interval: 200 seconds
- Maximum interval: 600 seconds

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 nd ra-lifetime  
ipv6 nd reachable-time  
ipv6 nd ns-interval
```

ipv6 nd ra-lifetime

Specifies the lifetime of the default route for terminals set by router advertisements.

Syntax

To set or change information:

```
ipv6 nd ra-lifetime <seconds>
```

To delete information:

```
no ipv6 nd ra-lifetime
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Specifies the lifetime (in seconds) of the default route for terminals set by router advertisements.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify, in decimal, either 0 or a value in the range from the maximum advertisement interval to 9000.

Note: Use the `ipv6 nd ra-interval` command to specify the maximum advertisement interval.

Default behavior

The initial value is set to 1800 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 nd ra-interval
ipv6 nd reachable-time
ipv6 nd ns-interval
```

ipv6 nd reachable-time

Specifies how long terminals receive router advertisements should consider that a neighboring node is reachable after they have confirmed reachability when they send packets.

Specifying a larger value reduces the number of inquiries for the reachability of neighboring nodes, but increases the possibility that the reachability information stored in terminals is different from the actual reachability.

Syntax

To set or change information:

```
ipv6 nd reachable-time <milli seconds>
```

To delete information:

```
no ipv6 nd reachable-time
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<milli seconds>

Specifies the validity time (milliseconds) of information about the reachability of a neighboring node.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 in decimal.

Default behavior

The initial value is set to 0 (the reachability of a neighboring node is uncertain).

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 nd ra-interval
ipv6 nd ra-lifetime
ipv6 nd ns-interval
```

ipv6 nd router-preference

Specifies the priority level of a router's advertisements. When a terminal receives advertisements from multiple routers, it uses this information to determine which router advertisement it should use. If the terminal receives router advertisements having the same priority from multiple routers, the router advertisement that was received earlier is used.

Syntax

To set or change information:

```
ipv6 nd router-preference { high | medium | low }
```

To delete information:

```
no ipv6 nd router-preference
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

{ high | medium | low }

Specifies the priority of router advertisements.

high

A priority higher than `medium` and `low`.

medium

A priority higher than `low` and lower than `high`.

low

A priority lower than `high` and `medium`.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The initial value is `medium`.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 nd suppress-ra

Suppresses router advertisements for the specified interface.

Syntax

To set information:

```
ipv6 nd suppress-ra
```

To delete information:

```
no ipv6 nd suppress-ra
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

Allows router advertisements.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

Chapter

10. DHCP/BOOTP Relay Agent

ip dhcp relay gateway
ip dhcp relay maximum-hop-count
ip helper-address

ip dhcp relay gateway

Sets the DHCP/BOOTP relay agent IP address (*giaddr*).

Syntax

To set or change information:

```
ip dhcp relay gateway <ipv4 address>
```

To delete information:

```
no ip dhcp relay gateway
```

Input mode

(*config-if*)

Ethernet interface or port channel interface

(*config-subif*)

Ethernet subinterface or port channel subinterface

Parameters

<ipv4 address>

Specifies the DHCP/BOOTP relay agent IP address (*giaddr*).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

The value must match the IP address set in the interface.

Default behavior

The primary address is used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. In a multihomed environment, use this setting to specify an IP address other than the primary address for the DHCP/BOOTP relay agent.

Related commands

None

ip dhcp relay maximum-hop-count

Sets the maximum hop count for DHCP and BOOTP packets.

Syntax

To set or change information:

```
ip dhcp relay maximum-hop-count <count>
```

To delete information:

```
no ip dhcp relay maximum-hop-count
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<count>

Specifies the maximum hop count for DHCP and BOOTP packets. The DHCP/BOOTP relay agent does not relay any DHCP or BOOTP packets whose hop count is equal to or greater than the hop count specified for this parameter.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 16

Default behavior

The maximum hop count for DHCP and BOOTP packets is set to 4.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ip helper-address

Sets the relay destination of DHCP and BOOTP packets.

Syntax

To set or change information:

```
ip helper-address <ipv4 address> [<ipv4 address>...]
```

To delete information:

```
no ip helper-address
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<ipv4 address> [<ipv4 address>...]

Specifies the IP address of the DHCP and BOOTP servers. You can set a maximum of 16 entries per interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

The following addresses cannot be set:

* 127.0.0.0 to 127.255.255.255

* Addresses that do not belong to class A, B, or C

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. When a broadcast DHCP or BOOTP packet destined for a subnet subject to management by the Device's own IPv4 address is received, if subnet-broadcast IPv4 packet forwarding is permitted (the `directed-broadcast` parameter is specified for the `ip address` command), Layer 3 forwarding as well as Layer 7 forwarding by the DHCP/BOOTP relay agent is carried out.

Related commands

None

Chapter

11. DHCPv6 Relay Agent

ipv6 dhcp relay destination
ipv6 dhcp relay maximum-hop-count
ipv6 dhcp relay static-route-setting

ipv6 dhcp relay destination

Sets the relay destination of DHCPv6 packets.

Syntax

To set or change information:

```
ipv6 dhcp relay destination {<ipv6 address> [<ipv6 address>...] | all-servers
interface <interface type> <interface number>}
```

To delete information:

```
no ipv6 dhcp relay destination
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

```
{<ipv6 address> [<ipv6 address>...] | all-servers interface <interface type> <interface number>}
```

Specifies the IPv6 address or the interface of the relay destination of DHCPv6 packets.

<ipv6 address> [<ipv6 address>...]

Specifies the IPv6 address of the DHCPv6 server. When this parameter is specified, packets are relayed to the unicast address of the specified DHCPv6 server.

all-servers interface <interface type> <interface number>

Specifies the interface to which DHCPv6 packets are forwarded and on which a global IPv6 address is set. When this parameter is specified, packets are relayed to the multicast address of all DHCPv6 servers.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv6 address>, specify a global unicast address with which the Device can communicate. You can set a maximum of 16 entries per interface. For details, see *Specifiable values for parameters*.

For <interface type> and <interface number>, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

- * Ethernet interface
- * Ethernet subinterface
- * Port channel interface
- * Port channel subinterface

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 dhcp relay maximum-hop-count

Sets the maximum hop count for relayed DHCPv6 packets.

Syntax

To set or change information:

```
ipv6 dhcp relay maximum-hop-count <count>
```

To delete information:

```
no ipv6 dhcp relay maximum-hop-count
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<count>

Specifies the maximum hop count for relayed DHCPv6 packets. Any DHCPv6 packet whose hop count is equal to or greater than the hop count specified for this parameter is not relayed.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 32

Default behavior

The maximum hop count for DHCPv6 packets is set to 4.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 dhcp relay static-route-setting

Automatically generates an IPv6 static route from a prefix delegated via a DHCPv6 relay agent.

Syntax

To set information:

```
ipv6 dhcp relay static-route-setting
```

To delete information:

```
no ipv6 dhcp relay static-route-setting
```

Input mode

(config)

Parameters

None

Default behavior

IPv6 static routes are not generated automatically.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If this setting is made after prefixes have been delegated, IPv6 static routes are also automatically generated for prefixes that have already been delegated.
2. If the setting is deleted, all automatically generated IPv6 static routes are deleted.
3. IPv6 static routes are automatically generated only when the DHCPv6 client is directly connected.

Related commands

None

Chapter

12. VRRP

- vrrp accept
- vrrp authentication
- vrrp follow
- vrrp ip
- vrrp ipv6
- vrrp mode
- vrrp name
- vrrp preempt
- vrrp preempt delay
- vrrp priority
- vrrp timers advertise
- vrrp timers non-preempt-swap

vrrp accept

Sets a virtual router to accept mode. If accept mode is enabled by this command, a virtual router in the master state can receive IP packets even if the router is not the owner of the IP address.

Syntax

To set information:

```
vrrp <vrid> accept
```

To delete information:

```
no vrrp <vrid> accept
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

Default behavior

Accept mode is disabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If accept mode is enabled for the IP address owner, the virtual router acts as the IP address owner.
2. This command can be specified only when both the real IP address and the virtual IP address exist on the same network.
3. If a real IP address that is the same as the virtual IP address of VRRP for which accept mode is enabled is set on the same network, these IP addresses are duplicated.
Also, if the virtual IP address and the real IP address for the IP address owner are set on the same network, these IP addresses are duplicated, as same as when accept mode is enabled.
4. If duplicated IPv6 address is detected, sending and receiving of IP packets is no longer available. In such a case, check the configuration, and try to place the interface in the up or down state (by using the `activate/inactivate` operation command).

Related commands

None

vrrp authentication

Sets the password used for advertisement packet authentication on a virtual router.

Syntax

To set or change information:

```
vrrp <vrid> authentication <text>
```

To delete information:

```
no vrrp <vrid> authentication
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

<text>

Specifies the password (SIMPLE TEXT PASSWORD) used for advertisement packet authentication.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Enclose a character string of no more than 8 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string* in *Specifiable values for parameters*.

Default behavior

No password is set. Advertisement packet authentication is not performed.

Impact on communication

None

When the change is applied

In the `vrrp mode` command, if `rfc3768` or `ietf-ipv6-spec-02` is set, the change is applied immediately after the setting values are changed.

Notes

1. If the `vrrp mode` command is not set, this setting is invalid.
2. If the `vrrp follow` command is set, this setting is invalid.

Related commands

None

vrrp follow

Specifies the primary virtual router, and sets a virtual router as a follower virtual router. The priority determination, PREEMPT mode, VRRP operation mode, and advertisement packet sending interval settings that have been set for the follower virtual router become invalid, and primary virtual router operation is conformed to.

Syntax

To set or change information:

```
vrrp <vrid> follow <string>
```

To delete information:

```
no vrrp <vrid> follow
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
1 to 255

<string>

Specifies the name of the primary virtual router.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Enclose a character string of no more than 15 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string in Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the virtual router is an address owner, you cannot set this command.
2. If you are operating on a primary virtual router from another virtual router, you cannot set this command. In addition, you cannot specify the name of your own virtual router or the name of a follower virtual router.

Related commands

vrrp name

vrrp ip

Assigns an IPv4 address to a virtual router.

Syntax

To set or change information:

```
vrrp <vrid> ip <ip address>
```

To delete information:

```
no vrrp <vrid> ip
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

<ip address>

Specifies the IP address of the virtual router.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

IPv4 address

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The maximum number of virtual routers (including both IPv4 virtual routers and IPv6 virtual routers) that can be set per device is 255. However, by using the group switching function and creating follower virtual routers, you can operate a maximum of 16380 virtual routers.
2. After an IP address is assigned to a virtual router by this command, the virtual router starts operating.

3. A virtual router for which the `vrrp follow` command has been set cannot be set as an address owner.

Related commands

`ip address`

vrrp ipv6

Assigns an IPv6 address to a virtual router.

Syntax

To set or change information:

```
vrrp <vrid> ipv6 <ipv6 address>
```

To delete information:

```
no vrrp <vrid> ipv6
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

<ipv6 address>

Specifies the IP address of the virtual router.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

IPv6 address

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The maximum number of virtual routers (including both IPv4 virtual routers and IPv6 virtual routers) that can be set per device is 255. However, by using the group switching function and creating follower virtual routers, you can operate a maximum of 16380 virtual routers.
2. After an IPv6 address is assigned to a virtual router by this command, the virtual router starts operating.

Related commands

ipv6 address

vrrp mode

Sets the behavior to which a virtual router conforms.

Syntax

To set or change information:

```
vrrp <vrid> mode {rfc3768 | ietf-ipv6-spec-02 | ietf-ipv6-spec-07 |  
ietf-unified-spec-02 | rfc5798}
```

To delete information:

```
no vrrp <vrid> mode
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

{rfc3768 | ietf-ipv6-spec-02 | ietf-ipv6-spec-07 | ietf-unified-spec-02 | rfc5798}

Specifies the behavior to which a virtual router conforms.

rfc3768

The behavior of IPv4 virtual routers conforms to RFC 3768. This cannot be specified for IPv6 virtual routers.

ietf-ipv6-spec-02

The behavior of IPv6 virtual routers conforms to draft-ietf-vrrp-ipv6-spec-02. This cannot be specified for IPv4 virtual routers.

ietf-ipv6-spec-07

The behavior of IPv6 virtual routers conforms to draft-ietf-vrrp-ipv6-spec-07. This cannot be specified for IPv4 virtual routers.

ietf-unified-spec-02

The behavior of virtual routers conforms to draft-ietf-unified-spec-02.

rfc5798

The behavior of virtual routers conforms to RFC 5798.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The behavior of virtual routers conforms to RFC 5798.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. When the behavior to which a virtual router conforms is set by using this command, the advertisement packet format also changes. If this setting is not the same on all devices that establish the VRRP, the state transitions in VRRP are not properly performed, which allows multiple master routers at the same time.
2. When this setting or another equivalent setting is performed for devices that establish VRRP, multiple master routers exist temporarily. After the settings for the devices are completed (as the same setting), only one master router is selected automatically.
3. When `ietf-ipv6-spec-07`, `ietf-unified-spec-02`, or `rfc5798` is specified, if the setting value for the `vrrp timers advertise` command exceeds 40, the advertisement packet sending interval is one second (the default).

Related commands

`vrrp timers advertise`

vrrp name

Sets the name of a virtual router.

Syntax

To set information:

```
vrrp <vrid> name <string>
```

To delete information:

```
no vrrp <vrid> name
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

<string>

Specifies the name of the virtual router

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Enclose a character string of no more than 15 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string* in *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

vrrp follow

vrrp preempt

Disables automatic switch back for a virtual router by using the `no vrrp preempt` command. When automatic switch back is enabled, if a virtual router detects a master router that has a lower priority than itself, the virtual router automatically takes over the master router.

Syntax

To set information:

```
no vrrp <vrid> preempt
```

To delete information:

```
vrrp <vrid> preempt
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

Default behavior

Automatic switch back is enabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If automatic switch back suppression is set, if the `swap vrrp` operation command is executed, the command has priority, and switch back is performed.
2. When a virtual router detects the down state of the master router, the virtual router takes over for the master router regardless of the automatic switch back setting.
3. If the `vrrp follow` command is set, this setting is invalid.

Related commands

None

vrrp preempt delay

Sets a period of time for suppressing automatic switch back. If automatic switch back is enabled, switch back processing is suppressed for the specified period of time before it is processed.

Syntax

To set or change information:

```
vrrp <vrid> preempt delay <seconds>
```

To delete information:

```
no vrrp <vrid> preempt delay
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

<seconds>

Specifies a period of time (in seconds) for suppressing automatic switch back.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 65535

Default behavior

The period of time for suppressing automatic switch back is set to 0 seconds. Automatic switch back is not suppressed.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the `vrrp follow` command is set, this setting is invalid.

Related commands

None

vrrp priority

Sets the priority to a virtual router.

Syntax

To set or change information:

```
vrrp <vrid> priority <priority>
```

To delete information:

```
no vrrp <vrid> priority
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

<priority>

Specifies the priority of the virtual router. If the IP address of the virtual router is the same as the IP address specified for the interface (that is, the virtual router is the owner of the IP address), the virtual router operates with priority 255 regardless of this setting.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 (low priority) to 254 (high priority)

Default behavior

If the IP address of the virtual router is the same as the IP address specified for the interface (that is, the virtual router is the owner of the IP address), the priority of the virtual router is 255.

If the virtual router is not the owner of the IP address, the priority of the virtual router is 100.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the `vrrp follow` command is set, this setting is invalid.

Related commands

None

vrrp timers advertise

Sets the sending interval of advertisement packets to be sent by a virtual router.

Syntax

To set or change information:

```
vrrp <vrid> timers advertise {<seconds> | msec <milli seconds>}
```

To delete information:

```
no vrrp <vrid> timers advertise
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

{<seconds> | msec <milli seconds>}

Specifies the sending interval of advertisement packets.

<seconds>

Specifies the sending interval of advertisement packets in seconds.

msec <milli seconds>

Specifies the sending interval of advertisement packets in units of 10 milliseconds.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <seconds>, specify a value from 1 to 255.

For <milli seconds>, set a value that is a multiple of 10 in the range from 200 to 40950.

Default behavior

The sending interval of advertisement packets is set to one second.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the `vrrp mode` command is not set, specification of a value larger than 40 is ignored, and one second (the default) is used.
2. If `ietf-ipv6-spec-07`, `vrrp ietf-unified-spec-02`, or `rfc5798` is set in the `vrrp mode` command, specification of a value greater than 40 is ignored, and one second (the default) is used.
3. If the `msec` parameter is set in this command, and if `rfc3768` or `ietf-ipv6-spec-02` is set in the `vrrp mode` command, one second (the default) is used.
4. If the `vrrp follow` command is set, this setting is invalid.
5. If a virtual router is running on a port channel interface or port channel subinterface, and if a low value is specified for the `msec` parameter, if a line failure of a port belonging to a channel group occurs, there temporarily might be more than one master router. After channel group port switching finishes, only one master router is automatically selected.

Related commands

`vrrp mode`

vrrp timers non-preempt-swap

Specifies the switch back suppression time to be applied when switch back processing is performed while automatic switch back is suppressed.

Syntax

To set or change information:

```
vrrp <vrid> timers non-preempt-swap <seconds>
```

To delete information:

```
no vrrp <vrid> timers non-preempt-swap
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<vrid>

Specifies the virtual router ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 255

<seconds>

Specifies (in seconds) the switch back suppression time to be applied when switch back processing is performed while automatic switch back is suppressed.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 65535

Default behavior

The switch back suppression time to be applied when switch back processing is performed while automatic switch back is suppressed is set to 0 seconds. Switch back is not suppressed.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the `vrrp follow` command is set, this setting is invalid.

Related commands

`vrrp preempt`

Chapter

13. Routing Options

```
ip auto-class-route
routing options graceful-restart time-limit
```

ip auto-class-route

Specifies the automatic generation of natural routes for a subnetted broadcast interface.

A natural route is a directly connected route that has a mask length that corresponds to an IP address class (8 bits for class A, 16 bits for class B, or 24 bits for class C). This route is not installed in the forwarding table, but can be distributed by using a routing protocol.

Syntax

To set information:

```
ip auto-class-route
```

To delete information:

```
no ip auto-class-route
```

Input mode

(config)

Parameters

None

Default behavior

Natural routes are not generated automatically.

Impact on communication

None

When the change is applied

The setting takes effect immediately.

Notes

None

Related commands

None

routing options graceful-restart time-limit

Specifies the maximum time that the Device can retain routes after a graceful restart begins.

Syntax

To set or change information:

```
routing options graceful-restart time-limit <seconds>
```

To delete information:

```
no routing options graceful-restart time-limit
```

Input mode

(config)

Parameters

<seconds>

Specifies (in seconds) the maximum time to retain routes.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1 to 3600 (in decimal)

Default behavior

180 seconds is set.

Impact on communication

None

When the change is applied

The setting takes effect immediately.

Notes

None

Related commands

```
graceful-restart mode (OSPF)
graceful-restart restart-time (OSPF)
graceful-restart mode (OSPFv3)
graceful-restart restart-time (OSPFv3)
bgp graceful-restart mode
bgp graceful-restart restart-time
```


Chapter

14. Route Summarization

ip summary-address
ipv6 summary-address

ip summary-address

Generates an IPv4 summarized route.

Syntax

To set or change information:

```
ip summary-address [vrf <vrf id>] <ipv4 prefix> <mask> [<distance>] [as-set]
[noinstall] [summary-only]
```

To delete information:

```
no ip summary-address [vrf <vrf id>] <ipv4 prefix> <mask>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the VRF to which the route belongs.

1. Default value when this parameter is omitted:

The route belongs to the global network.

2. Range of values:

Specify a VRF ID.

For details, see *Specifiable values for parameters*.

<ipv4 prefix>

Specifies a summarized address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

Note: Set 0 for each bit that is outside the range of <mask> in <ipv4 prefix>.

<mask>

Specifies a summarized address mask.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address mask.

Note: Specify the address mask so that when it is converted to a binary number, all bits after the first 0 bit are set to 0.

<distance>

Specifies the distance of the summarized route.

1. Default value when this parameter is omitted:

130

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

as-set

Specifies that AS_SET is generated when the AS_PATH attribute for a summarized route is generated.

1. Default value when this parameter is omitted:

AS_SET is not generated when the AS_PATH attribute for a summarized route is generated.

2. Range of values:

None

noinstall

Specifies that summarized routes will not be registered in the forwarding table. However, summarized routes can be distributed by using a routing protocol. Specify this parameter if you want to advertise summarized routes to an external destination by using another routing protocol, but do not want to discard packets via the summarized route.

1. Default value when this parameter is omitted:

Summarized routes are registered in the forwarding table.

2. Range of values:

None

summary-only

Suppresses advertisement of summarization source routes when summarized routes are advertised. When routes are summarized, use the `summary-only` parameter if you want to advertise only summarized routes while suppressing advertisement of summarization source routes.

1. Default value when this parameter is omitted:

Advertisement of summarization source routes is not suppressed.

2. Range of values:

None

Default behavior

Summarized routes are not generated.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Routes whose next hop has a loopback interface or null interface cannot be used as summarization source routes.

Related commands

```

distribute-list out (RIP)
distribute-list out (OSPF)
distribute-list out (BGP4)
redistribute (RIP)
redistribute (OSPF)

```

14. Route Summarization

```
redistribute (BGP4)
neighbor out (BGP4)
```

ipv6 summary-address

Generates an IPv6 summarized route.

Syntax

To set or change information:

```
ipv6 summary-address [vrf <vrf id>] <ipv6 prefix>/<prefixlen> [<distance>]
[as-set] [noinstall] [summary-only]
```

To delete information:

```
no ipv6 summary-address [vrf <vrf id>] <ipv6 prefix>/<prefixlen>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the VRF to which the route belongs.

1. Default value when this parameter is omitted:
The route belongs to the global network.
2. Range of values:
Specify a VRF ID.
For details, see *Specifiable values for parameters*.

<ipv6 prefix>

Specifies a summarized IPv6 address.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify the IPv6 prefix.
Note: Set all the bits that follow the bits specified for <prefixlen> of <ipv6 prefix> to 0.

<prefixlen>

Specifies the prefix length.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 0 to 128 in decimal.

<distance>

Specifies the distance of the summarized route.

1. Default value when this parameter is omitted:
130
2. Range of values:
Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

as-set

Specifies that AS_SET is generated when the AS_PATH attribute for a summarized route is generated.

1. Default value when this parameter is omitted:

AS_SET is not generated when the AS_PATH attribute for a summarized route is generated.

2. Range of values:

None

noinstall

Specifies that summarized routes will not be registered in the forwarding table. However, summarized routes can be distributed by using a routing protocol. Specify this parameter if you want to advertise summarized routes to an external destination by using another routing protocol, but do not want to discard packets via the summarized route.

1. Default value when this parameter is omitted:

Summarized routes are registered in the forwarding table.

2. Range of values:

None

summary-only

Suppresses advertisement of summarization source routes when summarized routes are advertised. When routes are summarized, use the `summary-only` parameter if you want to advertise only summarized routes while suppressing advertisement of summarization source routes.

1. Default value when this parameter is omitted:

Advertisement of summarization source routes is not suppressed.

2. Range of values:

None

Default behavior

Summarized routes are not generated.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Routes whose next hop has a loopback interface or null interface cannot be used as summarization source routes.

Related commands

```

distribute-list out (RIPng)
distribute-list out (OSPFv3)
distribute-list out (BGP4+)
redistribute (RIPng)
redistribute (OSPFv3)
redistribute (BGP4+)
neighbor out (BGP4+)

```

Chapter

15. Static Routing (IPv4)

ip route
ip route static maximum-paths
ip route static poll-interval
ip route static poll-multiplier

ip route

Generates an IPv4 static route.

Syntax

To set or change information:

```
ip route [vrf <vrf id>] <ipv4 prefix> <mask> <nexthop address> [<distance>]
[weight <weight>] [tag <tag>] [{noinstall | reject}] [poll] [noresolve]
[generate-bgp-route]
ip route [vrf <vrf id>] <ipv4 prefix> <mask> <nexthop address> <interface
type> <interface number> [<distance>] [weight <weight> ] [tag <tag>]
[{noinstall | reject}] [poll] [noresolve] [generate-bgp-route]
ip route [vrf <vrf id>] <ipv4 prefix> <mask> <nexthop address> {vrf <nexthop
vrf id> | global} [<distance>] [weight <weight> ] [tag <tag>] [{noinstall |
reject}] [poll] [noresolve] [generate-bgp-route]
ip route [vrf <vrf id>] <ipv4 prefix> <mask> <interface type> <interface
number> [<distance>] [weight <weight> ] [tag <tag>] [generate-bgp-route]
```

To delete information:

```
no ip route [vrf <vrf id>] <ipv4 prefix> <mask> <nexthop address>
no ip route [vrf <vrf id>] <ipv4 prefix> <mask> <nexthop address> <interface
type> <interface number>
no ip route [vrf <vrf id>] <ipv4 prefix> <mask> <nexthop address> {vrf
<nexthop vrf id> | global}
no ip route [vrf <vrf id>] <ipv4 prefix> <mask> <interface type> <interface
number>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the VRF to which the route belongs.

1. Default value when this parameter is omitted:
The route belongs to the global network.
2. Range of values:
Specify a VRF ID.
For details, see *Specifiable values for parameters*.

<ipv4 prefix>

Specifies the destination IPv4 address.

1. Default value when this parameter is omitted:
The next hop is not specified.
2. Range of values:
Specify an IPv4 address.
Note: Set 0 for each bit that is outside the range of <mask> in <ipv4 prefix>.

<mask>

Specifies the destination IP address mask.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.

2. Range of values:

Specify an IP address mask.

Note: Specify the address mask so that when it is converted to a binary number, all bits after the first bit that is 0 are set to 0.

<nexthop address>

Specifies the next hop address of the route.

1. Default value when this parameter is omitted:

The next hop is not specified.

2. Range of values:

Specify an IPv4 address.

<interface type> <interface number>

Specifies the interface used for resolving the next hop. If the route that resolves the next hop is different from the specified interface, that route is not enabled.

1. Default value when this parameter is omitted:

If *<nexthop address>* is specified:

The interface used for resolving the next hop is not specified.

If *<nexthop address>* is not specified:

This parameter cannot be omitted.

2. Range of values:

For *<interface type>* and *<interface number>*, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

If *<nexthop address>* is specified:

* Ethernet interface

* Ethernet subinterface

* Port channel interface

* Port channel subinterface

* Management port (specifiable only for global network routes)

If *<nexthop address>* is not specified:

* Null interface

{vrf *<nexthop vrf id>* | global}

Specifies that either the VRF to which the next hop belongs, or the next hop, belongs to the global network.

<nexthop vrf id>

Specifies the VRF to which the next hop belongs.

global

Specifies that the next hop belongs to the global network.

1. Default value when this parameter is omitted:

The next hop belongs to the same VRF as the route.

2. Range of values:

For *<next-hop vrf id>*, specify a VRF ID that is in the same range of values as *<vrf id>*.

For details about the range of *<vrf id>*, see *Specifiable values for parameters*.

<distance>

Specifies the distance of the route.

1. Default value when this parameter is omitted:

2

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

weight *<weight>*

Specifies the priority of the route. This parameter is used for determining the priority of the different routes to a destination.

1. Default value when this parameter is omitted:

0

2. Range of values:

Specify 0 to 255 in decimal. 255 indicates the highest priority, and 0 indicates the lowest priority.

tag *<tag>*

Specifies the tag value to be added to the route.

1. Default value when this parameter is omitted:

0

2. Range of values:

Specify 0 to 4294967295 in decimal.

{noinstall | reject}

noinstall

Specifies that static routes will not be registered in the forwarding table. However, static routes can be distributed by using a routing protocol. Specify this parameter if you want to advertise a static route to an external destination by using another routing protocol, but do not want to use it for forwarding packets on the Device.

reject

Specify this parameter to generate static routes as rejected routes. Specify this parameter if you want to discard packets that match the static route.

1. Default value when this parameter is omitted:

The static route is generated as a non-reject route, and registered in the forwarding table.

2. Range of values:

None

poll

Specifies that polling for checking reachability is enabled for the next hop. You can specify polling only when a next hop address is specified.

1. Default value when this parameter is omitted:

Polling is disabled.

2. Range of values:

None

`noresolve`

Uses only directly connected routes to resolve the next hop on static routes.

1. Default value when this parameter is omitted:

All routes[#] including directly connected routes are used to resolve the next hop on static routes.

[#]: A static route without a `noresolve` specification cannot be used as a next-hop resolution route.

2. Range of values:

None

`generate-bgp-route`

Generates a BGP4 advertisement route whose destination is the network address specified by the destination IPv4 address `<ipv4 prefix>` and the destination IP address mask `<mask>`.

1. Default value when this parameter is omitted:

No BGP4 advertisement route is generated.

2. Range of values:

None

Default behavior

IPv4 static routes are not generated.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. You cannot configure a multipath route between next hops in different VRFs.

The next hops that configure a multipath route are selected from among the next hops in the same VRF as the next hop with the highest weight value (that is enabled).

In the following example, the two next hops that configure a multipath route are 172.16.1.1 and 172.16.3.1:

```
ip route vrf 100 10.1.1.0 255.255.255.0 172.16.1.1 vrf 200 weight 30
ip route vrf 100 10.1.1.0 255.255.255.0 172.16.2.1 vrf 100 weight 20
ip route vrf 100 10.1.1.0 255.255.255.0 172.16.3.1 vrf 200 weight 10
```

2. When specifying the `generate-bgp-route` parameter, make sure to specify it for a static route on which a null interface is the next hop to prevent packets addressed to the relevant route from being forwarded to an unintended neighboring device.

Related commands

```
ip route static poll-interval
ip route static poll-multiplier
ip route static maximum-paths
```

ip route static maximum-paths

Specifies the maximum number of paths (maximum number of next hops) to be generated for static routing information.

Syntax

To set or change information:

```
ip route static maximum-paths <number>
```

To delete information:

```
no ip route static maximum-paths
```

Input mode

(config)

Parameters

<number>

Specifies the maximum number of paths (maximum number of next hops).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 16 in decimal.

Note, however, that if `ip urpf` command is set, you cannot set 9 or a greater value for <number>.

Default behavior

The initial value is set to 4.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`ip route`

ip route static poll-interval

Specifies the polling interval for a next hop.

Syntax

To set or change information:

```
ip route static poll-interval <seconds>
```

To delete information:

```
no ip route static poll-interval
```

Input mode

(config)

Parameters

<seconds>

Specifies the polling interval (in seconds).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 180 (seconds) in decimal.

If you specify 0, polling stops.

Default behavior

The initial value is set to five seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip route  
ip route static poll-multiplier
```

ip route static poll-multiplier

Specifies the number of times polling is performed for a next hop, and the number of consecutive responses.

Syntax

To set or change information:

```
ip route static poll-multiplier <invalid count> <restore count>
```

To delete information:

```
no ip route static poll-multiplier
```

Input mode

(config)

Parameters

<invalid count>

Specifies the number of times polling is performed. The static route for which polling is specified is disabled if no response is received within the specified number of consecutive polls.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (times) in decimal.

<restore count>

Specifies the number of consecutive responses required to restore a route. A static route that was disabled due to no response to polling will be re-enabled (restored) if responses to the specified number of consecutive polls are received from the next hop of that static route.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (times) in decimal.

Default behavior

The following initial values are set.

- Number of times polling is performed: 3
- Number of consecutive responses: 1

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

ip route

```
ip route static poll-interval
```


Chapter

16. Static Routing (IPv6)

ipv6 route
ipv6 route static maximum-paths
ipv6 route static poll-interval
ipv6 route static poll-multiplier

ipv6 route

Generates an IPv6 static route.

Syntax

To set or change information:

```
ipv6 route [vrf <vrf id>] <ipv6 prefix>/<prefixlen> <nexthop address>
[<distance>] [weight <weight>] [tag <tag>] [{noinstall | reject}] [poll]
[noresolve] [generate-bgp-route]
ipv6 route [vrf <vrf id>] <ipv6 prefix>/<prefixlen> <nexthop address>
<interface type> <interface number> [<distance>] [weight <weight> ] [tag
<tag>] [{noinstall | reject}] [poll] [noresolve] [generate-bgp-route]
ipv6 route [vrf <vrf id>] <ipv6 prefix>/<prefixlen> <nexthop address> {vrf
<nexthop vrf id> | global} [<distance>] [weight <weight>] [tag <tag>]
[{noinstall | reject}] [poll] [noresolve] [generate-bgp-route]
ipv6 route [vrf <vrf id>] <ipv6 prefix>/<prefixlen> <interface type>
<interface number> [<distance>] [weight <weight> ] [tag <tag>]
[generate-bgp-route]
```

To delete information:

```
no ipv6 route [vrf <vrf id>] <ipv6 prefix>/<prefixlen> <nexthop address>
no ipv6 route [vrf <vrf id>] <ipv6 prefix>/<prefixlen> <nexthop address>
<interface type> <interface number>
no ipv6 route [vrf <vrf id>] <ipv6 prefix>/<prefixlen> <nexthop address> {vrf
<nexthop vrf id> | global}
no ipv6 route [vrf <vrf id>] <ipv6 prefix>/<prefixlen> <interface type>
<interface number>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the VRF to which the route belongs.

1. Default value when this parameter is omitted:

The route belongs to the global network.

2. Range of values:

Specify a VRF ID.

For details, see *Specifiable values for parameters*.

<ipv6 prefix>

Specifies the destination IPv6 prefix.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify the IPv6 prefix.

Note: Set all the bits that follow the bits specified for <prefixlen> of <ipv6 prefix> to 0.

<prefixlen>

Specifies the prefix length.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 128 in decimal.

<nexthop address>

Specifies the IPv6 next hop address. When you specify an IPv6 link-local address, specify the interface after this parameter.

1. Default value when this parameter is omitted:

The next hop is not specified.

2. Range of values:

Specify an IPv6 global address or IPv6 link-local address.

<interface type> <interface number>

Specifies the interface used for resolving the next hop. If the route that resolves the next hop is different from the specified interface, that route is not enabled.

If an IPv6 link-local address is specified for *<nexthop address>*, specify the interface for this parameter.

1. Default value when this parameter is omitted:

If *<nexthop address>* is specified:

The interface used for resolving the next hop is not specified.

If *<nexthop address>* is not specified:

This parameter cannot be omitted.

2. Range of values:

For *<interface type>* and *<interface number>*, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

If *<nexthop address>* is specified:

* Ethernet interface

* Ethernet subinterface

* Port channel interface

* Port channel subinterface

* Management port (specifiable only for global network routes)

If *<nexthop address>* is not specified:

* Null interface

{vrf <nexthop vrf id> | global}

Specifies that either the VRF to which the next hop belongs, or the next hop, belongs to the global network.

<nexthop vrf id>

Specifies the VRF to which the next hop belongs.

global

Specifies that the next hop belongs to the global network.

1. Default value when this parameter is omitted:

The next hop belongs to the same VRF as the route.

2. Range of values:

For *<nexthop vrf id>*, specify a VRF ID that is in the same range of values as *<vrf id>*.

For details about the range of *<vrf id>*, see *Specifiable values for parameters*.

<distance>

Specifies the distance of the route.

1. Default value when this parameter is omitted:

2

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

weight *<weight>*

Specifies the priority of the route. This parameter is used for determining the priority of the different routes to a destination.

1. Default value when this parameter is omitted:

0

2. Range of values:

Specify 0 to 255 in decimal. 255 indicates the highest priority, and 0 indicates the lowest priority.

tag *<tag>*

Specifies the tag value to be added to the route.

1. Default value when this parameter is omitted:

0

2. Range of values:

Specify 0 to 4294967295 in decimal.

{noinstall | reject}

noinstall

Specifies that static routes will not be registered in the forwarding table. However, static routes can be distributed by using a routing protocol. Specify this parameter if you want to advertise a static route to an external destination by using another routing protocol, but do not want to use it for forwarding packets on the Device.

reject

Specify this parameter to generate static routes as rejected routes. Specify this parameter if you want to discard packets that match the static route.

1. Default value when this parameter is omitted:

The static route is generated as a non-reject route, and registered in the forwarding table.

2. Range of values:

None

poll

Specifies that polling for checking reachability is enabled for the next hop. You can specify

polling only when a next hop address is specified.

1. Default value when this parameter is omitted:

Polling is disabled.

2. Range of values:

None

noresolve

Uses only directly connected routes to resolve the next hop on static routes.

1. Default value when this parameter is omitted:

All routes[#] including directly connected routes are used to resolve the next hop on static routes.

[#]: A static route without a `noresolve` specification cannot be used as a next-hop resolution route.

2. Range of values:

None

generate-bgp-route

Generates a BGP4+ advertisement route whose destination is the network address specified by the destination IPv6 prefix *<ipv6 prefix>* and the prefix length *<prefixlen>*.

1. Default value when this parameter is omitted:

No BGP4+ advertisement route is generated.

2. Range of values:

None

Default behavior

IPv6 static routes are not generated.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. You cannot configure a multipath route between next hops in different VRFs.

The next hops that configure a multipath route are selected from among the next hops in the same VRF as the next hop with the highest weight value (that is enabled).

In the following example, the next hops that configure a multipath route are

2001:db8:1:1::1 and 2001:db8:1:3::1.

```
ipv6 route vrf 100 2001:db8:ffff:1::/64 2001:db8:1:1::1 vrf 200 weight 30
```

```
ipv6 route vrf 100 2001:db8:ffff:1::/64 2001:db8:1:2::1 vrf 100 weight 20
```

```
ipv6 route vrf 100 2001:db8:ffff:1::/64 2001:db8:1:3::1 vrf 200 weight 10
```

2. When specifying the `generate-bgp-route` parameter, make sure to specify it for a static route on which a null interface is the next hop to prevent packets addressed to the relevant route from being forwarded to an unintended neighboring device.

Related commands

```
ipv6 route static poll-interval
```

```
ipv6 route static poll-multiplier
```

16. Static Routing (IPv6)

```
ipv6 route static maximum-paths
```

ipv6 route static maximum-paths

Specifies the maximum number of paths (maximum number of next hops) to be generated for static routing information.

Syntax

To set or change information:

```
ipv6 route static maximum-paths <number>
```

To delete information:

```
no ipv6 route static maximum-paths
```

Input mode

(config)

Parameters

<number>

Specifies the maximum number of paths (maximum number of next hops).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 16 in decimal.

Note, however, that if `ip urpf` is set, you cannot set 9 or a greater value for <number>.

Default behavior

The initial value is set to 4.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`ip route`

ipv6 route static poll-interval

Specifies the polling interval for a next hop.

Syntax

To set or change information:

```
ipv6 route static poll-interval <seconds>
```

To delete information:

```
no ipv6 route static poll-interval
```

Input mode

(config)

Parameters

<seconds>

Specifies the polling interval (in seconds).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 180 (seconds) in decimal.

If you specify 0, polling stops.

Default behavior

The initial value is set to five seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 route  
ipv6 route static poll-multiplier
```

ipv6 route static poll-multiplier

Specifies the number of times polling is performed for a next hop, and the number of consecutive responses.

Syntax

To set or change information:

```
ipv6 route static poll-multiplier <invalid count> <restore count>
```

To delete information:

```
no ipv6 route static poll-multiplier
```

Input mode

(config)

Parameters

<invalid count>

Specifies the number of times polling is performed. The static route for which polling is specified is disabled if no response is received within the specified number of consecutive polls.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (times) in decimal.

<restore count>

Specifies the number of consecutive responses required to restore a route. A static route that was disabled due to no response to polling will be re-enabled (restored) if responses to the specified number of consecutive polls are received from the next hop of that static route.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (times) in decimal.

Default behavior

The following initial values are set.

- Number of times polling is performed: 3
- Number of consecutive responses: 1

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

ipv6 route

```
ipv6 route static poll-interval
```

Chapter

17. RIP

- address-family ipv4
- auto-summary
- default-metric
- disable
- distance
- exit-address-family
- generate-secondary-route
- inherit-metric
- ip rip authentication key
- ip rip v2-broadcast
- ip rip version
- metric-offset
- neighbor
- network
- passive-interface
- router rip
- timers basic
- version

address-family ipv4

Switches to `config-router-af` mode to configure the settings for each VRF.

Syntax

To set information:

```
address-family ipv4 vrf <vrf id>
```

To delete information:

```
no address-family ipv4 vrf <vrf id>
```

Input mode

(`config-router`)

Parameters

`vrf <vrf id>`

Specifies the VRF.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a VRF ID.

For details, see *Specifiable values for parameters*.

Default behavior

RIP is not running on the specified VRF.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If you delete the information set by this command, all information set by the commands in the relevant `config-router-af` mode is deleted.
2. The information set by this command is deleted if you delete all information set by the commands in `config-router-af` mode.

Related commands

None

auto-summary

Enables automatic summarization for RIP advertisement routes.

This functionality automatically summarizes multiple subnet routes as a single natural mask route, and advertises it to neighboring routers.

This functionality is supported for both RIP-1 and RIP-2.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set information:

```
auto-summary
```

To delete information:

```
no auto-summary
```

Input mode

```
(config-router)
```

```
(config-router-af)
```

Parameters

None

Default behavior

Automatic summarization for RIP advertisement routes is disabled.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are advertised.

Notes

1. If you specify this configuration when RIP-1 is used, subnet routes that were not advertised before this configuration was set are summarized as a natural mask route and advertised to neighboring routers.

Related commands

None

default-metric

Specifies the metric to be used when routing information learned by another protocol is advertised by RIP. Metrics that were set by using the `redistribute` or `distribute-list out` command have priority over the metric information specified by using this command. This command applies to static routes, OSPF routes, and BGP4 routes.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set or change information:

```
default-metric <metric>
```

To delete information:

```
no default-metric
```

Input mode

```
(config-router)
```

```
(config-router-af)
```

Parameters

<metric>

Specifies a metric.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 16 in decimal.

Default behavior

The following initial values are set.

- Static route: Metric 1
- OSPF route: Metric 16
- BGP4 route: Metric 16

Impact on communication

None

When the change is applied

The change is applied the next time the routes are advertised.

Notes

None

Related commands

```
inherit-metric
```

```
distribute-list out
```

```
redistribute
```

```
metric-offset
```

disable

Disables RIP.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set information:

```
disable
```

To delete information:

```
no disable
```

Input mode

```
(config-router)
```

```
(config-router-af)
```

Parameters

None

Default behavior

RIP is enabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

distance

Specifies the distance for routing information learned by RIP. A distance specified by the `distribute-list in` command has priority over that specified by the `distance` command.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set or change information:

```
distance <distance>
```

To delete information:

```
no distance
```

Input mode

```
(config-router)
```

```
(config-router-af)
```

Parameters

<distance>

Specifies the distance for RIP.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

Default behavior

The initial value is 120.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are learned.

Notes

None

Related commands

None

exit-address-family

Exits `config-router-af` mode, and returns to `config-router` mode.

Syntax

To set information:
`exit-address-family`

Input mode

(`config-router-af`)

Parameters

None

Default behavior

This command is automatically set when a configuration is set in `config-router-af` mode.

Impact on communication

None

When the change is applied

None

Notes

1. Use this command to copy and paste configuration entries that have already been set. To set a configuration on a command line, use the `exit` command.

Related commands

`address-family ipv4`

generate-secondary-route

Registers a secondary route in the routing table.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set information:

```
generate-secondary-route
```

To delete information:

```
no generate-secondary-route
```

Input mode

```
(config-router)
```

```
(config-router-af)
```

Parameters

None

Default behavior

A secondary route is not registered in the routing table.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are learned.

Notes

None

Related commands

None

inherit-metric

Specifies that the metric is to be inherited when routing information learned by another routing protocol is advertised by RIP.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set information:

```
inherit-metric
```

To delete information:

```
no inherit-metric
```

Input mode

```
(config-router)
```

```
(config-router-af)
```

Parameters

None

Default behavior

The metric is not inherited.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are advertised.

Notes

None

Related commands

```
default-metric
```

```
distribute-list out
```

```
redistribute
```

```
metric-offset
```

ip rip authentication key

Specifies the authentication method and authentication key for RIP-2 packets. This command is valid when `ip rip version 2` is specified in `config-if` mode, or when `version 2` is specified in either `config-router` mode or `config-router-af` mode. In other cases, the command is invalid.

Syntax

To set or change information:

```
ip rip authentication key <key id> {text | md5} <key>
```

To delete information:

```
no ip rip authentication key <key id>
```

Input mode

(`config-if`)

Ethernet interface, port channel interface, or management port

(`config-subif`)

Ethernet subinterface or port channel subinterface

Parameters

<key id>

Specifies the key identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 255 in decimal.

{text | md5}

Specifies the authentication method.

text

Plain-text password authentication is specified.

md5

Encrypted authentication (Keyed-MD5) is specified.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

<key>

Specifies the authentication key.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Enclose a character string of no more than 16 characters in double quotation marks (").

Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string in Specifiable values for parameters*.

Default behavior

Authentication is disabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Use the same authentication key for all routers in the same network. Generally, make sure that only one authentication key exists in the setting except when the setting is being changed for transition to a new authentication key.

Related commands

```
ip rip version  
version
```

ip rip v2-broadcast

Specifies that packets are to be broadcast. This command is valid when `ip rip version 2` is specified in `config-if` mode, or when `version 2` is specified in `config-router` mode. In other cases, the command is invalid.

Syntax

To set information:

```
ip rip v2-broadcast
```

To delete information:

```
no ip rip v2-broadcast
```

Input mode

(`config-if`)

Ethernet interface, port channel interface, or management port

(`config-subif`)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

The transmission type is determined based on the version information specified in `config-if` or `config-router` mode.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are advertised.

Notes

1. This command is used to broadcast advertisements of the routes in RIP-2 message format that match the conditions for RIP-2 route advertisement.

Related commands

```
ip rip version  
version
```

ip rip version

Specifies the RIP version and the type of message destination IP address used for the interface. The specified value has priority over the version specified in `config-router` mode.

The following table lists the RIP version and the type of destination IP address that are used depending on the value set by the command.

Table 17-1: RIP version and type of destination IP address

No.	Value set	Version	Type of destination IP address
1	When this command is omitted	1 [#]	Broadcast [#]
2	ip rip version 1	1	Broadcast
3	ip rip version 2	2	Multicast

#

If there is a version specified in `config-router` mode, that version is applied.

Syntax

To set or change information:

```
ip rip version { 1 | 2 }
```

To delete information:

```
no ip rip version
```

Input mode

(`config-if`)

Ethernet interface, port channel interface, or management port

(`config-subif`)

Ethernet subinterface or port channel subinterface

Parameters

{ 1 | 2 }

Specifies the version.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The initial value is 1.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are learned or advertised.

Notes

None

Related commands

```
ip rip v2-broadcast  
version
```

metric-offset

Specifies the metric increment when RIP packets are sent or received via the interface.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set or change information:

```
metric-offset <metric> <interface type> <interface number> { in | out }
```

To delete information:

```
no metric-offset [<metric>] <interface type> <interface number> { in | out }
```

Input mode

```
(config-router)
(config-router-af)
```

Parameters

<metric>

Specifies a metric increment.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 16 in decimal.

<interface type> <interface number>

Specifies the interface to which the metric will be added.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<interface type>* and *<interface number>*, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

* Ethernet interface

* Ethernet subinterface

* Port channel interface

* Port channel subinterface

* Management port (specifiable only for global network routes)

{ in | out }

in

Specify this to add the metric when packets are received

out

Specify this to add the metric when packets are sent.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

- The metric increment when packets are received is set to 1.
- The metric increment when packets are sent is set to 0.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are learned or advertised.

Notes

None

Related commands

```
default-metric  
inherit-metric  
distribute-list in  
distribute-list out
```

neighbor

Specifies the neighboring router to which RIP packets are forwarded.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set information:

```
neighbor <ipv4 address>
```

To delete information:

```
no neighbor <ipv4 address>
```

Input mode

```
(config-router)
```

```
(config-router-af)
```

Parameters

<ipv4 address>

Specifies the destination neighboring router.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

Default behavior

The destination neighboring router is not specified.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are advertised.

Notes

1. The following table describes the packet transfer operations (broadcast interface) for the `neighbor` command.

Table 17-2: Packet transfer operations (broadcast interface) for the neighbor command

No.	conditions	Operation
1	Either no network setting exists, or the neighbor setting is beyond the specifiable range of the network setting.	RIP packets are not sent to the router specified by the <code>neighbor</code> command.
2	The <code>neighbor</code> setting is within the specifiable range of the network setting, and the <code>passive-interface</code> command does not explicitly suppress the interface connected to the network of the router specified by the <code>neighbor</code> command.	RIP packets are sent by unicast to the neighboring router specified in the <code>neighbor</code> setting, and are sent by broadcast (multicast) to the interface specified in the network setting.

No .	conditions	Operation
3	The neighbor setting is within the specifiable range of the network setting, and the passive-interface command explicitly suppresses the interface connected to the network of the router specified by the neighbor command.	RIP packets are sent by unicast only to the neighboring router specified in the neighbor setting.

Related commands

```

network
passive-interface
distribute-list out

```

network

Specifies the destination network for RIP transmission. RIP packets are sent and received on interfaces within the specified network range. RIP packets are not sent or received on interfaces outside the range.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set information:

```
network <ipv4 prefix> [<wildcard mask>]
```

To delete information:

```
no network <ipv4 prefix> [<wildcard mask>]
```

Input mode

```
(config-router)
```

```
(config-router-af)
```

Parameters

<ipv4 prefix>

Specifies the destination network for RIP transmission.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

Note: Set to 0 all bits that follow the bits specified for *<wildcard mask>* of *<ipv4 prefix>*.

<wildcard mask>

Specifies a wildcard mask.

1. Default value when this parameter is omitted:

A wildcard mask is automatically calculated based on the destination network address.

The following table lists the wildcard masks that are automatically generated.

Table 17-3: Wildcard masks that are automatically generated

No.	Destination network address	Wildcard mask
1	0.0.0.0	255.255.255.255
2	class-A address	0.255.255.255
3	class-B address	0.0.255.255
4	class-C address	0.0.0.255

2. Range of values:

Specify in IPv4 address format.

Note: Specify the wildcard mask so that when it is converted to a binary number, all bits after the first 1 bit are set to 1.

Default behavior

RIP packets are not sent.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are learned or advertised.

Notes

1. Advertisement of direct routes applies only to direct routes within the range specified by the `network` command. Note that direct routes outside this range are not advertised.

Related commands

```
neighbor  
passive-interface  
distribute-list in  
distribute-list out
```

passive-interface

Disables a specified interface from sending routing information in RIP packets. Use this command if you do not want to notify other routers of routing information (for example, when the remote router is using static routing). This command can control only the interfaces enabled for RIP packet transmission in the `network` setting.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set information:

```
passive-interface {default | <interface type> <interface number>}
```

To delete information:

```
no passive-interface {default | <interface type> <interface number>}
```

Input mode

```
(config-router)
(config-router-af)
```

Parameters

```
{default | <interface type> <interface number>}
```

Specifies the interface to be prevented from sending RIP packets.

`default`

Prevents all interfaces from sending RIP packets.

`<interface type> <interface number>`

Specifies the interface to be prevented from sending RIP packets.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<interface type>` and `<interface number>`, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

- * Ethernet interface
- * Ethernet subinterface
- * Port channel interface
- * Port channel subinterface
- * Management port (specifiable only for `config-router` mode)

Default behavior

Routing information is sent in RIP packets.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are advertised.

Notes

1. Specify the `passive-interface default` command to disable transmission for all interfaces available for RIP packet transmission. In this state, if you specify the `no passive-interface <interface type> <interface number>` command, the specified interface becomes available for transmission.

Related commands

```
network  
neighbor  
distribute-list out
```

router rip

Configures router settings related to the RIP routing protocol. After this command is entered, the mode changes to `config-router` mode.

Syntax

To set information:

```
router rip
```

To delete information:

```
no router rip
```

Input mode

(`config`)

Parameters

None

Default behavior

RIP is disabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Sending and receiving RIP packets is not enabled simply by specifying this command. For details about RIP packet transmission and reception, see *network*.

Related commands

`network`

timers basic

Specifies the values of the various RIP timers.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set or change information:

```
timers basic <update> <aging> <garbage collection>
```

To delete information:

```
no timers basic
```

Input mode

```
(config-router)
```

```
(config-router-af)
```

Parameters

<update>

Specifies the value of the periodic advertisement timer in seconds.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 60 in decimal.

<aging>

Specifies the value of the aging timer in seconds.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 360 in decimal.

<garbage collection>

Specifies the time (seconds) that can elapse after the route is disabled until it is deleted from the routing table. During the specified period of time, the route is advertised with Metric 16 to the RIP destination.

Notes

The timer value that is actually applied will be a multiple of the periodic advertisement timer value.

If the setting is not a multiple of the periodic advertisement timer value and is greater than that timer value, the largest multiple of the periodic advertisement timer value that does not exceed the setting is applied.

If the setting value is smaller than the periodic advertisement timer value, the periodic advertisement timer value is applied.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:
Specify 1 to 480 in decimal.

Default behavior

The following initial values are set.

- *<update>*: 30 seconds
- *<aging>*: 180 seconds
- *<garbage collection>*: 60 seconds

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

version

Specifies the RIP version and the type of message destination IP address. The version specified for a specific interface has priority over the information specified by this command.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

The following table lists the RIP version and the type of destination IP address that are used depending on the value set by the command.

Table 17-4: RIP version and type of destination IP address

No.	Value set	Version	Type of destination IP address
1	When this command is omitted	1	Broadcast
2	version 1	1	Broadcast
3	version 2	2	Multicast

Syntax

To set or change information:

`version { 1 | 2 }`

To delete information:

`no version`

Input mode

`(config-router)`

`(config-router-af)`

Parameters

`{ 1 | 2 }`

Specifies the version.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The initial value is 1.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are learned or advertised.

Notes

None

Related commands

```
ip rip version  
ip rip v2-broadcast
```


Chapter

18. RIPng

- default-metric
- disable
- distance
- generate-secondary-route
- inherit-metric
- ipv6 rip enable
- ipv6 rip metric-offset
- ipv6 router rip
- passive-interface
- timers basic

default-metric

Specifies the metric to be used when routing information learned by another protocol is advertised by RIPvng. Metric values that were set by using the `redistribute` or `distribute-list out` command have priority over the metric information specified by using this command. This command applies to static routes, OSPFv3 routes, and BGP4+ routes.

Syntax

To set or change information:

```
default-metric <metric>
```

To delete information:

```
no default-metric
```

Input mode

(config-rtr-rip)

Parameters

<metric>

Specifies a metric.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 16 in decimal.

Default behavior

The following initial values are set.

- Static route: Metric 1
- OSPFv3 route: Metric 16
- BGP4+ route: Metric 16

Impact on communication

None

When the change is applied

The change is applied the next time the routes are advertised.

Notes

None

Related commands

```
inherit-metric  
distribute-list out  
redistribute  
ipv6 rip metric-offset
```

disable

Disables RIPng.

Syntax

To set information:
`disable`

To delete information:
`no disable`

Input mode

`(config-rtr-rip)`

Parameters

None

Default behavior

RIPng is enabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

distance

Specifies the distance for routing information learned by RIPng. A distance that was specified by using the `distribute-list in` command has priority over a distance specified by using this command.

Syntax

To set or change information:
`distance <distance>`

To delete information:
`no distance`

Input mode

(config-rtr-rip)

Parameters

<distance>

Specifies the distance for RIPng.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

Default behavior

The initial value is 120.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are learned.

Notes

None

Related commands

None

generate-secondary-route

Registers a secondary route in the routing table.

Syntax

To set information:

```
generate-secondary-route
```

To delete information:

```
no generate-secondary-route
```

Input mode

```
(config-rtr-rip)
```

Parameters

None

Default behavior

A secondary route is not registered in the routing table.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are learned.

Notes

None

Related commands

None

inherit-metric

Specifies that the metric is to be inherited when routing information learned by another routing protocol is advertised by RIPng.

Syntax

To set information:
`inherit-metric`

To delete information:
`no inherit-metric`

Input mode

`(config-rtr-rip)`

Parameters

None

Default behavior

The metric is not inherited.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are advertised.

Notes

None

Related commands

`default-metric`
`distribute-list out`
`redistribute`
`ipv6 rip metric-offset`

ipv6 rip enable

Enables RIPng on the specified interface.

Syntax

To set information:

```
ipv6 rip enable
```

To delete information:

```
no ipv6 rip enable
```

Input mode

(config-if)

Ethernet interface, port channel interface, management port, or loopback interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

RIPng is disabled on the specified interface.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 router rip
```

ipv6 rip metric-offset

Specifies the metric increment when RIPng packets are sent or received via the interface.

Syntax

To set or change information:

```
ipv6 rip metric-offset <metric> { in | out }
```

To delete information:

```
no ipv6 rip metric-offset [<metric>] { in | out }
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<metric>

Specifies a metric.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 16 in decimal.

{ in | out }

in

Specify this to add the metric when packets are received

out

Specify this to add the metric when packets are sent.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

- The metric increment when packets are received is set to 1.
- The metric increment when packets are sent is set to 0.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are learned or advertised.

Notes

None

Related commands

```
default-metric  
inherit-metric  
distribute-list in  
distribute-list out
```

ipv6 router rip

Configures router settings related to the RIPng routing protocol.

After this command is entered, the mode changes to `config-rtr-rip` mode.

Syntax

To set information:

```
ipv6 router rip [vrf <vrf id>]
```

To delete information:

```
no ipv6 router rip [vrf <vrf id>]
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the VRF to which RIPng belongs.

1. Default value when this parameter is omitted:

Belongs to the global network.

2. Range of values:

Specify a VRF ID.

For details, see *Specifiable values for parameters*.

Default behavior

RIPng is disabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 rip enable
```

passive-interface

Disables a specified interface from sending routing information in RIPng packets. Use this command if you do not want to notify other routers of routing information (for example, when the remote router is using static routing). This command can control only the interfaces enabled for RIPng packet transmission.

Syntax

To set information:

```
passive-interface {default | <interface type> <interface number>}
```

To delete information:

```
no passive-interface {default | <interface type> <interface number>}
```

Input mode

(config-rtr-rip)

Parameters

```
{default | <interface type> <interface number>}
```

Specifies the interface to be prevented from sending RIPng packets.

default

Prevents all interfaces from sending RIPng packets.

<interface type> <interface number>

Specifies the interface to be prevented from sending RIPng packets.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For **<interface type>** and **<interface number>**, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface in Specifiable values for parameters*.

- * Ethernet interface
- * Ethernet subinterface
- * Port channel interface
- * Port channel subinterface
- * Management port (specifiable only for global network settings)

Default behavior

Routing information is sent in RIPng packets.

Impact on communication

None

When the change is applied

The change is applied the next time the routes are advertised.

Notes

1. Specify the `passive-interface default` command to disable transmission for all interfaces available for RIPng packet transmission. In this state, if you specify the `no`

`passive-interface <interface type> <interface number>` command, the specified interface becomes available for transmission.

Related commands

`distribute-list out`

timers basic

Specifies the values of the various RIPng timers.

Syntax

To set or change information:

```
timers basic <update> <aging> <garbage collection>
```

To delete information:

```
no timers basic
```

Input mode

(config-rtr-rip)

Parameters

<update>

Specifies the value of the periodic advertisement timer in seconds.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 60 in decimal.

<aging>

Specifies the value of the aging timer in seconds.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 360 in decimal.

<garbage collection>

Specifies the time (in seconds) that can elapse after the route is disabled until it is deleted from the routing table. During the specified period of time, the route is advertised with Metric 16 to the RIPng destination.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 480 in decimal.

Default behavior

The following initial values are set.

- *<update>*: 30 seconds
- *<aging>*: 180 seconds
- *<garbage collection>*: 120 seconds

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

Chapter

19. OSPF

- area authentication
- area default-cost
- area nssa
- area nssa translate
- area range
- area stub
- area virtual-link
- areaid-format
- default-metric
- disable
- distance ospf
- graceful-restart mode
- graceful-restart restart-time
- graceful-restart strict-lsa-checking
- ip ospf area
- ip ospf authentication
- ip ospf authentication-key
- ip ospf cost
- ip ospf dead-interval
- ip ospf hello-interval
- ip ospf message-digest-key
- ip ospf network
- ip ospf priority
- ip ospf retransmit-interval
- ip ospf transmit-delay
- max-metric router-lsa
- maximum-paths
- message-size
- neighbor
- network
- passive-interface
- router-id
- router ospf
- suppress-fa
- timers spf

area authentication

Selects plain-text password authentication or MD5 authentication as the authentication method at the area level.

You can also specify an authentication method on a specific interface (by using the `ip ospf authentication` command in `config-if` mode). The authentication method that is set for a specific interface has priority over the information that is set by using this command.

Executing the `no area` command deletes this command, too.

Syntax

To set or change information:

```
area <area id> authentication [message-digest]
```

To delete information:

```
no area <area id> authentication
no area <area id>
```

Input mode

(config)

Parameters

<area id>

Specifies the area to which the Device belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify either a value in the range from 0 to 4294967295 (in decimal) or an IPv4 address.

message-digest

Selects MD5 authentication.

1. Default value when this parameter is omitted:

Plain-text password authentication is selected.

2. Range of values:

None

Default behavior

Null authentication (only checksum verification is performed and no authentication is performed) is set as the authentication method at the area level.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`ip ospf authentication`

```
ip ospf authentication-key  
ip ospf message-digest-key
```

area default-cost

Specifies the cost value of the default route that an area boundary router advertises to a stub area or NSSA. In an NSSA, the LSA used for advertising the default route differs depending on the configuration settings. This command is valid for advertisements for inter-area routing information (Type3 LSA).

Executing the `no area` command deletes this command, too.

Syntax

To set or change information:

```
area <area id> default-cost <cost>
```

To delete information:

```
no area <area id> default-cost
no area <area id>
```

Input mode

(config-router)

Parameters

<area id>

Specifies the area ID of a stub area or NSSA. If you specify any other area, this command is invalid.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify either a value in the range from 1 to 4294967295 (in decimal) or an IPv4 address other than 0.0.0.0.

<cost>

Specifies the cost value.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

Default behavior

The initial value is 1.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
area nssa
area stub
```

area nssa

Allows areas other than area 0 to function as NSSAs. In an NSSA, external AS routes learned by other areas are prevented from being advertised.

Executing the `no area` command deletes this command, too.

Syntax

To set or change information:

```
area <area id> nssa [default-information-originate [<metric> [<metric type>]]] [no-summary] [no-redistribution]
```

To delete information:

```
no area <area id> nssa
no area <area id>
```

Input mode

(config-router)

Parameters

<area id>

Specifies the area to which the Device belongs.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 1 to 4294967295 (in decimal) or an IPv4 address (except 0.0.0.0).

default-information-originate

Specifies that the area boundary router advertises the default route as external AS routing information (Type 7 LSA) to the NSSA.

1. Default value when this parameter is omitted:
External AS routes are not advertised. However, if the `no-summary` parameter is specified, the default route is advertised as inter-area routing information (Type 3 LSA).
2. Range of values:
None

<metric>

Specifies a metric for the default route.

1. Default value when this parameter is omitted:
1
2. Range of values:
Specify 1 to 65535.

<metric type>

Specifies a metric type for the default route.

1. Default value when this parameter is omitted:
2
2. Range of values:

Specify 1 or 2.

no-summary

The area boundary router does not advertise any routes from other areas, and instead advertises the default route as inter-area routing information (Type 3 LSA).

1. Default value when this parameter is omitted:
Routes from other areas (inter-area routing information) are advertised to the NSSA.
2. Range of values:
None

no-redistribution

Even if advertised route filtering has been configured (by using the `redistribute` command) for the area boundary filter, routes learned by other protocols are prevented from being advertised.

1. Default value when this parameter is omitted:
Routes learned by other protocols (external AS routing information) are advertised to the NSSA.
2. Range of values:
None

Default behavior

The areas do not work as NSSAs.

Impact on communication

Adjacency with neighboring routers within the area is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

area nssa translate

Specifies that when external AS routes (Type 7 LSA) learned from an NSSA are translated to an area other than the NSSA, the routes are advertised with the forwarding address set to 0.0.0.0. This command is valid only for area border routers with an NSSA configured.

Executing the `no area` command deletes this command, too.

Syntax

To set information:

```
area <area id> nssa translate type7 suppress-fa
```

To delete information:

```
no area <area id> nssa translate
no area <area id>
```

Input mode

(config-router)

Parameters

<area id>

Specifies the area ID of an NSSA.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 4294967295 (in decimal) or an IPv4 address (except 0.0.0.0).

`type7 suppress-fa`

Specifies that the forwarding destination address for the external AS routes (Type 7 LSA) for the NSSA is not inherited.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The forwarding destination address for Type 7 LSA learned from the NSSA is inherited and then set as the forwarding address.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`area nssa`

area range

Specifies networks in an area. A maximum of 1024 networks can be specified.

Use this command to configure route summarization on an area boundary router. This command is useful for reducing the amount of routing information transmitted between areas.

Executing the `no area` command deletes this command, too.

Syntax

To set or change information:

```
area <area id> range <ipv4 prefix> <mask> [{advertise | not-advertise}]
```

To delete information:

```
no area <area id> range <ipv4 prefix> <mask>
no area <area id>
```

Input mode

(config-router)

Parameters

<area id>

Specifies the area to which the Device belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 (in decimal) or an IPv4 address.

<ipv4 prefix>

Specifies a network.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IP address. Set the bits within the range of *<mask>* to a value other than 0, and set the bits outside the range of *<mask>* to 0.

Note: For *<ipv4 prefix>*, set 0 to the bits outside the range of *<mask>*.

<mask>

Specifies a mask.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IP address mask (other than 0).

Note: Specify the address mask so that when it is converted to a binary number, all bits after the first bit that is 0 are set to 0.

{advertise | not-advertise}

Specifies whether to advertise inter-area routes. The routing information that matches the specified network range is not advertised to other areas as inter-area routes. Instead, this

command allows you to advertise only a specified range as inter-area routes to other areas. However, if you specify `not-advertise`, nothing will be advertised.

1. Default value when this parameter is omitted:
`advertise` (Information is advertised as inter-area routes).
2. Range of values:
None

Default behavior

Individual routes connecting the areas are advertised without being summarized.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

area stub

Allows areas other than area 0 to function as stub areas.

In a stub area, external AS routes are prevented from being advertised.

Executing the `no area` command deletes this command, too.

Syntax

To set or change information:

```
area <area id> stub [no-default-summary] [no-summary]
```

To delete information:

```
no area <area id> stub
no area <area id>
```

Input mode

(config-router)

Parameters

<area id>

Specifies the area to which the Device belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 4294967295 (in decimal) or an IPv4 address (except 0.0.0.0).

`no-default-summary`

Specifies that the area boundary router does not advertise the default route to the stub area.

1. Default value when this parameter is omitted:

The default route is advertised to the stub area.

2. Range of values:

None

`no-summary`

Prevents routes from other areas from being advertised to the stub area.

1. Default value when this parameter is omitted:

Routes from other areas (inter-area routing information) are advertised.

2. Range of values:

None

Default behavior

Areas other than area 0 do not function as stub areas.

Impact on communication

Adjacency with neighboring routers within the area is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

area virtual-link

Specifies a virtual link. The virtual link is used for connecting an area boundary router that is not directly connected to area 0 (backbone area) to area 0. A virtual link is identified by a transit area and the remote router ID.

Executing the `no area` command deletes this command, too.

Syntax

To set or change information:

```
area <area id> virtual-link <router id> [hello-interval <seconds>]
[retransmit-interval <seconds>] [transmit-delay <seconds>] [dead-interval
<seconds>] [authentication-key <key>]
area <area id> virtual-link <router id> [message-digest-key <key id> md5
<key>]
```

To delete information:

```
no area <area id> virtual-link <router id>
no area <area id>
```

Input mode

(config-router)

Parameters

<area id>

Specifies a transit area. You cannot specify a stub area or NSSA.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 4294967295 (in decimal) or an IPv4 address (except 0.0.0.0).

<router id>

Specifies the ID of the remote router on the virtual link.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

hello-interval <seconds>

Specifies, in seconds, the sending interval for hello packets.

1. Default value when this parameter is omitted:

10

2. Range of values:

Specify 1 to 255 (seconds) in decimal.

retransmit-interval <seconds>

Specifies the retransmission interval in seconds.

1. Default value when this parameter is omitted:

5

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

`transmit-delay <seconds>`

Specifies the delay time in seconds.

1. Default value when this parameter is omitted:

1

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

`dead-interval <seconds>`

Specifies the number of seconds that can elapse before the neighboring router is deemed to be down.

1. Default value when this parameter is omitted:

Four times as large as the value of `hello-interval`.

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

`authentication-key <key>`

Specifies a key that is used for authentication on a virtual link when plain-text password authentication is enabled for area 0 (using the `area authentication` command).

1. Default value when this parameter is omitted:

Plain-text authentication is disabled.

2. Range of values:

Enclose a character string of no more than 8 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string in Specifiable values for parameters*.

`message-digest-key <key id>`

Specifies that when MD5 authentication is enabled for area 0 (by using the `area authentication` command), message digests are to be used for authentication on a virtual link. For details about MD5, see *ip ospf message-digest-key*.

1. Default value when this parameter is omitted:

MD5 authentication is disabled.

2. Range of values:

Specify, in decimal, an identifier in the range from 0 to 255.

`md5 <key>`

Specifies a key used to generate message digests.

1. Default value when this parameter is omitted:

This parameter cannot be omitted if you set the `message-digest-key` parameter.

2. Range of values:

Enclose a character string of no more than 16 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a

character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string* in *Specifiable values for parameters*.

Default behavior

There are no virtual links.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. A virtual link must be configured in both routers that serve as the endpoints. For each endpoint router, the router ID of the remote router must be set. Therefore, use a method such as setting the `router-id` command in `config-router` mode to define the router ID.
2. Use the same MD5 transmission key (specified for the `message-digest-key` parameter) for all routers connected to the same interface. Generally, make sure that only one key exists in the setting except when the setting is being changed for transition to a new key.

Related commands

`area authentication`

areaid-format

Specifies the display format of an area ID that is displayed by the `show ip ospf` operation command (displaying OSPF protocol information).

Syntax

To set or change information:

```
areaid-format {decimal | ipv4 address}
```

To delete information:

```
no areaid-format
```

Input mode

(config-router)

Parameters

{decimal | ipv4 address}

Specifies display format for an area ID.

Specify `decimal` to display the area ID as a decimal number. Specify `ipv4-address` to display the area ID as an IPv4 address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The area ID is displayed as a decimal number.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

default-metric

Specifies the metric of a route to be advertised as an external AS route. This command does not apply to directly connected routes. Metrics specified by using the `redistribute` command have priority over the information specified by this command.

Syntax

To set or change information:

```
default-metric <metric>
```

To delete information:

```
no default-metric
```

Input mode

(config-router)

Parameters

<metric>

Specifies a metric.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 65535 in decimal.

Default behavior

Metric 1 is set for a BGP route. Metric 20 is set for other routes.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`redistribute`

disable

Disables OSPF.

Syntax

To set information:
`disable`

To delete information:
`no disable`

Input mode

(config-router)

Parameters

None

Default behavior

OSPF is enabled.

Impact on communication

OSPF operation stops.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

distance ospf

Sets the distance for OSPF. You can specify different distances for each route type.

Syntax

To set or change information:

You can use either of the following two formats. Whichever is used, the results are the same.

Individual setting

```
distance [ospf {external | inter-area | intra-area}] <distance>
```

Note: You cannot specify both settings without route type specifications (`distance <distance>`) and settings with route type specifications. (If specified, the settings are overwritten.)

Concurrent setting of multiple parameters

```
distance ospf [intra-area <distance>] [inter-area <distance>] [external <distance>]
```

To delete information (delete all):

```
no distance
```

Input mode

(config-router)

Parameters

{external | inter-area | intra-area}

Specifies the type of route to which the `<distance>` parameter setting applies.

Specify `external` (external AS route), `inter-area` (inter-area route), or `intra-area` (intra-area route). Note that an inter-area route refers to a route from another area that is not directly connected.

1. Default value when this parameter is omitted:

The setting applies to all routes.

If you set `<distance>` with this parameter omitted to change information, other settings (information set by this parameter) will be deleted.

2. Range of values:

None

`<distance>`

Specifies a distance.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

Default behavior

The initial value is 110 for all OSPF routes.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`distribute-list in`

graceful-restart mode

Specifies whether to enable graceful restart functionality for OSPF.

For graceful restarts, both restart router functionality and helper router functionality exist. To use the restart router functionality, the helper router functionality must be enabled for all neighboring routers.

Syntax

To set or change information:

```
graceful-restart mode { restart | helper | both }
```

To delete information:

```
no graceful-restart mode
```

Input mode

(config-router)

Parameters

{ restart | helper | both }

Specifies the restart functionality or helper functionality.

If you specify `both`, both the restart functionality and helper functionality are enabled.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The restart router functionality and helper router functionality are disabled.

Impact on communication

None

When the change is applied

The change is applied when the next graceful restart is performed. The helper functionality is activated when a neighboring router starts a graceful restart.

Notes

1. To use the restart functionality, either set the `router-id` command to specify the router ID, or set an IPv4 address for the loopback interface. If you do not specify one of these settings, the router ID might change before or after the graceful restart begins. If the router ID changes, graceful restart fails.

Related commands

```
graceful-restart restart-time
graceful-restart strict-lsa-checking
routing options graceful-restart time-limit
```

graceful-restart restart-time

Specifies the time allowed for reconnection after restarting when the restart router functionality for graceful restart is used in OSPF.

Syntax

To set or change information:

```
graceful-restart restart-time <seconds>
```

To delete information:

```
no graceful-restart restart-time
```

Input mode

(config-router)

Parameters

<seconds>

Specifies (in seconds) the time allowed for graceful restart reconnection.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 3600 in decimal.

Default behavior

60 seconds is set.

Impact on communication

None

When the change is applied

The change is applied when the next graceful restart is performed.

Notes

None

Related commands

```
graceful-restart mode  
graceful-restart strict-lsa-checking  
routing options graceful-restart time-limit
```

graceful-restart strict-lsa-checking

Allows the helper router to stop the helper process if the LSA database is no longer synchronized with that of the restart router.

If you set this command, the helper process stops when either of the following conditions exists:

- During LSA advertisement, a graceful-restart start notification is received from a neighboring router that has not completed its response.
- After the helper process has started, a new LSA other than periodic advertisement is generated or learned, and then advertised to the restart router.

Syntax

To set information:

```
graceful-restart strict-lsa-checking
```

To delete information:

```
no graceful-restart strict-lsa-checking
```

Input mode

(config-router)

Parameters

None

Default behavior

Graceful restart continues even if the LSA databases are not synchronized.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Specify the same information in this command for all helper routers. This is because if at least one helper stops the graceful restart functionality, the restart router stops the graceful restart functionality with all helpers.

Related commands

```
graceful-restart mode
```

ip ospf area

Enables OSPF. OSPF operates on a specified domain.

If `multihoming` is specified (that is, multiple IP addresses are set) for the interface, OSPF is enabled for all IP addresses. If you want to specify an individual IP address, use the `network` command in `config-router` mode.

Syntax

To set or change information:

```
ip ospf <domain no.> area <area id>
```

To delete information:

```
no ip ospf [<domain no.>] area
```

Input mode

(`config-if`)

Ethernet interface, port channel interface, management port, or loopback interface

(`config-subif`)

Ethernet subinterface or port channel subinterface

Parameters

<domain no.>

Specifies a domain number. Set the same value as the domain number specified for the `router ospf` command. If you set a different value, the domain will operate as a different domain.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

<area id>

Specifies the area to which the interface belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 (in decimal) or an IPv4 address.

Default behavior

If neither the `ip ospf area` command nor the `network` command in `config-router` mode is specified, OSPF is disabled.

Impact on communication

If the domain number or area ID is changed, adjacency is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. You can configure only one domain. If the domain number is changed, adjacency is briefly

disconnected.

2. This command is invalid if the same interface is specified for this command and the `network` command in `config-router` mode (the `network` command has priority).
3. Before setting this command, you need to set the `router-id` command. Even if OSPF has not been configured in `config-router` mode, the interface for which this command is set will run OSPF. In this case, the router ID is automatically selected. Therefore, if you manually set the router ID later, the router ID being used is changed.
4. When this command is set for the global network, if you use the `no router ospf` command with `<domain no.>` specified to delete the domain that has the specified `<domain no.>`, this command is also deleted. In addition, when this command is set for the VRF, if you use the `no router ospf` command with `<domain no.>` and `<vrf id>` specified to delete the domain whose VRF and `<domain no.>` match the specification, this command is also deleted.
5. If you specify `no router ospf <domain no.>` to delete the setting, if the `<domain no.>` value is the same for both commands, the information set by the `ip ospf area` command is also deleted.

Related commands

```
network (router ospf)
ip address
```

ip ospf authentication

Selects plain-text password authentication or MD5 authentication as the authentication method for OSPF packets. If you perform authentication on a specified interface, you need to set the authentication method at the area level or use this command. To set the authentication method at the area level, use the `area authentication` command in `config-router` mode.

Syntax

To set or change information:

```
ip ospf authentication [{message-digest | null}]
```

To delete information:

```
no ip ospf authentication
```

Input mode

(`config-if`)

Ethernet interface, port channel interface, or management port

(`config-subif`)

Ethernet subinterface or port channel subinterface

Parameters

{`message-digest` | `null`}

Specifies the authentication method.

Specify either `message-digest` (MD5 authentication) or `null` (null authentication). If you specify null authentication, only checksum verification is performed and no authentication is performed.

1. Default value when this parameter is omitted:

Plain-text password authentication is selected.

2. Range of values:

None

Default behavior

The authentication method set for the area is used. If the authentication method is not set, null authentication is set.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If you set this command, the authentication method at the area level (set by the `area authentication` command in `config-router` mode) does not apply to the interface.

Related commands

```
area authentication
ip ospf authentication-key
ip ospf message-digest-key
```

ip ospf authentication-key

Specifies the authentication key. This key is used for authentication when plain-text password authentication is enabled (using the `area authentication` or `ip ospf authentication` command).

Syntax

To set or change information:

```
ip ospf authentication-key <key>
```

To delete information:

```
no ip ospf authentication-key
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<key>

This key is used for authentication.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Enclose a character string of no more than 8 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string* in *Specifiable values for parameters*.

Default behavior

Plain-text authentication is disabled for the interface.

Impact on communication

If a neighboring router on the same network uses a key that is different from the value set in this command, OSPF packets will be discarded.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip ospf authentication
area authentication
```

ip ospf cost

Specifies the cost value for an interface.

Syntax

To set or change information:

```
ip ospf cost <cost>
```

To delete information:

```
no ip ospf cost
```

Input mode

(config-if)

Ethernet interface, port channel interface, management port, or loopback interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<cost>

Specifies the cost value.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

Default behavior

The initial value is 1. However, 0 is set for the loopback interface.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ip ospf dead-interval

Specifies the length of time that the router maintains adjacency when hello packets can no longer be received from a neighboring router. When the specified time has elapsed since the last hello packet was received, the neighboring router is deemed to be down.

Syntax

To set or change information:

```
ip ospf dead-interval <seconds>
```

To delete information:

```
no ip ospf dead-interval
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Specifies the length of time that adjacency is to be maintained.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

Default behavior

The initial value is set to be 4 times as large as the value of `hello-interval`.

Impact on communication

None. However, if the value of `dead-interval` is different among the routers connected to the same network, adjacency will be disconnected after the time set for `dead-interval` has elapsed.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The value set for `dead-interval` must be the same for the routers connected to the same network.

Related commands

```
ip ospf hello-interval
```

ip ospf hello-interval

Specifies the sending interval for hello packets.

Syntax

To set or change information:

```
ip ospf hello-interval <seconds>
```

To delete information:

```
no ip ospf hello-interval
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Specifies the sending interval.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 255 (seconds) in decimal.

Default behavior

For an NBMA interface (an interface for which `non-broadcast` is specified for the `ip ospf network` command), the initial value is 30 seconds. For other cases, the initial value is set to 10 seconds.

Impact on communication

None. However, if the value of `hello-interval` is different among the routers connected to the same network, adjacency will be disconnected after the time set for `dead-interval` has elapsed.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The same transmission interval must be set for the routers connected to the same network.

Related commands

```
ip ospf dead-interval
ip ospf network
```

ip ospf message-digest-key

Specifies a key used to generate message digests. Message digests are used for authentication when MD5 authentication is enabled (using the `area authentication` or `ip ospf authentication` command).

Generally, the Device uses only one key for transmission. Although you can set multiple keys with different key IDs, to send hello packets in the process of establishing adjacency, the Device uses only the key that has the greatest key ID.

Multiple keys are used for authentication in the following cases:

- Authentication of received packets
- After adjacency is established, if neighboring routers advertise different key IDs, the maximum key advertised by each neighboring router is also used to generate a message digest for packets to be sent. That is, a packet having the same contents is sent several times with only authentication information changed.

Syntax

To set or change information:

```
ip ospf message-digest-key <key id> md5 <key>
```

To delete information:

```
no ip ospf message-digest-key <key id>
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<key id>

Specifies a key ID.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify, in decimal, an identifier (key ID) in the range from 0 to 255.

md5 *<key>*

Specifies the authentication key. In MD5 authentication, a received packet is authenticated by comparing the message digest of the received packet with a message digest generated from the authentication key that has the same key ID as the received packet.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Enclose a character string of no more than 16 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any*

character string in Specifiable values for parameters.

Default behavior

MD5 authentication is disabled for the interface.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Use the same key for transmission for all routers in the same interface. Generally, make sure that settings for only one key exist except when the setting is being changed for transition to a new key.

Related commands

```
ip ospf authentication
area authentication
```

ip ospf network

Specifies the OSPF network type.

The following describes the OSPF network types.

- Broadcast

Multiple neighboring routers on an interface are managed in an integrated manner by using multicast packets.

- Non-broadcast multiple-access (NBMA)

Multiple neighboring routers are managed in an integrated manner without using broadcast or multicast.

- Point-to-point

A single neighboring router is managed per IPv4 interface.

Syntax

To set or change information:

```
ip ospf network {broadcast | non-broadcast | point-to-point}
```

To delete information:

```
no ip ospf network
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

{broadcast | non-broadcast | point-to-point}

Specifies the network type for the OSPF interface.

broadcast

Broadcast is used.

non-broadcast

NBMA is used.

point-to-point

Point-to-point is used.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

Broadcast is used.

Impact on communication

Adjacency is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Make sure that the specified network type matches that of the neighboring device.

Related commands

```
neighbor (router ospf)
```

ip ospf priority

Specifies the priority for determining a designated router. A router with the highest priority in the network will be the designated router, and a router with the second-highest priority will be the backup designated router. However, if the designated router and the backup designated router have already been determined, they are not changed even if a router that has a higher priority is started.

Note that when the network type is point-to-point, a designated router is not selected because only one neighboring router is used.

Syntax

To set or change information:

```
ip ospf priority <priority>
```

To delete information:

```
no ip ospf priority
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<priority>

Specifies the priority.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 255 in decimal. A value of 0 makes the router ineligible to become a designated router.

The highest priority is 255, and the lowest priority is 1.

Default behavior

For broadcast and NBMA, the initial value is set to 1. For point-to-point, 0 is always set irrespective of the setting value.

Impact on communication

None. However, if you specify 0 when the local router is the designated router, adjacency is briefly disconnected.

When the change is applied

If you set 0, the setting takes effect immediately.

If you set 1 or a greater value, the setting takes effect from the next establishment of adjacency with the neighboring router.

Notes

None

Related commands

None

ip ospf retransmit-interval

Specifies the re-transmission interval for OSPF packets.

Syntax

To set or change information:

```
ip ospf retransmit-interval <seconds>
```

To delete information:

```
no ip ospf retransmit-interval
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Specifies the retransmission interval.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

Default behavior

The initial value is set to five seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ip ospf transmit-delay

Specifies the delay time required to send an OSPF packet. Set this command if you want to perform OSPF aging correctly.

Syntax

To set or change information:

```
ip ospf transmit-delay <seconds>
```

To delete information:

```
no ip ospf transmit-delay
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Specifies a delay time.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

Default behavior

The initial value is set to 1 second.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

max-metric router-lsa

Specifies that the device uses the maximum cost for advertisements and operates as a stub router.

Syntax

To set or change information:

```
max-metric router-lsa [on-startup <seconds>]
```

To delete information:

```
no max-metric router-lsa
```

Input mode

(config-router)

Parameters

on-startup

After startup, restart, or system switchover, the device operates as a stub router.

1. Default value when this parameter is omitted:

The functionality is always enabled.

2. Range of values:

None

<seconds>

Specifies the length of time that the device operates as a stub router after startup, restart, or system switchover.

1. Default value when this parameter is omitted:

This parameter cannot be omitted if you specify the `on-startup` parameter.

2. Range of values:

Specify 5 to 86400 (seconds) in decimal.

Default behavior

The device does not operate as a stub router.

Impact on communication

None

When the change is applied

- The change is applied immediately after setting values are changed.
- If you specify the `on-startup` parameter, the change takes effect after the restart or system switchover. Note that if the device is running as a stub router, adding the `on-startup` parameter immediately terminates the stub router.

Notes

1. If a stub router setting is added or deleted while the helper functionality for graceful restarts is operating, the graceful restart fails.

Related commands

None

maximum-paths

Specifies the maximum number of paths in the route when multiple paths (next hops) of equal cost exist for an OSPF-generated route.

Syntax

To set or change information:
`maximum-paths <number>`

To delete information:
`no maximum-paths`

Input mode

(config-router)

Parameters

<number>

Specifies the maximum number of paths.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 16 in decimal.

Note, however, that if `ip urpf` is set, you cannot set 9 or a greater value for *<number>*.

Default behavior

The initial value is 4.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

message-size

Specifies the maximum length of an OSPF packet the Device sends (the length of the IP packet from the IP header to the data section).

Syntax

To set or change information:
 `message-size <length>`

To delete information:
 `no message-size`

Input mode

(config-router)

Parameters

<length>

Specifies the maximum length of an OSPF packet.

Note that the specified setting is applied to all OSPF interfaces except virtual links, and that the IP MTU length is applied to an interface whose IP MTU length is shorter.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1280 to 9216 (octets)

Default behavior

The IP MTU length is the maximum OSPF packet length.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the LSA size learned from the neighboring router is larger than the specified value, packets of the IP MTU length, which is the maximum packet length, might be sent. Therefore, set the IP MTU lengths of the interfaces to the same MTU lengths as the other devices on the network.

Related commands

`ip mtu`
`mtu`

neighbor

Specifies the interface address of the remote router to which OSPF packets are sent.

This command is valid for NBMA interfaces (a network for which `non-broadcast` is specified for the `ip ospf network` command).

Syntax

To set or change information:

```
neighbor <ip address> [priority <number>] [poll-interval <seconds>]
```

To delete information:

```
no neighbor <ip address>
```

Input mode

(config-router)

Parameters

<ip address>

Specifies the remote router.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

priority <number>

Specifies the priority of the designated router for the remote router.

This priority is used to determine the destination of hello packets. A router that is neither a designated router nor a backup designated router sends hello packets to a remote router that is priority 1 or higher. This router does not send hello packets to a remote router that is priority 0, which means that the router is ineligible to become a designated router.

1. Default value when this parameter is omitted:

0

2. Range of values:

Specify 0 to 255 in decimal.

(If the router is eligible to become a designated router, specify a number equal to or greater than 1.)

poll-interval <seconds>

Specifies the interval (in seconds) for sending hello packets when the router is deemed to be down. Set a value greater than the `hello-interval` value.

1. Default value when this parameter is omitted:

120

2. Range of values:

Specify 1 to 255 in decimal.

Default behavior

This parameter cannot be omitted when an NBMA interface is used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip ospf network
ip ospf hello-interval
ip ospf priority
ip address
```

network

Specifies the network in which OSPF operates. OSPF operates on the interfaces that match the specified range. If *<ipv4 prefix>* is set to 0.0.0.0 and *<wildcard mask>* is set to 255.255.255.255, OSPF operates in all networks.

Syntax

To set or change information:

```
network <ipv4 prefix> <wildcard mask> area <area id>
```

To delete information:

```
no network <ipv4 prefix> <wildcard mask>
```

Input mode

(config-router)

Parameters

<ipv4 prefix>

Specifies a network.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

Note: Set all the bits specified for *<wildcard mask>* of *<ipv4 prefix>* to 0.

<wildcard mask>

Specifies a wildcard mask.

1. Default

This parameter cannot be omitted.

2. Range of values:

Specify this in IPv4 address format.

Specify the wildcard mask (in decimal) so that when it is converted to bits, all bits after the first bit that is 1 are set to 1.

Note: Specify the wildcard mask so that when it is converted to a binary number, all bits after the first 1 bit are set to 1.

area *<area id>*

Specifies the area to which the interface belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 (in decimal) or an IPv4 address.

Default behavior

The information set by the `ip ospf area` command in `config-if` mode is applied.

Impact on communication

If you use this command to change the area or domain to which the interfaces belong while OSPF is operating on the interfaces in the specified range, adjacency is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip ospf area  
ip address
```

passive-interface

Specifies that the OSPF network (interface specified by the `network` command in `config-router` mode) will be used as a stub network, which does not send or receive OSPF packets.

Syntax

To set information:

```
passive-interface {default | <interface type> <interface number>}
```

To delete information:

```
no passive-interface {default | <interface type> <interface number>}
```

Input mode

(`config-router`)

Parameters

```
{default | <interface type> <interface number>}
```

Sets all interfaces or the specified interface as a passive interface.

default

Sets all OSPF networks as a passive interface.

If you add or delete the default parameter, all other information set by the `passive-interface` command is deleted.

<interface type> <interface number>

Specifies the interface in the OSPF network.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For **<interface type>** and **<interface number>**, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

* Ethernet interface

* Ethernet subinterface

* Port channel interface

* Port channel subinterface

* Management port (specifiable only for the global network domain)

Default behavior

An interface that is not specified will not be used as a passive interface (stub network).

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Specify the `passive-interface default` command to disable transmission for all interfaces

available for OSPF packet transmission. In this state, if you specify the `no passive-interface <interface type> <interface number>` command, the specified interface becomes available for transmission.

Related commands

```
network (router ospf)
ip ospf area
```

router-id

Specifies a router ID (to identify a specific router).

Syntax

To set or change information:
`router-id <ip address>`

To delete information:
`no router-id`

Input mode

(config-router)

Parameters

<ip address>

Specifies the router ID.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify an IPv4 address other than 0.0.0.0.

Default behavior

When OSPF operation starts, the router ID is automatically selected in the following order from the VRF or global network to which OSPF belongs. However, after OSPF operation is started, the automatically selected router ID is not changed.

1. IPv4 address assigned to the loopback interface
2. Largest IPv4 address in the IPv4 interface

Impact on communication

If the setting is changed during OSPF operation and a different value from the router ID being used is set, adjacency is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Note the following if you omit this command to allow the router IDs to be automatically selected:
 - The largest IPv4 address might not be selected depending on the order in which configuration settings are made. For example, if you specify the `ip ospf area` command, OSPF operation starts as soon as the command is specified. The router ID will not be changed even if an IPv4 address with higher priority is subsequently set.
 - After OSPF operation starts, the router ID is not automatically changed when the information set by this command is deleted or when the loopback address is changed.
 - The router ID might be changed because, for example, the device is restarted.
2. In OSPF, the router ID and network address of each router is used to learn the network configuration and perform route calculation. Therefore, if an invalid router ID is specified (that is, the same router ID is set for different routers), the network configuration cannot be

learned correctly.

Related commands

```
ip address (interface loopback)
disable
```

router ospf

Configures router settings related to the OSPF routing protocol. After this command is entered, the mode changes to `config-router` mode.

Syntax

To set information:

```
router ospf <domain no.> [vrf <vrf id>]
```

To delete information:

```
no router ospf <domain no.> [vrf <vrf id>]
```

Input mode

(config)

Parameters

<domain no.>

Specifies the OSPF domain number.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

vrf <vrf id>

Specifies the VRF to which OSPF belongs.

1. Default value when this parameter is omitted:

Belongs to the global network.

2. Range of values:

Specify a VRF ID.

For details, see *Specifiable values for parameters*.

Default behavior

The operation specified by the `ip ospf area` command in `config-if` mode is performed.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If you delete the information that was set by using this command, the area setting in the domain (set by the `ip ospf area` command) is also deleted.

Related commands

`ip ospf area`

suppress-fa

Specifies that an address used for the forwarding destination will not be set for the forwarding address for an external AS route. At this time, set the forwarding address to 0.0.0.0. This command is valid only for AS boundary routers. This command is invalid for routers that are not AS boundary routers.

Syntax

To set information:
 suppress-fa

To delete information:
 no suppress-fa

Input mode

(config-router)

Parameters

None

Default behavior

If OSPF is running in the network specified as the forwarding destination for the source route, the forwarding address is set.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

redistribute

timers spf

Specifies the delay time for SPF calculations and the execution interval. The delay time is the time between when an SPF calculation is scheduled due to changes in the OSPF topology information and when the calculation actually starts.

The execution interval is the period of time to suppress SPF calculations after the previous SPF calculations are performed.

Syntax

To set or change information:

```
timers spf <delay> <interval>
```

To delete information:

```
no timers spf
```

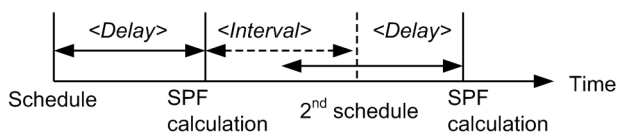
Input mode

(config-router)

Parameters

<delay>

Specifies the delay time for SPF calculations. The second and subsequent SPF calculations are performed after the delay time or after the execution interval from the previous SPF calculations (*<Interval>*), whichever is later.



1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 100 to 10000 (milliseconds) in decimal.

<interval>

Specifies the minimum interval between consecutive SPF calculations.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 1 to 10 (seconds) in decimal.

Default behavior

The delay is set to 2000 milliseconds (2 seconds) and the calculation interval is set to 5 seconds.

Impact on communication

None

When the change is applied

The change is applied when the next set of SPF calculations is performed.

Notes

None

Related commands

None

Chapter

20. OSPFv3

area default-cost
area range
area stub
area virtual-link
areaid-format
default-metric
disable
distance ospf
graceful-restart mode
graceful-restart restart-time
graceful-restart strict-lsa-checking
ipv6 ospf area
ipv6 ospf cost
ipv6 ospf dead-interval
ipv6 ospf hello-interval
ipv6 ospf network
ipv6 ospf priority
ipv6 ospf retransmit-interval
ipv6 ospf transmit-delay
ipv6 router ospf
max-metric router-lsa
maximum-paths
message-size
passive-interface
router-id
timers spf

area default-cost

Specifies the cost value of the default route that an area boundary router advertises to a stub area.

Syntax

To set or change information:

```
area <area id> default-cost <cost>
```

To delete information:

```
no area <area id> default-cost
```

To delete areas (all areas specified in the `stub`, `virtual-link`, and `range` commands are deleted):

```
no area <area id>
```

Input mode

(config-rtr)

Parameters

<area id>

Specifies the area ID of a stub area. If an area that is not a stub area is specified, this command is invalid.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 4294967295 (in decimal) or an IPv4 address (except 0.0.0.0).

<cost>

Specifies the cost value.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

Default behavior

The initial value is 1.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
area stub
```

area range

Specifies networks in an area. A maximum of 1024 networks can be specified.

Use this command to configure route summarization on an area boundary router. This command is useful for reducing the amount of routing information transmitted between areas.

Syntax

To set or change information:

```
area <area id> range <ipv6 prefix>/<prefixlen> [{advertise | not-advertise}]
```

To delete information:

```
no area <area id> range <ipv6 prefix>/<prefixlen>
```

To delete areas (all areas specified in the `stub`, `virtual-link`, and `range` commands are deleted):

```
no area <area id>
```

Input mode

(config-rtr)

Parameters

<area id>

Specifies the area to which the Device belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 (in decimal) or an IPv4 address.

<ipv6 prefix>

Specifies the IPv6 prefix.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify the IPv6 prefix.

Note: Set each bit that follows the bits specified for *<prefixlen>* of *<ipv6 prefix>* to 0.

<prefixlen>

Specifies the prefix length.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 128.

{advertise | not-advertise}

Specifies whether to advertise inter-area routes. All of the routing information that matches the range of the network indicated by the specified IPv6 prefix and prefix length is not advertised to other areas as inter-area routes. Instead, this command allows you to advertise only a specified range as inter-area routes to other areas. However, if you specify `not-advertise`, nothing will be advertised.

1. Default value when this parameter is omitted:
`advertise` (Information is advertised as inter-area routes).
2. Range of values:
None

Default behavior

Individual routes connecting the areas are advertised without being summarized.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

area stub

Allows areas other than area 0 to function as stub areas.

In a stub area, external AS routes are prevented from being advertised.

Syntax

To set information:

```
area <area id> stub [no-default-summary] [no-summary]
```

To delete information:

```
no area <area id> stub
```

To delete areas (all areas specified in the `stub`, `virtual-link`, and `range` commands are deleted):

```
no area <area id>
```

Input mode

(config-rtr)

Parameters

<area id>

Specifies the area to which the Device belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 4294967295 (in decimal) or an IPv4 address (except 0.0.0.0).

`no-default-summary`

Specifies that the area boundary router does not advertise the default route to the stub area.

1. Default value when this parameter is omitted:

The default route is advertised to the stub area.

2. Range of values:

None

`no-summary`

Prevents routes from other areas from being advertised to the stub area.

1. Default value when this parameter is omitted:

Routes from other areas (inter-area routing information) are advertised.

2. Range of values:

None

Default behavior

Areas other than area 0 do not function as stub areas.

Impact on communication

Adjacency with neighboring routers within the area is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

area virtual-link

Specifies a virtual link. The virtual link is used for connecting an area boundary router that is not directly connected to area 0 (backbone area) to area 0. A virtual link is identified by a transit area and the remote router ID.

Syntax

To set or change information:

```
area <area id> virtual-link <router id> [hello-interval <seconds>]
[retransmit-interval <seconds>] [transmit-delay <seconds>] [dead-interval
<seconds>]
```

To delete virtual links

```
no area <area id> virtual-link <router id>
```

To delete areas (all areas specified in the stub, virtual-link, and range commands are deleted):

```
no area <area id>
```

Input mode

(config-rtr)

Parameters

<area id>

Specifies a transit area. Stub areas cannot be specified.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 1 to 4294967295 (in decimal) or an IPv4 address (except 0.0.0.0).

<router id>

Specifies the ID of the remote router on the virtual link.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify an IPv4 address.

hello-interval *<seconds>*

Specifies, in seconds, the sending interval for hello packets.

1. Default value when this parameter is omitted:
10
2. Range of values:
Specify 1 to 255 (seconds) in decimal.

retransmit-interval *<seconds>*

Specifies the retransmission interval in seconds.

1. Default value when this parameter is omitted:
5
2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

`transmit-delay <seconds>`

Specifies the delay time in seconds.

1. Default value when this parameter is omitted:

1

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

`dead-interval <seconds>`

Specifies the number of seconds that can elapse before the neighboring router is deemed to be down.

1. Default value when this parameter is omitted:

Four times as large as the value of `hello-interval`.

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

Default behavior

There are no virtual links.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. A virtual link must be configured in both routers that serve as the endpoints. For each endpoint router, the router ID of the remote router must be set. Therefore, use a method such as setting the `router-id` command in `config-rtr` mode to define the router ID.

Related commands

None

areaid-format

Specifies the display format of an area ID that is displayed by the `show ipv6 ospf` operation command (displaying OSPFv3 protocol information).

Syntax

To set or change information:

```
areaid-format {decimal | ipv4-address}
```

To delete information:

```
no areaid-format
```

Input mode

(config-rtr)

Parameters

{decimal | ipv4-address}

Specifies display format for an area ID.

Specify `decimal` to display the area ID as a decimal number. Specify `ipv4-address` to display the area ID as an IPv4 address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The area ID is displayed as a decimal number.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

default-metric

Specifies the metric of a route to be advertised as an external AS route. This command does not apply to directly connected routes. Metrics specified by the `redistribute` command have priority over the information specified by this command.

Syntax

To set or change information:

```
default-metric <metric>
```

To delete information:

```
no default-metric
```

Input mode

(config-rtr)

Parameters

<metric>

Specifies a metric.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 65535 in decimal.

Default behavior

Metric 1 is set for BGP routes. Metric 20 is set for other routes.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`redistribute`

disable

Disables OSPFv3.

Syntax

To set information:

```
disable
```

To delete information:

```
no disable
```

Input mode

(config-rtr)

Parameters

None

Default behavior

OSPFv3 is enabled.

Impact on communication

OSPFv3 operation stops.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

distance ospf

Sets the distance for OSPFv3. You can specify different distances for each route type.

Syntax

To set or change information:

You can use either of the following two formats. Whichever is used, the results are the same.

Individual setting

```
distance [ospf {external | inter-area | intra-area}] <distance>
```

Note: You cannot specify both settings without route type specifications (`distance <distance>`) and settings with route type specifications. (If specified, the settings are overwritten.)

Concurrent setting of multiple parameters

```
distance ospf [intra-area <distance>] [inter-area <distance>] [external <distance>]
```

To delete information (delete all):

```
no distance
```

Input mode

(config-rtr)

Parameters

{external | inter-area | intra-area}

Specifies the type of route to which the `<distance>` parameter setting applies.

Specify `external` (external AS route), `inter-area` (inter-area route), or `intra-area` (intra-area route). Note that an inter-area route refers to a route from another area that is not directly connected.

1. Default value when this parameter is omitted:

The setting applies to all routes.

If you set `<distance>` with this parameter omitted to change information, other settings (information set by this parameter) will be deleted.

2. Range of values:

None

`<distance>`

Specifies a distance.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

Default behavior

The initial value is 110 for all OSPFv3 routes.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`distribute-list in`

graceful-restart mode

Specifies whether to enable graceful restart functionality for OSPFv3.

For graceful restarts, both restart router functionality and helper router functionality exist. To use the restart router functionality, the helper router functionality must be enabled for all neighboring routers.

Syntax

To set or change information:

```
graceful-restart mode { restart | helper | both }
```

To delete information:

```
no graceful-restart mode
```

Input mode

(config-rtr)

Parameters

{ restart | helper | both }

Specifies the restart functionality or helper functionality.

If you specify `both`, both the restart functionality and helper functionality are enabled.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The restart router functionality and helper router functionality are disabled.

Impact on communication

None

When the change is applied

The change is applied when the next graceful restart is performed. The helper functionality is activated when a neighboring router starts a graceful restart.

Notes

1. To use the restart functionality, either set the `router-id` command to specify the router ID, or set an IPv4 address for the loopback interface. If you do not specify one of these settings, the router ID might be changed before or after the graceful restart begins. If the router ID changes, graceful restart fails.

Related commands

```
graceful-restart restart-time
graceful-restart strict-lsa-checking
routing options graceful-restart time-limit
```

graceful-restart restart-time

Specifies the time allowed for re-connection after restarting when the restart router functionality for graceful restart is used in OSPFv3.

Syntax

To set or change information:

```
graceful-restart restart-time <seconds>
```

To delete information:

```
no graceful-restart restart-time
```

Input mode

(config-rtr)

Parameters

<seconds>

Specifies (in seconds) the time allowed for graceful restart re-connection.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 3600 in decimal.

Default behavior

60 seconds is set.

Impact on communication

None

When the change is applied

The change is applied when the next graceful restart is performed.

Notes

None

Related commands

```
graceful-restart mode  
graceful-restart strict-lsa-checking  
routing options graceful-restart time-limit
```

graceful-restart strict-lsa-checking

Allows the helper router to stop the helper process if the LSA database is no longer synchronized with that of the restart router.

If you set this command, the helper process stops when either of the following conditions exists:

- During LSA advertisement, a graceful-restart start notification is received from a neighboring router that has not completed its response.
- After the helper process has started, a new LSA other than periodic advertisement is generated or learned, and then advertised to the restart router.

Syntax

To set information:

```
graceful-restart strict-lsa-checking
```

To delete information:

```
no graceful-restart strict-lsa-checking
```

Input mode

(config-rtr)

Parameters

None

Default behavior

Graceful restart continues even if the LSA databases are not synchronized.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Specify the same information in this command for all helper routers. This is because if at least one helper stops the graceful restart functionality, the restart router stops the graceful restart functionality with all helpers.

Related commands

```
graceful-restart mode
```

ipv6 ospf area

Enables OSPFv3. OSPFv3 operates on a specified domain.

Syntax

To set or change information:

```
ipv6 ospf <domain no.> area <area id> [instance <instance id>]
```

To delete information:

```
no ipv6 ospf [<domain no.>] area
```

Input mode

(config-if)

Ethernet interface, port channel interface, management port, or loopback interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<domain no.>

Specifies a domain number. Set the same value as the domain number specified for the `ipv6 router ospf` command. If you set a different value, the domain will operate as a different domain.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

<area id>

Specifies the area to which the interface belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 (in decimal) or an IPv4 address.

instance *<instance id>*

Specifies the identifier for the group to which the router belongs in the target interface. Adjacency can be established only between routers that have the same identifier.

1. Default value when this parameter is omitted:

0

2. Range of values:

Specify 0 to 255 in decimal.

Default behavior

OSPFv3 is disabled.

Impact on communication

If the domain number or area ID is changed, adjacency is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. You can configure only one domain. If the domain number is changed, adjacency is briefly disconnected.
2. Before setting this command, you need to set the `router-id` command. Even if OSPFv3 has not been configured in `config-rtr` mode, OSPFv3 will be used for the interface for which this command is set. In this case, the router ID is automatically selected. Therefore, if you manually set the router ID later, the router ID being used is changed.
3. If you specify `no ipv6 router ospf <domain no.>` to delete the setting, if the `<domain no.>` value is the same for both commands, the information set by the `ipv6 ospf area` command is also deleted.

Related commands

`ipv6 address`

ipv6 ospf cost

Specifies the cost value for an interface.

Syntax

To set or change information:

```
ipv6 ospf cost <cost>
```

To delete information:

```
no ipv6 ospf cost
```

Input mode

(config-if)

Ethernet interface, port channel interface, management port, or loopback interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<cost>

Specifies the cost value.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

Default behavior

The initial value is 1. However, 0 is set for the loopback interface.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 ospf dead-interval

Specifies the length of time that the router maintains adjacency when hello packets can no longer be received from a neighboring router. When the specified time has elapsed since the last hello packet was received, the neighboring router is deemed to be down.

Syntax

To set or change information:

```
ipv6 ospf dead-interval <seconds>
```

To delete information:

```
no ipv6 ospf dead-interval
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Specifies the length of time that adjacency is to be maintained.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

Default behavior

The initial value is 4 times as large as the `hello-interval` value.

Impact on communication

None. However, if the value of `dead-interval` is different among the routers connected to the same network, adjacency will be disconnected after the time set for `dead-interval` has elapsed.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The value set for `dead-interval` must be the same for the routers connected to the same network.

Related commands

```
ipv6 ospf hello-interval
```

ipv6 ospf hello-interval

Specifies the sending interval for hello packets.

Syntax

To set or change information:

```
ipv6 ospf hello-interval <seconds>
```

To delete information:

```
no ipv6 ospf hello-interval
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Specifies the sending interval.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 255 (seconds) in decimal.

Default behavior

The initial value is 10 seconds.

Impact on communication

None. However, if the value of `hello-interval` is different among the routers connected to the same network, adjacency will be disconnected after the time set for `dead-interval` has elapsed.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The same sending interval for hello packets must be set for routers connected to the same network. Neighboring routers with different sending intervals cannot connect.

Related commands

```
ipv6 ospf dead-interval
```

ipv6 ospf network

Specifies the OSPFv3 network type.

The following describes the OSPFv3 network types.

- Broadcast

Multiple neighboring routers on an interface are managed in an integrated manner by using multicast packets.

- Point-to-point

A single neighboring router is managed per IPv6 interface.

Syntax

To set or change information:

```
ipv6 ospf network {broadcast | point-to-point}
```

To delete information:

```
no ipv6 ospf network
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

{broadcast | point-to-point}

Specifies the network type for the OSPFv3 interface.

broadcast

Broadcast is used.

point-to-point

Point-to-point is used.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

Broadcast is used.

Impact on communication

Adjacency is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Make sure that the specified network type matches that of the neighboring device.

Related commands

None

ipv6 ospf priority

Specifies the priority for determining a designated router. A router with the highest priority in the network will be the designated router, and a router with the second-highest priority will be the backup designated router. However, if the designated router and the backup designated router have already been determined, they are not changed even if a router that has a higher priority is started.

Note that when the network type is point-to-point, a designated router is not selected because only one neighboring router is used.

Syntax

To set or change information:

```
ipv6 ospf priority <priority>
```

To delete information:

```
no ipv6 ospf priority
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<priority>

Specifies the priority.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 255 in decimal. A value of 0 makes the router ineligible to become a designated router.

The highest priority is 255, and the lowest priority is 1.

Default behavior

For broadcast, the initial value is set to 1. For point-to-point, 0 is always set irrespective of the setting value.

Impact on communication

None. However, if you specify 0 when the local router is the designated router, adjacency is briefly disconnected.

When the change is applied

If you set 0, the setting takes effect immediately.

If you set 1 or a greater value, the setting takes effect from the next establishment of adjacency with the neighboring router.

Notes

None

Related commands

None

ipv6 ospf retransmit-interval

Specifies the retransmission interval for OSPFv3 packets.

Syntax

To set or change information:

```
ipv6 ospf retransmit-interval <seconds>
```

To delete information:

```
no ipv6 ospf retransmit-interval
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Specifies the retransmission interval.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

Default behavior

The initial value is set to five seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 ospf transmit-delay

Specifies the delay time required to send an OSPFv3 packet. Set this command if you want to perform OSPFv3 aging correctly.

Syntax

To set or change information:

```
ipv6 ospf transmit-delay <seconds>
```

To delete information:

```
no ipv6 ospf transmit-delay
```

Input mode

(config-if)

Ethernet interface, port channel interface, or management port

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Specifies a delay time.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 (seconds) in decimal.

Default behavior

The initial value is set to 1 second.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

ipv6 router ospf

Configures router settings related to the OSPFv3 routing protocol.

After this command is entered, the mode changes to `config-rtr` mode.

Syntax

To set information:

```
ipv6 router ospf <domain no.> [vrf <vrf id>]
```

To delete information:

```
no ipv6 router ospf <domain no.> [vrf <vrf id>]
```

Input mode

(config)

Parameters

<domain no.>

Specifies the OSPFv3 domain number.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

vrf <vrf id>

Specifies the VRF to which OSPFv3 belongs.

1. Default value when this parameter is omitted:

Belongs to the global network.

2. Range of values:

Specify a VRF ID.

For details, see *Specifiable values for parameters*.

Default behavior

The operation specified by the `ipv6 ospf area` command in `config-if` mode is performed.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If you delete the information set by this command, the area setting in the domain (set by the `ipv6 ospf area` command) is also deleted.

Related commands

`ipv6 ospf area`

max-metric router-lsa

Specifies that the device uses the maximum cost for advertisements and operates as a stub router.

Syntax

To set or change information:

```
max-metric router-lsa [on-startup <seconds>]
```

To delete information:

```
no max-metric router-lsa
```

Input mode

(config-rtr)

Parameters

on-startup

After startup, restart, or system switchover, the device operates as a stub router.

1. Default value when this parameter is omitted:

The functionality is always enabled.

2. Range of values:

None

<seconds>

Specifies the length of time that the switch operates as a stub router after startup, restart, or system switchover.

1. Default value when this parameter is omitted:

This parameter cannot be omitted if you specify the `on-startup` parameter.

2. Range of values:

Specify 5 to 86400 (seconds) in decimal.

Default behavior

The device does not operate as a stub router.

Impact on communication

None

When the change is applied

- The change is applied immediately after setting values are changed.
- If you specify the `on-startup` parameter, the change takes effect after the restart or system switchover. Note that if the device is running as a stub router, adding the `on-startup` parameter immediately terminates the stub router.

Notes

1. If a stub router setting is added or deleted while the helper functionality for graceful restarts is operating, the graceful restart fails.

Related commands

None

maximum-paths

Specifies the maximum number of paths in the route when multipaths (next hop) of equal cost exist for an OSPFv3-generated route.

Syntax

To set or change information:

```
maximum-paths <number>
```

To delete information:

```
no maximum-paths
```

Input mode

(config-rtr)

Parameters

<number>

Specifies the maximum number of paths.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 16 in decimal.

Note, however, that if `ip urpf` is set, you cannot set 9 or a greater value for <number>.

Default behavior

The initial value is 4.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

message-size

Specifies the maximum length of an OSPFv3 packet the Device sends (the length of the IPv6 packet from the IPv6 header to the data section).

Syntax

To set or change information:
`message-size <length>`

To delete information:
`no message-size`

Input mode

(config-rtr)

Parameters

<length>

Specifies the maximum length of an OSPFv3 packet.

Note that the specified setting is applied to all OSPFv3 interfaces except virtual links, and that the IP MTU length is applied to an interface whose IP MTU length is shorter.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

1280 to 9216 (octets)

Default behavior

The IP MTU length is the maximum OSPFv3 packet length.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If the LSA size learned from the neighboring router is larger than the specified value, packets of the IP MTU length, which is the maximum packet length, might be sent. Therefore, set the IP MTU lengths of the interfaces to the same MTU lengths as the other devices on the network.

Related commands

`ip mtu`
`mtu`

passive-interface

Specifies that the OSPFv3 network (connected to the interface for which `ipv6 ospf area` is specified in `config-if` mode) will be used as a stub network, which does not send or receive OSPFv3 packets.

Syntax

To set information:

```
passive-interface {default | <interface type> <interface number>}
```

To delete information:

```
no passive-interface {default | <interface type> <interface number>}
```

Input mode

(`config-rtr`)

Parameters

{default | <interface type> <interface number>}

Sets all interfaces or the specified interface as a passive interface.

default

Sets all OSPFv3 networks as a passive interface.

If you add or delete the default parameter, all other information set by the `passive-interface` command is deleted.

<interface type> <interface number>

Specifies the interface in the OSPFv3 network.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <interface type> and <interface number>, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface in Specifiable values for parameters*.

- * Ethernet interface
- * Ethernet subinterface
- * Port channel interface
- * Port channel subinterface
- * Management port (specifiable only for the global network domain)

Default behavior

An interface that is not specified will not be used as a passive interface (stub network).

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. Specify the `passive-interface default` command to disable transmission for all interfaces available for OSPFv3 packet transmission. In this state, if you specify the `no passive-interface <interface type> <interface number>` command, the specified interface becomes available for transmission.

Related commands

`ipv6 ospf area`

router-id

Specifies a router ID (to identify a specific router).

Syntax

To set or change information:

```
router-id <ip address>
```

To delete information:

```
no router-id
```

Input mode

(config-rtr)

Parameters

<ip address>

Specifies the router ID.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify an IPv4 address other than 0.0.0.0.

Default behavior

When OSPFv3 operation starts, the router ID is automatically selected in the following order from the VRF or global network to which OSPFv3 belongs. However, after OSPFv3 operation starts, the automatically selected router ID is not changed.

1. IPv4 address assigned to the loopback interface
2. Largest IPv4 address in the IPv4 interface

Impact on communication

If the setting is changed during OSPFv3 operation and a different value from the router ID being used is set, adjacency is briefly disconnected.

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If you omit this command and an interface that has an IPv4 address assigned does not exist in the VRF or global network to which OSPFv3 belongs, OSPFv3 is disabled.
2. Note the following if you omit this command to allow the router IDs to be automatically selected:
 - The largest IPv4 address might not be selected depending on the order in which configuration settings are made. For example, if you specify the `ipv6 ospf area` command, OSPFv3 operation starts as soon as the command is specified. The router ID will not be changed even if an IPv4 address with higher priority is subsequently set.
 - After OSPFv3 operation starts, the router ID is not automatically changed when the information set by this command is deleted or when the loopback address is changed.
 - The router ID might be changed because, for example, the device is restarted.
3. In OSPFv3, the router ID and network address of each router is used to learn the network

configuration and perform route calculations. Therefore, if an invalid router ID is specified (that is, the same router ID is set for different routers), the network configuration cannot be learned correctly.

Related commands

```
ip address (interface loopback)
disable
```

timers spf

Specifies the delay time for SPF calculations and the execution interval. The delay time is the time between when an SPF calculation is scheduled due to changes in the OSPFv3 topology information and when the calculation actually starts.

The execution interval is the period of time to suppress SPF calculations after the previous SPF calculations are performed.

Syntax

To set or change information:

```
timers spf <delay> <interval>
```

To delete information:

```
no timers spf
```

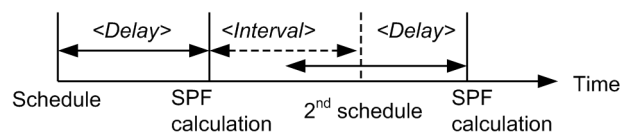
Input mode

(config-rtr)

Parameters

<delay>

Specifies the delay time for SPF calculations. The second and subsequent SPF calculations are performed after the delay time or after the execution interval from the previous SPF calculations (*<Interval>*), whichever is later.



1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 100 to 10000 (milliseconds) in decimal.

<interval>

Specifies the minimum interval between consecutive SPF calculations.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 2 to 10 (seconds) in decimal.

Default behavior

The delay is set to 2000 milliseconds (2 seconds) and the calculation interval is set to 5 seconds.

Impact on communication

None

When the change is applied

The change is applied when the next set of SPF calculations is performed.

Notes

None

Related commands

None

Chapter

21. BGP4/BGP4+

address-family ipv4
address-family ipv6
bgp always-compare-med
bgp bestpath compare-routerid
bgp client-to-client reflection
bgp cluster-id
bgp confederation identifier
bgp confederation peers
bgp dampening
bgp default local-preference
bgp fast-external-fallover
bgp graceful-restart mode
bgp graceful-restart restart-time
bgp graceful-restart stalepath-time
bgp nexthop
bgp router-id
default-information originate
default-metric
disable
distance bgp
exit-address-family
maximum-paths
neighbor activate
neighbor always-nexthop-self
neighbor as-override
neighbor description
neighbor ebgp-multihop
neighbor maximum-prefix
neighbor next-hop-self
neighbor password
neighbor peer-group (assigning members)
neighbor peer-group (creating)
neighbor permit-asloop
neighbor remote-as
neighbor remove-private-as
neighbor route-reflector-client
neighbor send-community
neighbor set-nexthop-peer
neighbor shutdown
neighbor soft-reconfiguration
neighbor timers
neighbor update-source
neighbor weight
network
router bgp
timers bgp

address-family ipv4

Switches to `config-router-af(ipv4 vrf)` mode, which allows you to set information for each VRF.

Syntax

To set information:

```
address-family ipv4 vrf <vrf id>
```

To delete information:

```
no address-family ipv4 vrf <vrf id>
```

Input mode

(config-router)

Parameters

vrf <vrf id>

Specifies the VRF.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a VRF ID.

For details, see *Specifiable values for parameters*.

Default behavior

A BGP4 route policy cannot be set for the specified VRF.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If you delete the information set by this command, all information set by the commands for the relevant `config-router-af(ipv4 vrf)` mode is deleted.
2. The information set by this command is deleted if you delete all information set by the commands in `config-router-af(ipv4 vrf)` mode.

Related commands

None

address-family ipv6

Switches to `config-router-af (ipv6)` mode, which allows you to set BGP4+ information for the global network or to `config-router-af (ipv6 vrf)` mode, which allows you to set information for each VRF.

Syntax

To set information:

```
address-family ipv6 [vrf <vrf id>]
```

To delete information:

```
no address-family ipv6 [vrf <vrf id>]
```

Input mode

(config-router)

Parameters

`vrf <vrf id>`

Specifies the VRF.

1. Default value when this parameter is omitted:

Switches to `config-router-af (ipv6)` mode, which allows you to set BGP4+ information for the global network.

2. Range of values:

Specify a VRF ID.

For details, see *Specifiable values for parameters*.

Default behavior

A BGP4+ route policy cannot be set.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If you delete the information that was set by this command, all information that was set by the commands for the relevant `config-router-af (ipv6)` mode or the `config-router-af (ipv6 vrf)` mode is deleted.
2. The information set by this command is deleted if you delete all information set by the commands in `config-router-af (ipv6)` mode or `config-router-af (ipv6 vrf)` mode.

Related commands

None

bgp always-compare-med

During route selection, this allows comparison of MED values of routes received from different neighboring ASs.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set information:

```
bgp always-compare-med
```

To delete information:

```
no bgp always-compare-med
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

None

Default behavior

During route selection, the MED values of routes received from the same neighboring AS are used for comparison, but the MED values of routes received from different neighboring ASs are not.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

None

Related commands

```
maximum-paths
```

bgp bestpath compare-routerid

Specifies the use of peer BGP identifiers (router IDs) for route selection among routes learned from external peers.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

Syntax

To set information:

```
bgp bestpath compare-routerid
```

To delete information:

```
no bgp bestpath compare-routerid
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

None

Default behavior

Peer BGP identifiers (router IDs) are not used for route selection among routes learned from external peers.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. For route selection among routes learned from internal peers or among routes learned from member AS peers, peer BGP identifiers (router IDs) are used regardless of the setting of this command.
2. If an item with higher comparison priority (for example, the number of ASs in the AS_PATH attribute) than the peer BGP identifier (router ID) determines route selection, the peer BGP identifier is not used regardless of the command setting.

Related commands

None

bgp client-to-client reflection

Uses the `no bgp client-to-client reflection` command to prevent BGP routes from being reflected between peers specified as route reflector clients.

If the `no bgp client-to-client reflection` command is not used, BGP routes are reflected between the route reflector clients.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set information:

```
no bgp client-to-client reflection
```

To delete information:

```
bgp client-to-client reflection
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

None

Default behavior

The BGP routes are reflected between the route reflector clients.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

None

Related commands

```
bgp cluster-id
neighbor route-reflector-client
```

bgp cluster-id

Specifies the cluster ID to be used in route reflection. This command must be set when one cluster contains multiple route reflectors. Specify this command on the router that runs as a route reflector. The same cluster ID must be specified for each route reflector in the same cluster. Do not specify this command for a client.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

Syntax

To set or change information:

```
bgp cluster-id <ipv4 address>
```

To delete information:

```
no bgp cluster-id
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

<ipv4 address>

Specifies a cluster ID (in IPv4 address format).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address other than 0.0.0.0.

Default behavior

The selected router ID is used as the cluster ID.

Impact on communication

If route refreshing capability has not been negotiated with the client when this command changes the cluster ID, the BGP session with the client is temporarily disconnected. As a result, communication stops until the routes are relearned.

When the change is applied

The change is applied when the command is set.

Notes

1. If route refreshing capability has not been negotiated with the client when this command changes the cluster ID, the BGP session with the client is temporarily disconnected.

Related commands

```
bgp router-id
bgp client-to-client reflection
neighbor route-reflector-client
```

bgp confederation identifier

Specifies the AS number of the local confederation when configuring a confederation.

This command is common to both BGP4 (including VRF) and BGP4+ (including VRF).

Syntax

To set or change information:

```
bgp confederation identifier <as>
```

To delete information:

```
no bgp confederation identifier
```

Input mode

(config-router)

Parameters

<as>

Specifies the AS number of the confederation to which the local router belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

Default behavior

The AS number of the confederation is not set.

Impact on communication

If you use this command to change the AS number, BGP sessions with all peers are temporarily disconnected. As a result, communication stops until the routes are relearned.

When the change is applied

The change is applied when the command is set.

Notes

1. If you use this command to change the AS number, BGP sessions with all peers are temporarily disconnected.
2. If you use this command to set an AS number, the AS number set by the `router bgp` command becomes the member AS number of the local router.

Related commands

```
router bgp
bgp confederation peers
neighbor remote-as
```

bgp confederation peers

Specifies the member AS numbers of the ASs connected to the local member AS when configuring a confederation. The member AS numbers are used for connecting BGP sessions with the member ASs in the confederation.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

Syntax

To set or change information:

```
bgp confederation peers <as> [...]
```

To delete information:

```
no bgp confederation peers [<as> [...]]
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

<as> [...]

Specifies the member AS number of a connected peer.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

Default behavior

Member ASs in the confederation are not connected.

Impact on communication

If you use this command to change the member ASs, the BGP session with the specified peer is temporarily disconnected. As a result, communication stops until the routes are relearned.

When the change is applied

The change is applied when the command is set.

Notes

1. If you use this command to change the member ASs, the BGP session with the specified peer is temporarily disconnected.
2. The member AS number specified by this command must be different from both the local member AS number specified by the `router bgp` command and the AS number specified by the `bgp confederation identifier` command.
3. This command allows more than one line. You can specify up to 25 AS numbers on one line. Note that you can specify up to 256 AS numbers for the global network and VRF. When you

specify AS numbers by using `no bgp confederation peers`, only matching lines are deleted.

Related commands

```
bgp confederation identifier  
neighbor remote-as
```

bgp dampening

Specifies that the use of unstable (route-flapping) routes learned from an external peer or inter-AS peer is to be temporarily suppressed to reduce the effect of route flapping.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

Syntax

To set or change information:

```
bgp dampening [<half life> [<reuse> <suppress> <max suppress time>]]
```

To delete information:

```
no bgp dampening
```

Input mode

```
(config-router)
```

```
(config-router-af) (ipv6)
```

Parameters

<half life>

Specifies the half-life time of the penalty. The half-life time means the time required for the penalty accumulated with route flapping to be reduced to 50%.

1. Default value when this parameter is omitted:

The initial value is 15 (minutes).

2. Range of values:

Specify 1 to 45 (minutes) in decimal. Specify a value smaller than the value of *<max suppress time>*.

<reuse>

Specifies the lower limit of the penalty for restarting the use of suppressed routes. When a penalty that was decremented based on the value of *<half life>* reaches the *<reuse>* value, the use of suppressed routes is restarted.

1. Default value when this parameter is omitted:

The initial value is 2.

2. Range of values:

Specify 1 to 15 in decimal. Specify a value smaller than the value of *<suppress>*.

<suppress>

Specifies the upper limit of the penalty for suppressing the use of routes. The penalty is incremented by 1 every time a route becomes unreachable. The use of routes is suppressed when the penalty reaches or exceeds the *<suppress>* value.

1. Default value when this parameter is omitted:

The initial value is 3.

2. Range of values:

Specify 2 to 16 in decimal. Specify a value larger than the value of *<reuse>*.

<max suppress time>

Specifies the maximum duration for the suppression of a route. This value indicates the time that can elapse before the penalty changes from the maximum to the value of *<reuse>*.

The maximum penalty is calculated as follows:

- Maximum penalty = $\text{<reuse>} \times 2^{(\text{<max suppress time>} / \text{<half life>})}$

If the calculation result exceeds 240, 240 is set.

1. Default value when this parameter is omitted:

The initial value is 4 times as large as the *<half life>* value.

2. Range of values:

Specify 2 to 180 (minutes) in decimal. Specify a value larger than the value of *<half life>*.

Default behavior

The route flap dampening functionality is disabled.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. Even if flapping occurs frequently, the maximum penalty value is used as the upper limit of the penalty. If the calculation result exceeds 240 and the penalty has reached the maximum (240), the duration for which the use of routes is actually suppressed is shorter than the time specified for *<max suppress time>*. Also note that if the maximum penalty is smaller than the value of *<suppress>*, the use of routes is not suppressed.
2. While flapping is in progress, if you change the *<half life>*, *<reuse>*, *<suppress>*, or *<max suppress time>* parameter, the flap history is deleted.
3. The command does not apply to BGP4 or BGP4+ routes in a VRF.

Related commands

None

bgp default local-preference

Specifies the default value of the LOCAL_PREF attribute of routes to be advertised to an internal peer.

The Local-Preference value set by the `neighbor route-map` or `redistribute` command has priority over the information set by this command.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af (ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set or change information:

```
bgp default local-preference <local preference>
```

To delete information:

```
no bgp default local-preference
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

<local preference>

Specifies the value of Local-Preference.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 65535 in decimal.

Default behavior

<local preference> is set to 100.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

None

Related commands

None

bgp fast-external-fallover

Uses the `no bgp fast-external-fallover` command to prevent an external peer that is directly connected from being disconnected immediately after the interface to the peer goes down. This command is valid only for external peers that are directly connected.

Note that, for external peers and internal peers that are multihop-connected, regardless of the setting specified by this command, the BGP session is not disconnected immediately after the interface to the peer goes down.

The target of application of this command differs depending on the input mode setting, as described below.

- If you set the command in `config-router` mode:
The setting applies to BGP4 and BGP4+ of the global network
- If you set the command in `config-router-af(ipv4 vrf)` mode:
The setting applies to BGP4 of the specified VRF.
- If you set the command in `config-router-af(ipv6 vrf)` mode:
The setting applies to BGP4+ of the specified VRF.

Syntax

To set or change information:

```
no bgp fast-external-fallover
```

To delete information:

```
bgp fast-external-fallover
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

None

Default behavior

After the interface to an external peer that is directly connected goes down, the peer is disconnected immediately.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. If a hold timeout takes place due to an interface going down, regardless of the setting specified by this command, the BGP session is disconnected.

Related commands

None

bgp graceful-restart mode

Specifies use of and the operating mode of the graceful restart functionality. The graceful restart functionality is negotiated for the peer for which this command is specified.

This command is common to BGP4 (including VRF) and BGP4+ (including VRF).

Syntax

To set or change information:

```
bgp graceful-restart mode {restart | receive | both}
```

To delete information:

```
no bgp graceful-restart mode
```

Input mode

(config-router)

Parameters

{restart | receive | both}

restart

Enables the restart router functionality, and disables the receive router functionality.

receive

Enables the receive router functionality, and disables the restart router functionality.

both

Enables both the restart router functionality and the receive router functionality.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The graceful restart functionality is not negotiated for the peer.

Impact on communication

If one of the following occurs, the BGP session with the specified peer is temporarily disconnected. As a result, communication stops until the routes are relearned.

- The graceful restart functionality is enabled or disabled by this command
- By changing the parameter value, the graceful restart mode is changed to enable only the receive router functionality, or is changed to another mode from a mode where only the receive router functionality is enabled

When the change is applied

The change is applied when the command is set.

Notes

1. If one of the following occurs, the BGP session with the specified peer is temporarily disconnected:
 - Graceful restart is enabled or disabled by this command

- By changing the parameter value, the graceful restart mode is changed to enable only the receive router functionality, or is changed to another mode from a mode where only the receive router functionality is enabled

Related commands

```
routing options graceful-restart time-limit  
bgp graceful-restart restart-time  
bgp graceful-restart stalepath-time
```

bgp graceful-restart restart-time

Specifies the maximum time that a peer will wait to be reconnected after a neighboring router has commenced a graceful restart.

This command is common to BGP4 (including VRF) and BGP4+ (including VRF).

Executing the `no bgp graceful-restart mode` command also deletes this command.

Syntax

To set or change information:

```
bgp graceful-restart restart-time <seconds>
```

To delete information:

```
no bgp graceful-restart restart-time
```

Input mode

(config-router)

Parameters

<seconds>

Specifies the maximum time (in seconds) that a peer will wait to be reconnected after a neighboring router has commenced a graceful restart. If the peer cannot be reconnected within the maximum time, the receive router deletes the routes received from the peer.

The restart router stops monitoring the receipt of End-of-RIB from the peer.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 3600 in decimal.

Default behavior

The initial value is 120 (seconds).

Impact on communication

None

When the change is applied

The change is applied to the timer value used by the device when the next graceful restart is performed.

Notes

1. The information set by this command is applied to the timer value used by the device when the next graceful restart is performed. Negotiation with the connected remote device is performed when the next BGP session is established. If only the information set by this command is changed, the BGP session is not automatically reconnected. If you need to notify the connected remote device, use the operation command to reconnect the BGP session.

Related commands

```
routing options graceful-restart time-limit
bgp graceful-restart mode
bgp graceful-restart stalepath-time
```

bgp graceful-restart stalepath-time

Specifies the maximum time that a peer will keep routes received before a graceful restart after the neighboring router has commenced a graceful restart.

This command is common to BGP4 (including VRF) and BGP4+ (including VRF).

Executing the `no bgp graceful-restart mode` command also deletes this command.

Syntax

To set or change information:

```
bgp graceful-restart stalepath-time <seconds>
```

To delete information:

```
no bgp graceful-restart stalepath-time
```

Input mode

(config-router)

Parameters

<seconds>

Specifies the maximum time (in seconds) that a peer will keep routes received before a graceful restart after the neighboring router has commenced a graceful restart. If the routes cannot be received again from the peer within the maximum time, the routes are deleted.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 3600 in decimal.

Default behavior

The initial value is 360 (seconds).

Impact on communication

None

When the change is applied

The change is applied to the timer value used by the device when the next graceful restart is performed.

Notes

None

Related commands

```
routing options graceful-restart time-limit
bgp graceful-restart mode
bgp graceful-restart restart-time
```

bgp nexthop

Specifies the route to be used in resolving the next hop of a BGP route.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af (ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set or change information:

```
bgp nexthop route-map <route map>
```

To delete information:

```
no bgp nexthop
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

```
route-map <route map>
```

Specifies the route map for which the route filter used to resolve the next hop of a BGP route is specified.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Active IGP routes, static routes, and directly connected routes are used to resolve the next hop of a BGP route.

Impact on communication

None

When the change is applied

- For a BGP4 route, the change is applied when the `clear ip bgp [vrf {<vrfid> | all}] * { in | both }` operation command is executed.
- For a BGP4+ route, the change is applied when the `clear ipv6 bgp [vrf {<vrfid> | all}] * { in | both }` operation command is executed.

Notes

1. If the filter specified for `<route map>` is not set or if a `match protocol` entry is not set for

the `route-map` command, IGP routes, static routes, directly connected routes, and BGP routes are applicable for the command.

2. Routes imported from other VRFs or the global network are not used for resolving the next hop.

Related commands

`route-map`

bgp router-id

Sets the router identifier of the Device to be used for BGP.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

Syntax

To set or change information:

```
bgp router-id <ipv4 address>
```

To delete information:

```
no bgp router-id
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

<ipv4 address>

Specifies the router identifier (IPv4 address).

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify an IPv4 address other than 0.0.0.0.

Default behavior

The IPv4 address assigned to the loopback interface of the VRF or global network to which BGP belongs is used. If no IPv4 address has been assigned to the loopback interface, the largest IPv4 address assigned to the interface is used.

Impact on communication

If you use this command to change the router identifier, all BGP sessions are temporarily disconnected. As a result, communication stops until the routes are relearned.

When the change is applied

The change is applied when the command is set.

Notes

1. If all of the following conditions are met, BGP is disabled:
 - The local router identifier has not been set by this command.
 - No IPv4 address has been set for the loopback interface.
 - There are no interfaces for which an IPv4 address is set.
2. If either the IPv4 address for the loopback interface or the IPv4 address for an interface is selected as the router identifier and then the IPv4 address of the interface is changed, the

change is not applied to the BGP behavior until any of the following occurs:

- The Device is restarted.
 - The IP unicast routing program is restarted.
 - The disable (BGP4) command is deleted.
3. If you add, change, or delete information set by this command, BGP sessions with all peers are temporarily disconnected.

Related commands

```
interface  
bgp cluster-id
```

default-information originate

Advertises the default routes redistributed from non-BGP routing protocols to all BGP peers.

If you set the command in `config-router` mode, the setting applies to the default IPv4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the default IPv4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to the default IPv6 routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the default IPv6 routes of the specified VRF.

Syntax

To set information:

```
default-information originate
```

To delete information:

```
no default-information originate
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

None

Default behavior

The default routes learned by non-BGP routing protocols are not advertised via BGP.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. A default route learned via BGP will be advertised regardless of the command setting.

Related commands

```
ip route
redistribute
```

default-metric

Sets the metric (MED attribute) of the routing information to be advertised via BGP. This command applies when routing information is advertised to external peers or when routing information learned by another protocol is advertised via BGP. The metric specified for the `neighbor route-map` or `redistribute` command has priority over the metric specified for this command.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set or change information:

```
default-metric <metric>
```

To delete information:

```
no default-metric
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

<metric>

Sets the metric (MED attribute) of the routing information to be advertised.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 in decimal.

Default behavior

The metric (MED attribute) is not set when routing information is advertised to external peers or when routing information learned by another protocol is advertised via BGP.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

None

Related commands

`distribute-list`
`redistribute`

disable

Disables BGP even if the BGP setting is specified.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af (ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

Syntax

To set information:

`disable`

To delete information:

`no disable`

Input mode

`(config-router)`

`(config-router-af) (ipv4 vrf)`

`(config-router-af) (ipv6 vrf)`

Parameters

None

Default behavior

BGP is enabled.

Impact on communication

A BGP route is not generated.

When the change is applied

The change is applied when the command is set.

Notes

None

Related commands

None

distance bgp

Sets distances for the routing information learned from an external peer, internal peer, and member AS peer.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af (ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set or change information:

```
distance bgp <external distance> <internal distance>
```

To delete information:

```
no distance bgp
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

<external distance>

Sets the distance of a route learned from an external peer.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

<internal distance>

Sets the distance of routes learned from an internal peer and member AS peer.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

Default behavior

<external distance> is set to 20, and *<internal distance>* is set to 200.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

None

Related commands

None

exit-address-family

Exits `config-router-af` mode, and returns to `config-router` mode.

Syntax

To set information:
`exit-address-family`

Input mode

`(config-router-af) (ipv4 vrf)`
`(config-router-af) (ipv6)`
`(config-router-af) (ipv6 vrf)`

Parameters

None

Default behavior

This command is automatically set when a configuration is set in `config-router-af` mode.

Impact on communication

None

When the change is applied

None

Notes

1. Use this command to copy and paste configuration entries that have already been set. To set a configuration on a command line, use the `exit` command.

Related commands

None

maximum-paths

Generates multipaths using the specified value as the maximum number of paths when multiple routing information entries of equal cost to a given destination exist.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set or change information:

```
maximum-paths <number> [{ same-as | all-as }]
```

To delete information:

```
no maximum-paths
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

<number>

Specifies the maximum number of multipaths.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 16 in decimal (when 1 is specified, multipaths are not generated).

Note, however, that if `ip urpf` is set, you cannot set 9 or a greater value for *<number>*.

{ same-as | all-as }

Specifies BGP routes for which multipaths can be generated. If you specify `same-as`, multipaths can be generated for the BGP routes received from the same neighboring AS. If you specify `all-as`, multipaths can be generated for the BGP routes learned from different ASs. Note that `all-as` must be specified together with `bgp always-compare-med`.

1. Default value when this parameter is omitted:

`same-as` is applied.

2. Range of values:

None

Default behavior

Multipaths are not generated.

Impact on communication

Load balancing, where packets are forwarded over multipaths to the same destination generated by the command, is used.

When the change is applied

The change is applied when the command is set.

Notes

1. If this command is set, a next hop with the smallest address is preferentially selected for the BGP route from the next hops of equal-cost BGP routes.

Related commands

`bgp always-compare-med`

neighbor activate

Enables an exchange of routes between an IPv6 address family and peers.

This command applies only to BGP4+.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <ipv6 address>` deletes all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

```
neighbor {<ipv6 address> | <peer group>} activate
```

To delete information:

```
no neighbor {<ipv6 address> | <peer group>} [activate]
```

Input mode

```
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{<ipv6 address> | <peer group>}
```

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv6 address>`, specify an IPv6 address of a peer.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

IPv6 routes cannot be exchanged.

Impact on communication

If this command is not set, a BGP session using an IPv6 address as a peer address is not established.

When the change is applied

The change is applied when the command is set.

Notes

1. If this command is not set when an IPv6 address is used for peering, a BGP session with the peer cannot be established.
2. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members)` command to assign the peer to the peer group.

3. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating)` command to configure the peer group.

Related commands

```
neighbor remote-as  
neighbor peer-group (assigning members)  
neighbor peer-group (creating)
```

neighbor always-nexthop-self

Specifies that the next hop of routes advertised to an internal peer is to be forcibly changed to the address of the local router used for peering with the internal peer (this command also applies when using route reflection or when advertising IGP routes by BGP).

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} always-nexthop-self`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} always-nexthop-self`

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} [always-nexthop-self]`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} [always-nexthop-self]`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv6 address>*, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

If the peer from which the BGP route was learned and the advertising destination peer are on the same network interface, the next hop of the routing information advertised to an internal peer is not changed.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. For route reflection, when routes learned from a client is advertised to the client (reflected) or IGP routes are advertised to an internal peer by BGP, the next hop is not changed even if the `neighbor next-hop-self` command is set. Use this command if you want to change the next hop to the peering address of local router when using route reflection or when advertising IGP routes to an internal peer.
2. Internal peers can only be specified.
3. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members)` command to assign the peer to the peer group.
4. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating)` command to configure the peer group.

Related commands

```
neighbor route-reflector-client
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor as-override

Specifies that the first AS number set for the AS_SEQUENCE path type of the ASPATH attribute is to be overwritten with the local AS number and advertised to an external peer. If the same number as the first AS number appears in succession, all the consecutive AS numbers are overwritten.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} as-override`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} as-override`

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} [as-override]`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} [as-override]`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv6 address>*, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Handled as the normal ASPATH attribute.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

None

Related commands

```
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor description

Specifies supplementary information for the peer. The specified information is displayed in the configuration file and added to the log data related to the peer.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set or change information:

For `config-router` mode:

```
neighbor {<ipv4 address> | <ipv6 address> | <peer group>} description
<text>
```

For `config-router-af(ipv4 vrf)` mode:

```
neighbor {<ipv4 address> | <peer group>} description <text>
```

For `config-router-af(ipv6 vrf)` mode:

```
neighbor {<ipv6 address> | <peer group>} description <text>
```

To delete information:

For `config-router` mode:

```
no neighbor {<ipv4 address> | <ipv6 address> | <peer group>}
[description]
```

For `config-router-af(ipv4 vrf)` mode:

```
no neighbor {<ipv4 address> | <peer group>} [description]
```

For `config-router-af(ipv6 vrf)` mode:

```
no neighbor {<ipv6 address> | <peer group>} [description]
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{<ipv4 address> | <ipv6 address> | <peer group>}
```

Specifies the IPv4 address of the BGP4 peer, the IPv6 address of the BGP4+ peer, or the BGP4 or BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<ipv6 address>`, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{*<ipv4 address>* | *<peer group>*}

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv4 address>*, specify an IPv4 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{*<ipv6 address>* | *<peer group>*}

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv6 address>*, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<text>

Specifies the supplementary information.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Enclose a character string of no more than 64 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string in Specifiable values for parameters*.

Default behavior

A supplementary description of a peer is not added.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command` to assign the peer to the peer group.
2. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating) command` to configure the peer group.

Related commands

```
neighbor remote-as  
neighbor peer-group (assigning members)  
neighbor peer-group (creating)
```

neighbor ebgp-multihop

Allows a BGP connection between an external peer and a member AS peer that are not directly connected.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set or change information:

For `config-router` mode:

```
neighbor {<ipv4 address> | <ipv6 address> | <peer group>} ebgp-multihop
[<ttl>]
```

For `config-router-af(ipv4 vrf)` mode:

```
neighbor {<ipv4 address> | <peer group>} ebgp-multihop [<ttl>]
```

For `config-router-af(ipv6 vrf)` mode:

```
neighbor {<ipv6 address> | <peer group>} ebgp-multihop [<ttl>]
```

To delete information:

For `config-router` mode:

```
no neighbor {<ipv4 address> | <ipv6 address> | <peer group>}
[ebgp-multihop]
```

For `config-router-af(ipv4 vrf)` mode:

```
no neighbor {<ipv4 address> | <peer group>} [ebgp-multihop]
```

For `config-router-af(ipv6 vrf)` mode:

```
no neighbor {<ipv6 address> | <peer group>} [ebgp-multihop]
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{<ipv4 address> | <ipv6 address> | <peer group>}
```

Specifies the IPv4 address of the BGP4 peer, the IPv6 address of the BGP4+ peer, or the BGP4 or BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<ipv6 address>`, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{*<ipv4 address>* | *<peer group>*}

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv4 address>*, specify an IPv4 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{*<ipv6 address>* | *<peer group>*}

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv6 address>*, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<ttl>

Specifies the number of hops.

1. Default value when this parameter is omitted:

255

2. Range of values:

Specify 1 to 255 in decimal.

Default behavior

If an external peer and a member AS peer are not directly connected, no BGP connection can be established.

Impact on communication

If you change the setting of this command, the BGP session with the specified peer is temporarily disconnected. As a result, communication stops until the routes are relearned from the peer.

When the change is applied

The change is applied when the command is set.

Notes

1. Only external peers or AS peers can be specified. For internal peers, this command is not required even if the peers are not directly connected to the interface.
2. If you add, change, or delete information set by this command, the BGP session with the peer is temporarily disconnected.
3. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command`

to assign the peer to the peer group.

4. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating)` command to configure the peer group.

Related commands

```
neighbor update-source
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor maximum-prefix

Limits the number of routes that can be learned from a BGP peer. You can specify that the BGP peer is to be disconnected if the number of learned routes exceeds a maximum so that no more routes are learned.

The disconnected BGP peer is reconnected by inputting the `clear ip bgp` (for BGP4) or `clear ipv6 bgp` (for BGP4+) operation command.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set or change information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:

```
neighbor {<ipv4 address> | <peer group>} maximum-prefix <maximum>
[<threshold>] [{warning-only | restart <minutes>}]
```

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:

```
neighbor {<ipv6 address> | <peer group>} maximum-prefix <maximum>
[<threshold>] [{warning-only | restart <minutes>}]
```

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:

```
no neighbor {<ipv4 address> | <peer group>} [maximum-prefix]
```

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:

```
no neighbor {<ipv6 address> | <peer group>} [maximum-prefix]
```

Input mode

```
(config-router)
(config-router-af)(ipv4 vrf)
(config-router-af)(ipv6)
(config-router-af)(ipv6 vrf)
```

Parameters

{<ipv4 address> | <peer group>}

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv4 address>, specify an IPv4 address.

For <peer group>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{<ipv6 address> | <peer group>}

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv6 address>, specify an IPv6 address.

For <peer group>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

maximum-prefix <maximum>

Specifies the maximum number of routes that can be learned from a BGP peer.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 4294967295 in decimal.

<threshold>

Sets a threshold for output of a warning system message for the maximum number of routes that can be learned from a BGP peer. If you specify 100%, no system message is output.

1. Default value when this parameter is omitted:

75 is applied.

2. Range of values:

Specify 1 to 100 (percent) in decimal.

warning-only

Specifies that the BGP peer is not to be disconnected even if the number of routes learned from the BGP peer exceeds the maximum.

1. Default value when this parameter is omitted:

The BGP peer is disconnected if the number of routes learned from the BGP peer exceeds the maximum.

2. Range of values:

None

restart <minutes>

Specifies the time that a BGP peer will wait to be reconnected after it is disconnected because the number of routes learned from the BGP peer exceeded the maximum. You can reconnect the disconnected BGP peer anytime by inputting the `clear ip bgp` (for BGP4) or `clear ipv6 bgp` (for BGP4+) operation command.

1. Default value when this parameter is omitted:

After the number of routes learned from a BGP peer exceeded the maximum and the BGP was disconnected, the BGP peer is not reconnected until the `clear ip bgp` (for BGP4) or `clear ipv6 bgp` (for BGP4+) is entered.

2. Range of values:

Specify 1 to 65535 (minutes) in decimal.

Default behavior

The number of routes that can be learned from a BGP peer is not limited.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command` to assign the peer to the peer group.
2. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating) command` to configure the peer group.

Related commands

```
neighbor remote-as  
neighbor peer-group (assigning members)  
neighbor peer-group (creating)
```

neighbor next-hop-self

Allows the next hop when a route learned from a BGP peer is advertised to BGP peers to be changed to the local address used for peering with the destination BGP peers.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} next-hop-self`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} next-hop-self`

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} [next-hop-self]`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} [next-hop-self]`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For *<ipv6 address>*, specify an IPv6 address.
For *<peer group>*, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

If the peer from which the BGP route was learned and the advertising destination peer are on the same network interface, the next hop of the routing information advertised to an internal peer is not changed.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. When route reflection is used or when an IGP route is advertised to an internal peer by BGP, the next hop to be advertised to the client is not changed even if this command is set. If you want to change the next hop when using route reflection or when advertising an IGP route to an internal peer, use the `neighbor always-nexthop-self` command.
2. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command` to assign the peer to the peer group.
3. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating) command` to configure the peer group.

Related commands

```
neighbor always-nexthop-self
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor password

Sets TCP MD5 authentication information (authentication key used to generate message digests) between peers.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set or change information:

For `config-router` mode:

```
neighbor {<ipv4 address> | <ipv6 address> | <peer group>} password <key>
```

For `config-router-af(ipv4 vrf)` mode:

```
neighbor {<ipv4 address> | <peer group>} password <key>
```

For `config-router-af(ipv6 vrf)` mode:

```
neighbor {<ipv6 address> | <peer group>} password <key>
```

To delete information:

For `config-router` mode:

```
no neighbor {<ipv4 address> | <ipv6 address> | <peer group>} [password]
```

For `config-router-af(ipv4 vrf)` mode:

```
no neighbor {<ipv4 address> | <peer group>} [password]
```

For `config-router-af(ipv6 vrf)` mode:

```
no neighbor {<ipv6 address> | <peer group>} [password]
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{<ipv4 address> | <ipv6 address> | <peer group>}
```

Specifies the IPv4 address of the BGP4 peer, the IPv6 address of the BGP4+ peer, or the BGP4 or BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<ipv6 address>`, specify an IPv6 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{<ipv4 address> | <peer group>}

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv4 address>, specify an IPv4 address.

For <peer group>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{<ipv6 address> | <peer group>}

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv6 address>, specify an IPv6 address.

For <peer group>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<key>

Specifies TCP MD5 authentication information.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Enclose a character string of no more than 80 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string in Specifiable values for parameters*.

Default behavior

TCP MD5 authentication is not used.

Impact on communication

If you use this command to change the authentication key, the BGP session with the specified peer is temporarily disconnected. As a result, communication stops until the routes are relearned from the peer.

When the change is applied

The change is applied when the command is set.

Notes

1. If you use this command to add, change, or delete TCP MD5 authentication information, the BGP session with the peer is temporarily disconnected.
2. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members)` command

to assign the peer to the peer group.

3. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating)` command to configure the peer group.

Related commands

```
neighbor remote-as  
neighbor peer-group (assigning members)  
neighbor peer-group (creating)
```

neighbor peer-group (assigning members)

Assigns a peer to a peer group. Because the `neighbor` command settings for a peer group apply to all peers that belong to the peer group, you can simplify settings by assigning the peers that have the same `neighbor` command settings to the same peer group. It is also possible to separately set the `neighbor` command settings for each peer in the peer group. In this case, the `neighbor` command settings for the peer are applied.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network. Note, however, that BGP4 peers and BGP4+ peers cannot be assigned to the same peer group.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer.

Syntax

To set or change information:

For `config-router` mode:

```
neighbor {<ipv4 address> | <ipv6 address>} peer-group <peer group>
```

For `config-router-af(ipv4 vrf)` mode:

```
neighbor <ipv4 address> peer-group <peer group>
```

For `config-router-af(ipv6 vrf)` mode:

```
neighbor <ipv6 address> peer-group <peer group>
```

To delete information:

For `config-router` mode:

```
no neighbor {<ipv4 address> | <ipv6 address>} [peer-group]
```

For `config-router-af(ipv4 vrf)` mode:

```
no neighbor <ipv4 address> [peer-group]
```

For `config-router-af(ipv6 vrf)` mode:

```
no neighbor <ipv6 address> [peer-group]
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{<ipv4 address> | <ipv6 address>}
```

Specifies the IPv4 address of the BGP4 peer or the IPv6 address of the BGP4+ peer.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<ipv6 address>`, specify an IPv6 address.

For details, see *Specifiable values for parameters*.

<ipv4 address>

Specifies the IPv4 address of the BGP4 peer.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

For details, see *Specifiable values for parameters*.

<ipv6 address>

Specifies the IPv6 address of the BGP4+ peer.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv6 address.

For details, see *Specifiable values for parameters*.

<peer group>

Specifies the peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Peers are not assigned to a peer group.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. Before you can set this command, you need to use the `neighbor peer-group (creating)` command to configure a peer group.
2. Before you can set this command, you need to use the `neighbor remote-as` command to set the peer or the AS number for the peer group containing the peer.
3. If you delete the information set by the command when the `neighbor remote-as` command has not been set for the peer, all information about the peer is deleted.
4. External peers and member AS peers cannot be assigned to a group that contains internal peers.
5. BGP4 peers and BGP4+ peers in the global network cannot be assigned to the same peer group. In a VRF, you can set the same peer group identifier for BGP4 and BGP4+. In this case,

the BGP4 peer group and BGP4+ peer group are treated as different peer groups.

6. Peers of the global network and peers of VRF cannot be assigned to the same peer group. Peers of different VRFs cannot be assigned to the same peer group. The same peer group identifier can be set for the peers of the global network and peers of VRF, or peers in different VRFs. In this case, the peers of the global network and peers of VRF, or the peers of different VRFs, are handled as different peer groups.
7. If you change the target peer group, the route filtering for the new peer group does not apply to the peers unless you enter either of the following operation commands: `clear ip bgp [vrf {<vrfid> | all}] * {both | in | out}` (for BGP4) or `clear ipv6 bgp [vrf {<vrfid> | all}] * {both | in | out}` (for BGP4+).

Related commands

```
neighbor peer-group (creating)
neighbor remote-as
```

neighbor peer-group (creating)

Configures a group of peers that share the configuration settings. The `neighbor` command settings apply to all peers that belong to the specified peer group. It is also possible to separately set the `neighbor` command settings for each peer in the peer group. In this case, the `neighbor` command settings for the peer are applied.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network. Note, however, that BGP4 peers and BGP4+ peers cannot be assigned to the same peer group.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

```
neighbor <peer group> peer-group
```

To delete information:

```
no neighbor <peer group> [peer-group]
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

<peer group>

Specifies the peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

A group of peers that share the configuration settings is not configured.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. You must set this command before you can specify another `neighbor` command for the peer group.
2. If you delete the information set by this command, all the `neighbor` command settings for the

peer group are deleted. If the `neighbor remote-as` command has not been set for a peer that belongs to the specified peer group, all information about the peer is also deleted. If the `neighbor remote-as` command has been set, the information about the peer is not deleted.

3. External peers and member AS peers cannot be assigned to a group that contains internal peers.
4. BGP4 peers and BGP4+ peers in the global network cannot be assigned to the same peer group. In a VRF, you can set the same peer group identifier for BGP4 and BGP4+. In this case, the BGP4 peer group and BGP4+ peer group are treated as different peer groups.
5. Peers of the global network and peers of VRF cannot be assigned to the same peer group. Peers of different VRFs cannot be assigned to the same peer group. The same peer group identifier can be set for the peers of the global network and peers of VRF, or peers in different VRFs. In this case, the peers of the global network and peers of VRF, or the peers of different VRFs, are handled as different peer groups.

Related commands

`neighbor peer-group` (assigning members)

neighbor permit-asloop

Allows a received route to be accepted as a normal route even if the ASPATH attribute of the received route shows an AS loop.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} permit-asloop`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} permit-asloop`

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} [permit-asloop]`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} [permit-asloop]`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For *<ipv6 address>*, specify an IPv6 address.
For *<peer group>*, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

AS loop routes are not accepted.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

None

Related commands

```
neighbor remote-as  
neighbor peer-group (assigning members)  
neighbor peer-group (creating)
```

neighbor remote-as

Sets the AS number of a BGP peer or peer group. This command must be used to set a BGP peer.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set or change information:

For `config-router` mode:

```
neighbor {<ipv4 address> | <ipv6 address> | <peer group>} remote-as <as>
```

For `config-router-af(ipv4 vrf)` mode:

```
neighbor {<ipv4 address> | <peer group>} remote-as <as>
```

For `config-router-af(ipv6 vrf)` mode:

```
neighbor {<ipv6 address> | <peer group>} remote-as <as>
```

To delete information:

For `config-router` mode:

```
no neighbor {<ipv4 address> | <ipv6 address> | <peer group>} [remote-as]
```

For `config-router-af(ipv4 vrf)` mode:

```
no neighbor {<ipv4 address> | <peer group>} [remote-as]
```

For `config-router-af(ipv6 vrf)` mode:

```
no neighbor {<ipv6 address> | <peer group>} [remote-as]
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{<ipv4 address> | <ipv6 address> | <peer group>}
```

Specifies the IPv4 address of the BGP4 peer, the IPv6 address of the BGP4+ peer, or the BGP4 or BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<ipv6 address>`, specify an IPv6 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{<ipv4 address> | <peer group>}

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv4 address>, specify an IPv4 address.

For <peer group>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{<ipv6 address> | <peer group>}

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv6 address>, specify an IPv6 address.

For <peer group>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<as>

Specifies the AS number of the BGP peer.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

Default behavior

No BGP peer is set.

Impact on communication

If you use this command to change the AS number of the peer, the BGP session with the specified peer is temporarily disconnected. As a result, communication stops until the routes are relearned from the peer.

When the change is applied

The change is applied when the command is set.

Notes

1. Before you enter this command, use the `bgp router-id` command to set the local router identifier or set an IPv4 address for the loopback interface.

If neither is set, this command cannot be set.

2. Notes on setting information

- Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating)` command to configure the peer group.
- If you set this command for a peer group, you cannot set the command for a peer that belong to the peer group.

- If you set this command for a peer that belongs to a peer group, you cannot set the command for the peer group.
 - This command must be set for a peer before you can specify another neighbor command for that peer. This command must be set for either a peer that belongs to a peer group or the peer group.
3. To use a link-local address for *<IPv6-Address>*, you need to use the `neighbor update-source` command to specify the interface that indicates the local peer address (link-local address).

Related commands

Other `neighbor` commands related to the peer or peer group

`bgp confederation identifier`

`bgp confederation peers`

neighbor remove-private-as

Specifies the removal of private AS numbers when the routing information whose AS_PATH attribute contains only private AS numbers (64512 to 65535) is advertised to external peers or member AS peers.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} remove-private-as`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} remove-private-as`

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} remove-private-as`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} remove-private-as`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv6 address>*, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Private AS numbers are advertised without change.

Impact on communication

None

When the change is applied

The change is applied when the `clear ip bgp [vrf {<vrfid> | all}] * { out | both }` (for BGP4) or `clear ipv6 bgp [vrf {<vrfid> | all}] * { out | both }` (for BGP4+) operation command is executed.

Notes

None

Related commands

None

neighbor route-reflector-client

Specifies the route reflector client. This command also specifies that the local router is to operate as a route reflector.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af (ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode or `config-router-af (ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} route-reflector-client`

For `config-router-af (ipv6)` mode or `config-router-af (ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} route-reflector-client`

To delete information:

For `config-router` mode or `config-router-af (ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} [route-reflector-client]`

For `config-router-af (ipv6)` mode or `config-router-af (ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} [route-reflector-client]`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For *<ipv6 address>*, specify an IPv6 address.
For *<peer group>*, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

The route reflector client is not specified.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. Internal peers can only be specified.
2. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command` to assign the peer to the peer group.
3. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating) command` to configure the peer group.

Related commands

```

bgp cluster-id
bgp client-to-client reflection
neighbor always-nexthop-self
neighbor set-nexthop-peer
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)

```

neighbor send-community

Specifies that the COMMUNITIES attribute is to be sent if it is added to the BGP routing information that is to be advertised.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} send-community`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} send-community`

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} [send-community]`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} [send-community]`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For *<ipv6 address>*, specify an IPv6 address.
For *<peer group>*, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

The COMMUNITIES attribute is not sent even if it is added to the BGP routing information to be advertised.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command` to assign the peer to the peer group.
2. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating) command` to configure the peer group.

Related commands

```
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor set-nexthop-peer

Specifies that the next hop of the received routing information is to be changed to the remote IP address used for peering.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} set-nexthop-peer`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} set-nexthop-peer`

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} [set-nexthop-peer]`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} [set-nexthop-peer]`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For *<ipv6 address>*, specify an IPv6 address.
For *<peer group>*, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

The next hop of the received routing information is not changed.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command` to assign the peer to the peer group.
2. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating) command` to configure the peer group.

Related commands

```
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor shutdown

Disables a peer connection.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode:

```
neighbor {<ipv4 address> | <ipv6 address> | <peer group>} shutdown
```

For `config-router-af(ipv4 vrf)` mode:

```
neighbor {<ipv4 address> | <peer group>} shutdown
```

For `config-router-af(ipv6 vrf)` mode:

```
neighbor {<ipv6 address> | <peer group>} shutdown
```

To delete information:

For `config-router` mode:

```
no neighbor {<ipv4 address> | <ipv6 address> | <peer group>} [shutdown]
```

For `config-router-af(ipv4 vrf)` mode:

```
no neighbor {<ipv4 address> | <peer group>} [shutdown]
```

For `config-router-af(ipv6 vrf)` mode:

```
no neighbor {<ipv6 address> | <peer group>} [shutdown]
```

Input mode

(`config-router`)

(`config-router-af`) (`ipv4 vrf`)

(`config-router-af`) (`ipv6 vrf`)

Parameters

{<ipv4 address> | <ipv6 address> | <peer group>}

Specifies the IPv4 address of the BGP4 peer, the IPv6 address of the BGP4+ peer, or the BGP4 or BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv4 address>, specify an IPv4 address.

For <ipv6 address>, specify an IPv6 address.

For <peer group>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{<ipv4 address> | <peer group>}

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv4 address>, specify an IPv4 address.

For <peer group>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{<ipv6 address> | <peer group>}

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <ipv6 address>, specify an IPv6 address.

For <peer group>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

A peer connection is not disabled.

Impact on communication

Because this command disconnects the BGP session with the specified peer, communication over the destination routes learned from the peer stops.

When the change is applied

The change is applied when the command is set.

Notes

1. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command` to assign the peer to the peer group.
2. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating) command` to configure the peer group.

Related commands

```
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor soft-reconfiguration

Stores routes that have been suppressed by the input policy. If the input policy is changed, this command allows the new input policy without disconnecting the BGP session.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} soft-reconfiguration inbound`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} soft-reconfiguration inbound`

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} [soft-reconfiguration inbound]`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} [soft-reconfiguration inbound]`

Input mode

```
(config-router)
(config-router-af)(ipv4 vrf)
(config-router-af)(ipv6)
(config-router-af)(ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv6 address>*, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

inbound

Specifies the input policy.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The routes suppressed by the input policy are not stored.

Impact on communication

If route refreshing capability has not been negotiated with the peer when the information set by this command is deleted, the BGP session is temporarily disconnected. As a result, communication stops until the routes are relearned.

When the change is applied

The change is applied when the command is set.

Notes

1. If route refreshing capability has not been negotiated with the peer when the information set by this command is deleted, the BGP session is temporarily disconnected.
2. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members)` command to assign the peer to the peer group.
3. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating)` command to configure the peer group.

Related commands

```
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor timers

Sets the `KEEPALIVE` message transmission interval and hold timer value for BGP peers.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set or change information:

For `config-router` mode:

```
neighbor {<ipv4 address> | <ipv6 address> | <peer group>} timers <keep
alive> <hold time>
```

For `config-router-af(ipv4 vrf)` mode:

```
neighbor {<ipv4 address> | <peer group>} timers <keep alive> <hold time>
```

For `config-router-af(ipv6 vrf)` mode:

```
neighbor {<ipv6 address> | <peer group>} timers <keep alive> <hold time>
```

To delete information:

For `config-router` mode:

```
no neighbor {<ipv4 address> | <ipv6 address> | <peer group>} [timers]
```

For `config-router-af(ipv4 vrf)` mode:

```
no neighbor {<ipv4 address> | <peer group>} [timers]
```

For `config-router-af(ipv6 vrf)` mode:

```
no neighbor {<ipv6 address> | <peer group>} [timers]
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{<ipv4 address> | <ipv6 address> | <peer group>}
```

Specifies the IPv4 address of the BGP4 peer, the IPv6 address of the BGP4+ peer, or the BGP4 or BGP4+ peer group identifier.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For `<ipv4 address>`, specify an IPv4 address.
For `<ipv6 address>`, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{*<ipv4 address>* | *<peer group>*}

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv4 address>*, specify an IPv4 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{*<ipv6 address>* | *<peer group>*}

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv6 address>*, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<keep alive>

Specifies the `KEEPALIVE` message sending interval (in seconds) for BGP.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 65534 (seconds) in decimal.

If 0 is specified, no `KEEPALIVE` messages are sent when the BGP session is established.

If you specify 0 for *<hold time>*, you can specify only 0 for this parameter. If the value of *<hold time>* is other than 0, the value of this parameter must be smaller than the value of *<hold time>*.

The `KEEPALIVE` message transmission interval to be used depends on the negotiation result of the hold timer value when the BGP4 or BGP4+ session is established as described below.

* If the local hold timer value is selected during negotiation of the hold timer value, the value of this parameter is used.

* If the remote hold timer value is selected during negotiation of the hold timer value and one third of the hold timer value in the negotiation result is smaller than the value of this parameter, that one-third value is used. If one third of the hold timer value in the negotiation result is equal to or greater than the value of this parameter, the value of this parameter is used.

<hold time>

Specifies the Holdtime timer value in seconds.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 or 3 to 65535 (seconds) in decimal.

If you specify 0, the hold time with a peer is not monitored.

If you specify 0 for *<keep alive>*, you can specify only 0 for this parameter.

Default behavior

If the `KEEPALIVE` message transmission interval and hold timer value have been set by the `timers bgp` command, the values specified for the `timers bgp` command are applied. If these values were not set by the `timers bgp` command, *<keep alive>* is set to 60 and *<hold time>* is set to 180.

Impact on communication

If you use this command to change the hold timer value, the BGP session with the specified peer is temporarily disconnected. As a result, communication stops until the routes are relearned from the peer.

When the change is applied

The change is applied when the command is set.

Notes

1. If you use this command to change the value of *<hold time>* or *<keep alive>*, the BGP session with the specified peer is temporarily disconnected.
2. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command` to assign the peer to the peer group.
3. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating) command` to configure the peer group.

Related commands

```
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor update-source

Specifies the interface used as the local IPv4 address (or IPv6 address) for the BGP session with a peer.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set or change information:

For `config-router` mode:

```
neighbor {<ipv4 address> | <ipv6 address> | <peer group>} update-source
<interface type> <interface number>
```

For `config-router-af(ipv4 vrf)` mode:

```
neighbor {<ipv4 address> | <peer group>} update-source <interface type>
<interface number>
```

For `config-router-af(ipv6 vrf)` mode:

```
neighbor {<ipv6 address> | <peer group>} update-source <interface type>
<interface number>
```

To delete information:

For `config-router` mode:

```
no neighbor {<ipv4 address> | <ipv6 address> | <peer group>}
[update-source]
```

For `config-router-af(ipv4 vrf)` mode:

```
no neighbor {<ipv4 address> | <peer group>} [update-source]
```

For `config-router-af(ipv6 vrf)` mode:

```
no neighbor {<ipv6 address> | <peer group>} [update-source]
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{<ipv4 address> | <ipv6 address> | <peer group>}
```

Specifies the IPv4 address of the BGP4 peer, the IPv6 address of the BGP4+ peer, or the BGP4 or BGP4+ peer group identifier.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For `<ipv4 address>`, specify an IPv4 address.

For *<ipv6 address>*, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{*<ipv4 address>* | *<peer group>*}

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv4 address>*, specify an IPv4 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{*<ipv6 address>* | *<peer group>*}

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv6 address>*, specify an IPv6 address.

For *<peer group>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<interface type> *<interface number>*

Specifies the interface used as the local IPv4 address (or IPv6 address).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<interface type>* and *<interface number>*, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

* Ethernet interface

* Ethernet subinterface

* Port channel interface

* Port channel subinterface

* Loopback interface

* Management port (specifiable only for global network peers)

For the loopback interface, specify either 0 in *config-router* mode, or *<loopback id>* in either *config-router-af (ipv4 vrf)* mode or *config-router-af (ipv6 vrf)* mode.

Default behavior

The source IPv4 address is set to the local IPv4 address for which the BGP connection has been set. Similarly, the source IPv6 address is set to the local IPv6 address for which the BGP connection has been set.

Impact on communication

If you use this command to change the local peer address, the BGP session with the specified peer is temporarily disconnected. As a result, communication stops until the routes are relearned from the peer.

When the change is applied

The change is applied when the command is set.

Notes

1. If multiple addresses have been set for the specified interface, the largest address is selected.
2. If you use this command to change the local peer address, the BGP session with the peer is temporarily disconnected.
3. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members)` command to assign the peer to the peer group.
4. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating)` command to configure the peer group.

Related commands

```
neighbor ebgp-multihop
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

neighbor weight

Sets the weighting of routes received from a peer. If routes with the same destination are learned from multiple peers, routes with larger values are handled as preferred routes.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

`no neighbor <ipv4 address>` and `no neighbor <ipv6 address>` delete all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Syntax

To set or change information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`neighbor {<ipv4 address> | <peer group>} weight <number>`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`neighbor {<ipv6 address> | <peer group>} weight <number>`

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no neighbor {<ipv4 address> | <peer group>} [weight]`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no neighbor {<ipv6 address> | <peer group>} [weight]`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

`{<ipv4 address> | <peer group>}`

Specifies the IPv4 address of the BGP4 peer or the BGP4 peer group identifier.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`{<ipv6 address> | <peer group>}`

Specifies the IPv6 address of the BGP4+ peer or the BGP4+ peer group identifier.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For *<ipv6 address>*, specify an IPv6 address.
For *<peer group>*, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

<number>

Specifies the weight value.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 0 to 255 in decimal. 0 indicates the lowest priority, and 255 indicates the highest priority.

Default behavior

The weighting is handled as 0 (lowest priority).

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. Before you can set this command for a peer, you need to use the `neighbor remote-as` command to set the peer or use the `neighbor peer-group (assigning members) command` to assign the peer to the peer group.
2. Before you can set this command for a peer group, you need to use the `neighbor peer-group (creating) command` to configure the peer group.

Related commands

```
neighbor remote-as
neighbor peer-group (assigning members)
neighbor peer-group (creating)
```

network

Specifies the network address of the routing information generated and advertised via BGP. If there is an active route of any protocol that matches the specified network address, a BGP advertised route is generated and advertised. Advertised routes are inactive routes which are not registered in the forwarding table.

If you set the command in `config-router` mode, the setting applies to BGP4 routes of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to the BGP4 routes of the specified VRF.

If you set the command in `config-router-af(ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

This command can be specified more than once.

Syntax

To set information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`network <ipv4 prefix>/<masklen> [ge <masklen>] [le <masklen>]`

(multiple lines can be entered)

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`network <ipv6 prefix>/<prefixlen> [ge <prefixlen>] [le <prefixlen>]`

(multiple lines can be entered)

To delete information:

For `config-router` mode or `config-router-af(ipv4 vrf)` mode:
`no network <ipv4 prefix>/<masklen> [ge <masklen>] [le <masklen>]`

For `config-router-af(ipv6)` mode or `config-router-af(ipv6 vrf)` mode:
`no network <ipv6 prefix>/<prefixlen> [ge <prefixlen>] [le <prefixlen>]`

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

<ipv4 prefix>

Specify the prefix of the IPv4 address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify the prefix of the IPv4 address.

Note: Set each bit that follows the bits specified for *<masklen>* of *<ipv4 prefix>* to 0.

<masklen>

Specifies the mask length of the IPv4 address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 32 in decimal.

<ipv6 prefix>

Specify the prefix of the IPv6 address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify the prefix of the IPv6 address.

Note: Set each bit that follows the bits specified for *<prefixlen>* of *<ipv6 prefix>* to 0.

<prefixlen>

Specifies the mask length of the IPv6 address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 128 in decimal.

ge <masklen>

Sets a condition that the prefix mask length must be equal to or greater than the value of *<masklen>*.

1. Default value when this parameter is omitted:

The mask length must be equal to or greater than the *<masklen>* value specified for *<ipv4 prefix>/<masklen>*.

2. Range of values:

Specify 0 to 32 in decimal.

le <masklen>

Sets a condition that the prefix mask length must be equal to or smaller than the value of *<masklen>*.

The value of *ge <masklen>* must be equal to or smaller than the value of *le <masklen>*.

1. Default value when this parameter is omitted:

The mask length must be equal to or smaller than the value of *<masklen>* specified for *<ipv4 prefix>/<masklen>*.

2. Range of values:

Specify 0 to 32 in decimal.

ge <prefixlen>

Sets a condition that the prefix length must be equal to or greater than the value of *<prefixlen>*.

1. Default value when this parameter is omitted:

The mask length must be equal to or greater than the value of *<prefixlen>* specified for *<ipv6 prefix>/<prefixlen>*.

2. Range of values:

Specify 0 to 128 in decimal.

le <prefixlen>

Sets a condition that the prefix length must be equal to or smaller than the value of *<prefixlen>*.

The value of *ge <prefixlen>* must be equal to or smaller than the value of *le <prefixlen>*.

1. Default value when this parameter is omitted:

The mask length must be equal to or smaller than the value of *<prefixlen>* specified for *<ipv6 prefix>/<prefixlen>*.

2. Range of values:

Specify 0 to 128 in decimal.

Default behavior

Advertised routes are not generated or advertised.

Impact on communication

None

When the change is applied

The change is applied when the command is set.

Notes

1. Advertised routes are advertised to all peers unless route filtering is explicitly set. Make sure that you use route filtering to suppress advertisements to the router from which the BGP route was learned. If a route generated from the BGP4 route and bound for the same destination as the BGP4 route is advertised to that router, a routing loop might occur.

Related commands

`route-map`

router bgp

Configures router settings related to the BGP (BGP4 and BGP4+) routing protocol.

After this command is entered, the mode changes to `config-router` mode.

Use the `address-family ipv4` command to change `config-router` mode to `config-router-af(ipv4 vrf)` mode.

Use the `address-family ipv6` command to change `config-router` mode to `config-router-af(ipv6)` or `config-router-af(ipv6 vrf)` mode.

This command is common to BGP4 (including VRF) and BGP4+ (including VRF).

Syntax

To set information:

```
router bgp <as>
```

To delete information:

```
no router bgp <as>
```

Input mode

(config)

Parameters

<as>

Specifies the AS number of the autonomous system to which the Device belongs. If the AS number for the confederation is set by the `bgp confederation identifier` command, specify the member AS number of the member to which the local router belongs.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 65535 in decimal.

Default behavior

BGP is disabled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. BGP4+ routing information can be learned and advertised only via a BGP session that is used for peering with an IPv6 address.
2. The BGP4 policy for the global network must be set in `config-router` mode. Before setting the BGP4 policy for a VRF, use the `address-family ipv4` command to switch to `config-router-af(ipv4)` mode. Before setting the BGP4+ policy for the global network, use the `address-family ipv6` command to switch to `config-router-af(ipv6)` mode. Before setting the BGP4+ policy for a VRF, use the `address-family ipv6` command to switch to `config-router-af(ipv6 vrf)` mode.

Related commands

```
interface  
bgp confederation identifier
```

timers bgp

Sets the `KEEPALIVE` message transmission interval and hold timer value for all BGP peers.

However, if the `neighbor timers` command has been set, the `KEEPALIVE` message transmission interval and hold timer value set by the `neighbor timers` command have priority.

If you set the command in `config-router` mode, the setting applies to BGP4 and BGP4+ of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

If you set the command in `config-router-af(ipv6 vrf)` mode, the setting applies to BGP4+ of the specified VRF.

Syntax

To set or change information:

```
timers bgp <keep alive> <hold time>
```

To delete information:

```
no timers bgp
```

Input mode

```
(config-router)
(config-router-af) (ipv4 vrf)
(config-router-af) (ipv6 vrf)
```

Parameters

<keep alive>

Specifies the `KEEPALIVE` message transmission interval for BGP.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 65534 (seconds) in decimal.

If 0 is specified, no `KEEPALIVE` messages are sent when the BGP session is established.

If you specify 0 for *<hold time>*, you can specify only 0 for this parameter. If the value of *<hold time>* is other than 0, the value of this parameter must be smaller than the value of *<hold time>*.

The `KEEPALIVE` message transmission interval to be used depends on the negotiation result of the hold timer value when the BGP4 or BGP4+ session is established as described below.

* If the local hold timer value is selected during negotiation of the hold timer value, the value of this parameter is used.

* If the remote hold timer value is selected during negotiation of the hold timer value and one third of the hold timer value in the negotiation result is smaller than the value of this parameter, that one-third value is used. If one third of the hold timer value in the negotiation result is equal to or greater than the value of this parameter, the value of this parameter is used.

<hold time>

Specifies the Holdtime timer value in seconds.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify 0 or 3 to 65535 (seconds) in decimal.
If you specify 0, the hold time with a peer is not monitored.
If you specify 0 for *<keep alive>*, you can specify only 0 for this parameter.

Default behavior

<keep alive> is set to 60, and *<hold time>* is set to 180.

Impact on communication

If you use this command to change the hold timer value, BGP sessions with all peers are temporarily disconnected. As a result, communication stops until the routes are relearned.

When the change is applied

The change is applied when the command is set.

Notes

1. If the hold-time negotiation result is not 0 when a BGP session with the peer is established and *<keep alive>* is set to 0, a hold-time timeout occurs on the specified peer and the BGP session with the peer is disconnected.
2. If you use this command to change the *<hold time>* or *<keep alive>* value, all BGP sessions with peers are temporarily disconnected.

Related commands

neighbor timers

Chapter

22. Route Filtering

distributed-list in (BGP4)
distributed-list in (BGP4+)
distributed-list in (OSPF)
distributed-list in (OSPFv3)
distributed-list in (RIP)
distributed-list in (RIPng)
distributed-list out (BGP4)
distributed-list out (BGP4+)
distributed-list out (OSPF)
distributed-list out (OSPFv3)
distributed-list out (RIP)
distributed-list out (RIPng)
ip as-path access-list
ip community-list
ip prefix-list
ipv6 prefix-list
match as-path
match community
match interface
match ip address
match ip route-source
match ipv6 address
match ipv6 route-source
match origin
match protocol
match route-type
match tag
match vrf
neighbor in (BGP4)
neighbor in (BGP4+)
neighbor out (BGP4)
neighbor out (BGP4+)
redistribute (BGP4)
redistribute (BGP4+)
redistribute (OSPF)
redistribute (OSPFv3)
redistribute (RIP)
redistribute (RIPng)
route-map
set as-path prepend count
set community
set community-delete
set distance
set local-preference
set metric
set metric-type
set origin
set tag

distribute-list in (BGP4)

Filters which routes learned from BGP4 are to be added to the routing table.

If you set the command in `config-router` mode, the setting applies to BGP4 of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

Syntax

To set or change information:

```
distribute-list {<access list name> | prefix <prefix list> | route-map <route map>} in
```

To delete information:

```
no distribute-list [{<access list name> | prefix <prefix list> | route-map <route map>}] in
```

Input mode

```
(config-router)
(config-router-af)
```

Parameters

```
{<access list name> | prefix <prefix list> | route-map <route map>}
```

Specifies the access-list, prefix-list, or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<access list name>`, specify an access list name of no more than 31 characters.

For `<prefix list>`, specify a name of no more than 31 characters.

For `<route map>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Routes learned from BGP4 are not controlled.

Impact on communication

None

When the change is applied

The change is applied when the `clear ip bgp [vrf {<vrf id> | all}] * { in | both }` operation command is executed.

Notes

None

Related commands

```
ip access-list
ip prefix-list
route-map
```

distribute-list in (BGP4+)

Filters which routes learned from BGP4+ are to be added to the routing table.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set or change information:

```
distribute-list {prefix-list <prefix list> | route-map <route map>} in
```

To delete information:

```
no distribute-list [{prefix-list <prefix list> | route-map <route map>}] in
```

Input mode

```
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{prefix-list <prefix list> | route-map <route map>}
```

Specifies the prefix-list or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<prefix list>*, specify a name of no more than 31 characters.

For *<route map>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Routes learned from BGP4+ are not controlled.

Impact on communication

None

When the change is applied

The change is applied when the `clear ipv6 bgp [vrf {<vrf id> | all}] * { in | both }` operation command is executed.

Notes

None

Related commands

```
ipv6 prefix-list
route-map
```

distribute-list in (OSPF)

Filters which routes learned from OSPF are to be added to the routing table.

Syntax

To set or change information:

```
distribute-list {<access list name> | prefix <prefix list> | route-map <route map>} in
```

To delete information:

```
no distribute-list [{<access list name> | prefix <prefix list> | route-map <route map>}] in
```

Input mode

(config-router)

Parameters

```
{<access list name> | prefix <prefix list> | route-map <route map>}
```

Specifies the access-list, prefix-list, or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <access list name>, specify an access list name of no more than 31 characters.

For <prefix list>, specify a name of no more than 31 characters.

For <route map>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Routes learned from OSPF are not controlled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip access-list
ip prefix-list
route-map
```

distribute-list in (OSPFv3)

Filters which routes learned from OSPFv3 are to be added to the routing table.

Syntax

To set or change information:

```
distribute-list {prefix-list <prefix list> | route-map <route map>} in
```

To delete information:

```
no distribute-list [{prefix-list <prefix list> | route-map <route map>}] in
```

Input mode

(config-rtr)

Parameters

```
{prefix-list <prefix list> | route-map <route map>}
```

Specifies the prefix-list or route-map to which the filter criteria apply.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <prefix list>, specify a name of no more than 31 characters.

For <route map>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Routes learned from OSPFv3 are not controlled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 prefix-list
route-map
```

distribute-list in (RIP)

Filters which routes learned from RIP are to be added to the routing table.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set or change information:

```
distribute-list {<access list name> | prefix <prefix list> | route-map <route map>} in [<interface type> <interface number>]
distribute-list {<access list name> | prefix <prefix list> | route-map <route map>} gateway <ipv4 address> in
```

To delete information:

```
no distribute-list [{<access list name> | prefix <prefix list> | route-map <route map>}] in [<interface type> <interface number>]
no distribute-list [{<access list name> | prefix <prefix list> | route-map <route map>}] gateway <ipv4 address> in
```

Input mode

```
(config-router)
(config-router-af)
```

Parameters

```
{<access list name> | prefix <prefix list> | route-map <route map>}
```

Specifies the access-list, prefix-list, or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<access list name>`, specify an access list name of no more than 31 characters.

For `<prefix list>`, specify a name of no more than 31 characters.

For `<route map>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

```
gateway <ipv4 address>
```

Specifies the gateway.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

```
<interface type> <interface number>
```

Specifies the learning source interface.

1. Default value when this parameter is omitted:

There is no filter dedicated to the interface.

2. Range of values:

For `<interface type>` and `<interface number>`, you can specify interface names and

numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

- * Ethernet interface
- * Ethernet subinterface
- * Port channel interface
- * Port channel subinterface
- * Management port (specifiable only for `config-router` mode)

Default behavior

Routes learned from RIP are not controlled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip access-list
ip prefix-list
route-map
```

distribute-list in (RIPng)

Filters which routes learned from RIPng are to be added to the routing table.

Syntax

To set or change information:

```
distribute-list {prefix-list <prefix list> | route-map <route map>} in
[<interface type> <interface number>]
```

To delete information:

```
no distribute-list [{prefix-list <prefix list> | route-map <route map>}] in
[<interface type> <interface number>]
```

Input mode

(config-rtr-rip)

Parameters

{prefix-list <prefix list> | route-map <route map>}

Specifies the prefix-list or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <prefix list>, specify a name of no more than 31 characters.

For <route map>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<interface type> <interface number>

Specifies the learning source interface.

1. Default value when this parameter is omitted:

Routes are not filtered by the interface.

2. Range of values:

For <interface type> and <interface number>, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

* Ethernet interface

* Ethernet subinterface

* Port channel interface

* Port channel subinterface

* Management port (specifiable only for global network config-rtr-rip mode)

Default behavior

Routes learned from RIPng are not controlled.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`ipv6 prefix-list`
`route-map`

distribute-list out (BGP4)

Filters the routes to be advertised by BGP4.

If you set the command in `config-router` mode, the setting applies to BGP4 of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

Syntax

To set or change information:

```
distribute-list {<access list name> | prefix <prefix list> | route-map <route map>} out [<protocol>]
```

To delete information:

```
no distribute-list [{<access list name> | prefix <prefix list> | route-map <route map>}] out [<protocol>]
```

Input mode

```
(config-router)
(config-router-af)
```

Parameters

```
{<access list name> | prefix <prefix list> | route-map <route map>}
```

Specifies the access-list, prefix-list, or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<access list name>*, specify an access list name of no more than 31 characters.

For *<prefix list>*, specify a name of no more than 31 characters.

For *<route map>*, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

```
<protocol>
```

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

Routes are not filtered by the protocol.

2. Range of values:

```
<protocol> := { connected | static | summary | rip | ospf <domain no.> | bgp | extra-vrf }
```

```
<domain no.>: 1 to 65535 in decimal
```

Default behavior

Routes to be advertised by BGP are not filtered.

Impact on communication

None

When the change is applied

The change is applied when the `clear ip bgp [vrf {<vrf id> | all}] * { out | both }`

operation command is executed.

Notes

None

Related commands

```
ip access-list  
ip prefix-list  
route-map
```

distribute-list out (BGP4+)

Filters the routes to be advertised by BGP4+.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set or change information:

```
distribute-list {prefix-list <prefix list> | route-map <route map>} out
[<protocol>]
```

To delete information:

```
no distribute-list [{prefix-list <prefix list> | route-map <route map>}] out
[<protocol>]
```

Input mode

```
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{prefix-list <prefix list> | route-map <route map>}
```

Specifies the prefix-list or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<prefix list>`, specify a name of no more than 31 characters.

For `<route map>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

```
<protocol>
```

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

Routes are not filtered by the protocol.

2. Range of values:

```
<protocol> := { connected | static | summary | rip | ospf <domain no.> | bgp | extra-vrf }
```

```
<domain no.>: 1 to 65535 in decimal
```

Default behavior

Routes to be advertised by BGP4+ are not filtered.

Impact on communication

None

When the change is applied

The change is applied when the `clear ipv6 bgp [vrf {<vrf id> | all}] * { out | both }` operation command is executed.

Notes

None

Related commands

ipv6 prefix-list
route-map

distribute-list out (OSPF)

Filters the routes to be advertised by OSPF.

Syntax

To set or change information:

```
distribute-list {<access list name> | prefix <prefix list> | route-map <route map>} out [<protocol>]
```

To delete information:

```
no distribute-list [{<access list name> | prefix <prefix list> | route-map <route map>}] out [<protocol>]
```

Input mode

(config-router)

Parameters

```
{<access list name> | prefix <prefix list> | route-map <route map>}
```

Specifies the access-list, prefix-list, or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <access list name>, specify an access list name of no more than 31 characters.

For <prefix list>, specify a name of no more than 31 characters.

For <route map>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

```
<protocol>
```

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

Routes are not filtered by the protocol.

2. Range of values:

```
<protocol> := { connected | static | summary | rip | ospf <domain no.> | bgp | extra-vrf }
```

```
<domain no.>: 1 to 65535 in decimal
```

Default behavior

Routes to be advertised by OSPF are not filtered.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip access-list
```

```
ip prefix-list  
route-map
```

distribute-list out (OSPFv3)

Filters the routes to be advertised by OSPFv3.

Syntax

To set or change information:

```
distribute-list {prefix-list <prefix list> | route-map <route map>} out
[<protocol>]
```

To delete information:

```
no distribute-list [{prefix-list <prefix list> | route-map <route map>}] out
[<protocol>]
```

Input mode

(config-rtr)

Parameters

{prefix-list <prefix list> | route-map <route map>}

Specifies the prefix-list or route-map to which the filter criteria apply.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <prefix list>, specify a name of no more than 31 characters.

For <route map>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

Routes are not filtered by the protocol.

2. Range of values:

<protocol> := { connected | static | summary | rip | ospf <domain no.> | bgp | extra-vrf }

<domain no.>: 1 to 65535 in decimal

Default behavior

Routes to be advertised by OSPFv3 are not filtered.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ipv6 prefix-list
route-map
```

distribute-list out (RIP)

Filters the routes to be advertised by RIP.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set or change information:

```
distribute-list {<access list name> | prefix <prefix list> | route-map <route map>} out [{<interface type> <interface number> | <protocol>}]
distribute-list {<access list name> | prefix <prefix list> | route-map <route map>} gateway <ipv4 address> out [<protocol>]
```

To delete information:

```
no distribute-list [{<access list name> | prefix <prefix list> | route-map <route map>}] out [{<interface type> <interface number> | <protocol>}]
no distribute-list [{<access list name> | prefix <prefix list> | route-map <route map>}] gateway <ipv4 address> out [<protocol>]
```

Input mode

```
(config-router)
(config-router-af)
```

Parameters

{<access list name> | prefix <prefix list> | route-map <route map>}

Specifies the access-list, prefix-list, or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <access list name>, specify an access list name of no more than 31 characters.

For <prefix list>, specify a name of no more than 31 characters.

For <route map>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<interface type> <interface number>

Specifies the learning source interface.

1. Default value when this parameter is omitted:

Routes are not filtered by the interface.

2. Range of values:

For <interface type> and <interface number>, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

* Ethernet interface

* Ethernet subinterface

* Port channel interface

* Port channel subinterface

* Management port (specifiable only for `config-router` mode)

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

Routes are not filtered by the protocol.

2. Range of values:

<protocol> := {connected | static | summary | rip | ospf *<domain no.>* | bgp | extra-vrf }

<domain no.>: 1 to 65535 in decimal

gateway *<ipv4 address>*

Specifies the gateway.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv4 address.

Default behavior

Routes to be advertised by RIP are not filtered.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip access-list
ip prefix-list
route-map
```

distribute-list out (RIPng)

Filters which routes are advertised by RIPng.

Syntax

To set or change information:

```
distribute-list {prefix-list <prefix list> | route-map <route map>} out
[{{<interface type> <interface number> | <protocol>}}
```

To delete information:

```
no distribute-list [{prefix-list <prefix list> | route-map <route map>}] out
[{{<interface type> <interface number> | <protocol>}}
```

Input mode

(config-rtr-rip)

Parameters

```
{prefix-list <prefix list> | route-map <route map>}
```

Specifies the prefix-list or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <prefix list>, specify a name of no more than 31 characters.

For <route map>, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

```
<interface type> <interface number>
```

Specifies the learning source interface.

1. Default value when this parameter is omitted:

Routes are not filtered by the interface.

2. Range of values:

For <interface type> and <interface number>, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

* Ethernet interface

* Ethernet subinterface

* Port channel interface

* Port channel subinterface

* Management port (specifiable only for global network config-rtr-rip mode)

```
<protocol>
```

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

Routes are not filtered by the protocol.

2. Range of values:

`<protocol> := { connected | static | summary | rip | ospf <domain no.> | bgp | extra-vrf }`
`<domain no.>: 1 to 65535 in decimal`

Default behavior

Routes to be advertised by RIPv6 are not filtered.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`ipv6 prefix-list`
`route-map`

ip as-path access-list

Configures an `ip as-path access-list` that operates as an `AS_PATH` filter for BGP4 and BGP4+. The `ip as-path access-list` filters routes based on the `AS_PATH` attribute specified in a regular expression.

Syntax

To set information (information cannot be changed):

```
ip as-path access-list <id> {permit | deny} <regexp>
```

To delete information:

```
no ip as-path access-list <id>
```

Input mode

(config)

Parameters

`<id>`

Specifies the identifier used to identify the `ip as-path access-list` for the `AS_PATH` filter. This identifier is used to reference the `ip as-path access-list`.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 500 in decimal.

`{permit | deny}`

Permits or denies access when filter criteria are met. Specify `permit` to permit access. Specify `deny` to deny access.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

`<regexp>`

Specifies the `AS_PATH` attribute in a regular expression. Enclose `<regexp>` in double quotation marks ("").

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a regular expression. For details about how to specify the regular expression, see *23.1.2(3)(d) Regular expressions* in the manual *Configuration Guide Vol. 3 For Version 12.1*.

Default behavior

No `ip as-path access-list` is used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The filter denies any routes that do not match the filter criteria.
An `ip as-path access-list` that does not exist can also be used as a filter. In this case, the filter permits all routes.
2. Do not use a configuration displayed by the `show` command to enter a regular expression that contains a question mark (?).

Related commands

`match as-path`

ip community-list

Configures a community-list that operates as a Community filter for BGP4 and BGP4+. A community-list operating as a Community filter filters routes based on their Communities attribute.

Syntax

To set information (information cannot be changed):

```
ip community-list {<standard> | standard <id>} {permit | deny} [{<community>
| <aa>:<nn> | local-as | no-advertise | no-export}] [...]
ip community-list {<expanded> | expanded <id>} {permit | deny} <regex>
```

To delete information:

```
no ip community-list {<standard> | <expanded> | standard <id> | expanded <id>}
```

Input mode

(config)

Parameters

{<standard> | standard <id>}

Specifies the identifier used to identify the community-list. This identifier is used to reference the community-list. If you specify this parameter, you need to specify a set of Communities attributes as filter criteria.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For <standard>, specify 1 to 99 in decimal.
For <id>, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

{<expanded> | expanded <id>}

Specifies the identifier used to identify the community-list. This identifier is used to reference the community-list. If you specify this parameter, you need to specify the Communities attribute in a regular expression as filter criteria.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For <expanded>, specify 100 to 500 in decimal.
For <id>, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

{permit | deny}

Permits or denies access when filter criteria are met. Specify `permit` to permit access. Specify `deny` to deny access.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:

None

{<community> | <aa>:<nn> | local-as | no-advertise | no-export}

Specifies the Communities attribute as filter criteria. You can specify a maximum of 25 parameters.

1. Default value when this parameter is omitted:
A match of any Communities attribute is set as filter criteria.
2. Range of values:
For <community>, specify 0 to 4294967295 in decimal.
For each of <aa>:<nn>, specify 0 to 65535 in decimal.

<regex>

Specifies the Communities attribute in a regular expression. Enclose <regex> in double quotation marks (").

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify a regular expression. For details about how to specify the regular expression, see *23.1.2(3)(d) Regular expressions* in the manual *Configuration Guide Vol. 3 For Version 12.1*.

Default behavior

No community-list is used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The filter denies any routes that do not match the filter criteria.
A community-list that does not exist can also be used as a filter. In this case, the filter permits all routes.
2. Do not use a configuration displayed by the `show` command to enter a regular expression that contains a question mark (?).

Related commands

`match community`

ip prefix-list

Configures an `ip prefix-list`. You can use the `ip prefix-list` to filter routes by IPv4 address or IPv4 prefix.

Syntax

To set information:

```
ip prefix-list <id> description <text>
ip prefix-list <id> [seq <sequence>] {permit | deny} <ipv4 prefix>/<masklen>
[ge <min length>] [le <max length>]
```

To change information:

```
ip prefix-list <id> description <text>
```

To delete information:

```
no ip prefix-list <id>
no ip prefix-list <id> description
no ip prefix-list <id> seq <sequence>
```

Input mode

(config)

Parameters

<id>

Specifies the identifier of the `ip prefix-list` to be configured.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

description <text>

Sets a supplementary description of an `ip prefix-list`.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Enclose a character string of no more than 64 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string in Specifiable values for parameters*.

seq <sequence>

Sets the sequence number for the order in which the filter criteria are applied.

1. Default value when this parameter is omitted:

If a condition has never been set in the `ip prefix-list`, the initial value is 10. If any condition has been set, the maximum value of the condition that has ever been set plus 10 is used.

2. Range of values:

Specify 1 to 4294967295 in decimal. If you omit *<sequence>* when a value greater than 4294967285 has ever been set, an error occurs.

{permit | deny}

Permits or denies access when filter criteria are met. Specify *permit* to permit access. Specify *deny* to deny access.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

<ipv4 prefix>/<masklen>

Specifies the address condition for the IPv4 prefix as filter criteria. Specify an address for *<ipv4 prefix>*, and specify the range for checking matches for *<masklen>*.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv4 prefix>*, specify an IPv4 prefix.

For *<masklen>*, specify 0 to 32 in decimal.

Note: Set each bit that follows the bits specified for *<masklen>* of *<ipv4 prefix>* to 0.

[ge *<min length>*] [le *<max length>*]

Specifies the minimum and maximum values of the mask length to be used as filter criteria. For *ge <min length>*, specify the minimum mask length. For *le <max length>*, specify the maximum mask length.

1. Default value when this parameter is omitted:

If both *ge* and *le* are omitted, the condition is a match of the *<masklen>* value.

If *le* is omitted, a value that is equal to or greater than the value of *<min length>* and equal to or smaller than 32 meets the condition.

If *ge* is omitted, a value that is equal to or greater than the value of *<masklen>* and equal to or smaller than the value of *<max length>* meets the condition.

2. Range of values:

For *<min length>*, specify 0 to 32 in decimal.

For *<max length>*, specify 0 to 32 in decimal.

If you omit *ge*, make sure that the value of *<masklen>* is equal to or smaller than the value of *<max length>*.

If you specify *ge*, make sure that the value of *<min length>* is equal to or smaller than the value of *<max length>*.

Default behavior

No *ip prefix-list* is used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The filter denies any routes that do not match the filter criteria.
An `ip prefix-list` without `permit` or `deny` specified can also be used as a filter. In this case, the filter permits all routes.
2. After you have set values by using this command, this command can only be used to change the value of the `description` parameter. Each `ip prefix-list` identifier (`<id>`) must have a unique prefix setting (`<ipv4 prefix>/<masklen> [ge <min length>] [le <max length>]`).

Related commands

```

distribute-list in (RIP)
distribute-list in (OSPF)
distribute-list in (BGP4)
distribute-list out (RIP)
distribute-list out (OSPF)
distribute-list out (BGP4)
neighbor in (BGP4)
neighbor out (BGP4)

```

ipv6 prefix-list

Configures an `ipv6 prefix-list`. You can use the `ipv6 prefix-list` to filter routes by IPv6 address or IPv6 prefix.

Syntax

To set information:

```
ipv6 prefix-list <id> description <text>
ipv6 prefix-list <id> [seq <sequence>] {permit | deny} <ipv6 prefix>/
<prefixlen> [ge <min length>] [le <max length>]
```

To change information:

```
ipv6 prefix-list <id> description <text>
```

To delete information:

```
no ipv6 prefix-list <id>
no ipv6 prefix-list <id> description
no ipv6 prefix-list <id> seq <sequence>
```

Input mode

(config)

Parameters

`<id>`

Specifies the identifier of the `ipv6 prefix-list` to be configured.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

`description <text>`

Sets a supplementary description for an `ipv6 prefix-list`.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Enclose a character string of no more than 64 characters in double quotation marks ("). Specifiable characters are alphanumeric characters and special characters. To enter a character string that does not include any special characters such as a space, you do not need to enclose the character string in double quotation marks ("). For details, see *Any character string in Specifiable values for parameters*.

`seq <sequence>`

Sets the sequence number for the order in which the filter criteria are applied.

1. Default value when this parameter is omitted:

If a condition has never been set in the `ipv6 prefix-list`, the initial value is 10. If any condition has been set, the maximum value of the condition that has ever been set plus 10 is used.

2. Range of values:

Specify 1 to 4294967295 in decimal. If you omit *<sequence>* when a value greater than 4294967285 has ever been set, an error occurs.

{permit | deny}

Permits or denies access when filter criteria are met. Specify *permit* to permit access. Specify *deny* to deny access.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

<ipv6 prefix>/<prefixlen>

Specifies the address condition for the IPv6 prefix as filter criteria. Specify an address for *<ipv6 prefix>* and specify the range for checking matches for *<prefixlen>*.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For *<ipv6 prefix>*, specify an IPv6 prefix.

For *<prefixlen>*, specify 0 to 128 in decimal.

Note: Set each bit following the bits specified for *<prefixlen>* of *<ipv6 prefix>* to 0.

[ge *<min length>*] [le *<max length>*]

Specifies the minimum and maximum values of the prefix length to be used as filter criteria. For *ge <min length>*, specify the minimum prefix length. For *le <max length>*, specify the maximum prefix length.

1. Default value when this parameter is omitted:

If both *ge* and *le* are omitted, the condition is a match of the value of *<prefixlen>*.

If *le* is omitted, a value that is equal to or greater than the value of *<min length>* and equal to or smaller than 128 meets the condition.

If *ge* is omitted, a value that is equal to or greater than the value of *<prefixlen>* and equal to or smaller than the value of *<max length>* meets the condition.

2. Range of values:

For *<min length>*, specify 0 to 128 in decimal.

For *<max length>*, specify 0 to 128 in decimal.

If you omit *ge*, make sure that the value of *<prefixlen>* is equal to or smaller than the value of *<max length>*.

If you specify *ge*, make sure that the value of *<min length>* is equal to or smaller than the value of *<prefixlen>*.

Default behavior

No *ipv6 prefix-list* is used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. The filter denies any routes that do not match the filter criteria.
An `ipv6 prefix-list` that does not have `permit` or `deny` specified can also be used as a filter. In this case, the filter permits all routes.
2. After you have set values by using this command, this command can only be used to change the value of the `description` parameter. Each `ipv6 prefix-list` identifier (`<id>`) must have a unique prefix setting (`<ipv6 prefix>/<prefixlen> [ge <min length>] [le <max length>]`).

Related commands

```

distribute-list in (RIPng)
distribute-list in (OSPFv3)
distribute-list in (BGP4+)
distribute-list out (RIPng)
distribute-list out (OSPFv3)
distribute-list out (BGP4+)
neighbor in (BGP4+)
neighbor out (BGP4+)

```

match as-path

Configures route-map to use the AS_PATH attribute as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match as-path <as path list> [...]
```

To delete information:

```
no match as-path [<as path list> [...]]
```

Input mode

(config-route-map)

Parameters

<as path list>

Specifies an ip as-path access-list to be used as filter criteria. If a match as-path entry already exists, the information you specified is added to the existing entry. However, if the entered ip as-path access-list already exists, no information is added. You can specify a maximum of 16 parameters.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 500 in decimal.

Default behavior

The AS_PATH attribute is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```
ip as-path access-list
```

match community

Configures route-map to use the Communities attribute as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match community <community list> [...]
```

To delete information:

```
no match community [<community list> [...]]
```

Input mode

(config-route-map)

Parameters

<community list>

Specifies the community-list to be used as filter criteria. If a `match community` entry already exists, the information you specified is added to the existing entry. However, if the entered community-list already exists, no information is added. You can specify a maximum of 16 parameters.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 500 in decimal, or a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

The Communities attribute is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`ip community-list`

match interface

Configures route-map to use the interface of the route as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match interface <interface type> <interface number> [...]
```

To delete information:

```
no match interface [<interface type> <interface number> [...]]
```

Input mode

(config-route-map)

Parameters

<interface type> <interface number>

Specifies the interface to be used as filter criteria. If a `match interface` entry already exists, the information you specified is added to the existing entry. However, if the entered interface already exists, no information is added. You can specify a maximum of 16 parameters.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <interface type> and <interface number>, you can specify interface names and numbers that correspond to the following interface type groups. For details, see *How to specify an interface* in *Specifiable values for parameters*.

- * Ethernet interface
- * Ethernet subinterface
- * Port channel interface
- * Port channel subinterface
- * Loopback interface
- * Null interface
- * Management port

Default behavior

The interface is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. With BGP4 or BGP4+ learned route filtering, routes do not match any interface.

Related commands

None

match ip address

Configures route-map to use the IPv4 address prefix as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match ip address {<access list name> [...] | prefix-list <prefix list> [...]}
```

To delete information:

```
no match ip address [{<access list name> [...] | prefix-list <prefix list> [...]}]
```

Input mode

(config-route-map)

Parameters

```
{<access list name> [...] | prefix-list <prefix list> [...]}
```

Specifies the access-list or prefix-list for the IPv4 address prefix to be used as filter criteria. If a `match ip address` entry already exists, the information you specified is added to the existing entry. However, if the entered list already exists, no information is added. In the same entry, you cannot simultaneously specify both an access-list and a prefix-list. You can specify a maximum of 16 parameters.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<access list name>`, specify an access list name of no more than 31 characters.

For `<prefix list>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

The IPv4 address prefix is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. This commands permits access for any IPv6 address prefix.

Related commands

```
ip access-list
ip prefix-list
```

match ip route-source

Configures route-map to use the source IPv4 address as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match ip route-source {<access list name> [...] | prefix-list <prefix list> [...]}
```

To delete information:

```
no match ip route-source [{<access list name> [...] | prefix-list <prefix list> [...]}]
```

Input mode

(config-route-map)

Parameters

```
{<access list name> [...] | prefix-list <prefix list> [...]}
```

Specifies the access-list or prefix-list for the source IPv4 address to be used as filter criteria. If a `match ip route-source` entry already exists, the information you specified is added to the existing entry. However, if the entered list already exists, no information is added. In the same entry, you cannot simultaneously specify both an access-list and a prefix-list. You can specify a maximum of 16 parameters.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<access list name>`, specify an access list name of no more than 31 characters.

For `<prefix list>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

The source IPv4 address is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. This command permits access for any source IPv6 address.

Related commands

```
ip access-list
ip prefix-list
```

match ipv6 address

Configures route-map to use the IPv6 address prefix as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match ipv6 address {<access list name> [...] | prefix-list <prefix list>
[...]}
```

To delete information:

```
no match ipv6 address [{<access list name> [...] | prefix-list <prefix list>
[...]}]
```

Input mode

(config-route-map)

Parameters

```
{<access list name> [...] | prefix-list <prefix list> [...]}
```

Specifies the access-list or prefix-list for the IPv6 address prefix to be used as filter criteria. If a `match ipv6 address` entry already exists, the information you specified is added to the existing entry. However, if the entered list already exists, no information is added. In the same entry, you cannot simultaneously specify both an access-list and a prefix-list. You can specify a maximum of 16 parameters.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For `<access list name>`, specify an access list name of no more than 31 characters.
For `<prefix list>`, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

The IPv6 address prefix is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. This commands permits access for any IPv4 address prefix.

Related commands

```
ipv6 access-list
ipv6 prefix-list
```

match ipv6 route-source

Configures route-map to use the source IPv6 address as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match ipv6 route-source {<access list name> [...] | prefix-list <prefix list> [...]}
```

To delete information:

```
no match ipv6 route-source [{<access list name> [...] | prefix-list <prefix list> [...]}]
```

Input mode

(config-route-map)

Parameters

```
{<access list name> [...] | prefix-list <prefix list> [...]}
```

Specifies the access-list or prefix-list for the source IPv6 address to be used as filter criteria. If a `match ipv6 route-source` entry already exists, the information you specified is added to the existing entry. However, if the entered list already exists, no information is added. In the same entry, you cannot simultaneously specify both an access-list and a prefix-list. You can specify a maximum of 16 parameters.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<access list name>`, specify an access list name of no more than 31 characters.

For `<prefix list>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

The source IPv6 address is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. This commands permits access for any source IPv4 address.

Related commands

```
ipv6 access-list
ipv6 prefix-list
```

match origin

Configures route-map to use the ORIGIN attribute as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match origin [igp] [egp] [incomplete]
```

To delete information:

```
no match origin [igp] [egp] [incomplete]
```

Input mode

(config-route-map)

Parameters

[igp] [egp] [incomplete]

Specifies the ORIGIN attribute to be used as filter criteria. If a `match origin` entry already exists, the information you specified is added to the existing entry. However, if the entered ORIGIN attribute already exists, no information is added.

1. Default value when this parameter is omitted:
None. Nothing is created if a `match origin` entry does not exist.
2. Range of values:
None

Default behavior

The ORIGIN attribute is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

match protocol

Configures route-map to use the routing protocol as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match protocol <protocol> [...]
```

To delete information:

```
no match protocol [<protocol> [...]]
```

Input mode

(config-route-map)

Parameters

<protocol>

Specifies the protocol to be used as filter criteria. If a `match protocol` entry already exists, the information you specified is added to the existing entry. However, if the entered protocol already exists, no information is added. You can specify a maximum of 16 parameters.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

<protocol> := { connected | static | summary | rip | ospf *<domain no.>* | bgp | extra-vrf }

<domain no.>: 1 to 65535 in decimal

Default behavior

The protocol is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

match route-type

Configures route-map to use the route type as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match route-type [local] [internal] [external] [external type-1] [external
type-2] [nssa-external] [nssa-external type-1] [nssa-external type-2]
```

To delete information:

```
no match route-type [local] [internal] [external] [external type-1] [external
type-2] [nssa-external] [nssa-external type-1] [nssa-external type-2]
```

Input mode

(config-route-map)

Parameters

[local] [internal] [external] [external type-1] [external type-2] [nssa-external] [nssa-external type-1] [nssa-external type-2]

Specifies the route type to be used as filter criteria.

To use a route generated by BGP4/BGP4+ advertised route generation as the learning source, specify `local`.

To use OSPF or OSPFv3 intra-area routes and inter-area routes, specify `internal`.

To use OSPF or OSPFv3 external AS routes, specify `external`. `type-1` and `type-2` are the metric types of external AS routes. If you specify `external`, the processing is the same as when you specify both `external type-1` and `external type-2`.

To use external AS routes learned from OSPF NSSA, specify `nssa-external`. `type-1` and `type-2` are the metric types of external AS routes. If you specify `nssa-external`, the processing is the same as when both `nssa-external type-1` and `nssa-external type-2` are specified.

1. Default value when this parameter is omitted:
None. Nothing is created if a `match route-type` entry does not exist.
2. Range of values:
None

Default behavior

The route type is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. If a `match route-type` entry already exists, the information you specified is added to the existing entry. However, if the specified parameter already exists, no information is added.

Related commands

None

match tag

Configures route-map to use the tag value as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match tag <tag> [...]
```

To delete information:

```
no match tag [<tag> [...]]
```

Input mode

(config-route-map)

Parameters

<tag>

Specifies the tag to be used as filter criteria. If a `match tag` entry already exists, the information you specified is added to the existing entry. However, if the entered tag already exists, no information is added. You can specify a maximum of 16 parameters.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 in decimal.

Default behavior

The tag value is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

match vrf

Configures a route-map to use a VRF as filter criteria.

Syntax

To set or add information (information cannot be changed):

```
match vrf {<vrf id> | global } [<vrf id> ...]
```

To delete information:

```
no match vrf [{<vrf id> | global } [<vrf id> ...]]
```

Input mode

(config-route-map)

Parameters

```
{<vrf id> | global } [<vrf id> ...]
```

Specifies the VRF to be used as filter criteria. If a `match vrf` entry already exists, the information you specified is added to the existing entry. However, if the entered parameter already exists, no information is added. You can specify a maximum of 16 parameters for this command.

<vrf id>

The VRF route is used as filter criteria.

global

The global route is used as filter criteria.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <vrf id>, specify a VRF ID.

For details, see *Specifiable values for parameters*.

Default behavior

A VRF is not used as filter criteria.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

neighbor in (BGP4)

Filters which routes learned from BGP4 are to be added to the routing table.

If you set the command in `config-router` mode, the setting applies to BGP4 of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

Syntax

To set or change information:

```
neighbor {<ipv4 address> | <peer group>} {distribute-list <access list name>
| prefix-list <prefix list> | route-map <route map>} in
```

To delete information:

```
no neighbor {<ipv4 address> | <peer group>} [{distribute-list [<access list
name>] | prefix-list [<prefix list>] | route-map [<route map>]} in]
```

Notes

`no neighbor <ipv4 address>` deletes all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Input mode

```
(config-router)
(config-router-af)
```

Parameters

```
{<ipv4 address> | <peer group>}
```

Specifies the neighbor IPv4 address to be used for filtering or the BGP4 peer group identifier to be used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

```
{distribute-list <access list name> | prefix-list <prefix list> | route-map <route map>}
```

Specifies the access-list, prefix-list, or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<access list name>`, specify an access list name of no more than 31 characters.

For `<prefix list>`, specify a name of no more than 31 characters.

For `<route map>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Routes learned from BGP4 are not controlled.

Impact on communication

None

When the change is applied

The change is applied when the `clear ip bgp [vrf {<vrf id> | all}] * { in | both }` operation command is executed.

Notes

None

Related commands

```
ip access-list
ip prefix-list
route-map
```

neighbor in (BGP4+)

Filters which routes learned from BGP4+ are to be added to the routing table.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set or change information:

```
neighbor {<ipv6 address> | <peer group>} {prefix-list <prefix list> |
route-map <route map> } in
```

To delete information:

```
no neighbor {<ipv6 address> | <peer group>} [{prefix-list [<prefix list>] |
route-map [<route map>] } in]
```

Notes

`no neighbor <ipv6 address>` deletes all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Input mode

```
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

```
{<ipv6 address> | <peer group>}
```

Specifies the neighbor IPv6 address to be used for filtering or the BGP4+ peer group identifier to be used for filtering.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For `<ipv6 address>`, specify an IPv6 address.
For `<peer group>`, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

```
{prefix-list <prefix list> | route-map <route map>}
```

Specifies the prefix-list or route-map to which the filter criteria apply.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For `<prefix list>`, specify a name of no more than 31 characters.
For `<route map>`, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

Routes learned from BGP4+ are not controlled.

Impact on communication

None

When the change is applied

The change is applied when the `clear ipv6 bgp [vrf {<vrfid> | all}] * { in | both }` operation command is executed.

Notes

None

Related commands

`ipv6 prefix-list`
`route-map`

neighbor out (BGP4)

Filters the routes to be advertised by BGP4.

If you set the command in `config-router` mode, the setting applies to BGP4 of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

Syntax

To set or change information:

```
neighbor {<ipv4 address> | <peer group>} {distribute-list <access list name>
| prefix-list <prefix list> | route-map <route map>} out [<protocol>]
```

To delete information:

```
no neighbor {<ipv4 address> | <peer group>} [{distribute-list [<access list
name>] | prefix-list [<prefix list>] | route-map [<route map>]} out
[<protocol>]]
```

Notes

`no neighbor <ipv4 address>` deletes all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Input mode

```
(config-router)
(config-router-af)
```

Parameters

```
{<ipv4 address> | <peer group>}
```

Specifies the neighbor IPv4 address to be used for filtering or the BGP4 peer group identifier to be used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<ipv4 address>`, specify an IPv4 address.

For `<peer group>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

```
{distribute-list <access list name> | prefix-list <prefix list> | route-map <route map>}
```

Specifies the access-list, prefix-list, or route-map used for filtering.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<access list name>`, specify an access list name of no more than 31 characters.

For `<prefix list>`, specify a name of no more than 31 characters.

For `<route map>`, specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

Routes are not filtered by the protocol.

2. Range of values:

<protocol> := {connected | static | summary | rip | ospf *<domain no.>* | bgp | extra-vrf}

<domain no.>: 1 to 65535 in decimal

Default behavior

Routes to be advertised by BGP4 are not filtered.

Impact on communication

None

When the change is applied

The change is applied when the `clear ip bgp [vrf {<vrf id> | all}] * { out | both }` operation command is executed.

Notes

None

Related commands

```
ip access-list
ip prefix-list
route-map
```

neighbor out (BGP4+)

Filters the routes to be advertised by BGP4+.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set or change information:

```
neighbor {<ipv6 address> | <peer group>} {prefix-list <prefix list> |
route-map <route map> } out [<protocol>]
```

To delete information:

```
no neighbor {<ipv6 address> | <peer group>} [{prefix-list [<prefix list>] |
route-map [<route map>] } out [<protocol>]]
```

Notes

`no neighbor <ipv6 address>` deletes all `neighbor` command settings for the peer. `no neighbor <peer group>` deletes all `neighbor` command settings for the peer group, including the settings for the peers that belong to the peer group.

Input mode

```
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

{<ipv6 address> | <peer group>}

Specifies the neighbor IPv6 address to be used for filtering or the BGP4+ peer group identifier to be used for filtering.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For <ipv6 address>, specify an IPv6 address.
For <peer group>, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

{prefix-list <prefix list> | route-map <route map>}

Specifies the prefix-list or route-map to which the filter criteria apply.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
For <prefix list>, specify a name of no more than 31 characters.
For <route map>, specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:
Routes are not filtered by the protocol.
2. Range of values:
`<protocol> := {connected | static | summary | rip | ospf <domain no.> | bgp | extra-vrf }`
`<domain no.>: 1 to 65535 in decimal`

Default behavior

Routes to be advertised by BGP4+ are not filtered.

Impact on communication

None

When the change is applied

The change is applied when the `clear ipv6 bgp [vrf {<vrfid> | all}] * { out | both }` operation command is executed.

Notes

None

Related commands

`ipv6 prefix-list`
`route-map`

redistribute (BGP4)

Filters which routes learned by other protocols are to be advertised to BGP4.

If you set the command in `config-router` mode, the setting applies to BGP4 of the global network.

If you set the command in `config-router-af(ipv4 vrf)` mode, the setting applies to BGP4 of the specified VRF.

Syntax

To set, change, or add information:

```
redistribute <protocol> [<protocol option>] [metric <metric>] [route-map <route map>]
```

To delete information:

```
no redistribute <protocol>
```

Input mode

```
(config-router)
(config-router-af)
```

Parameters

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

<protocol> := {connected | static | summary | rip | ospf *<domain no.>* | bgp | extra-vrf}
<domain no.>: 1 to 65535 in decimal

<protocol option>

Specifies the route type. You can specify this parameter only if *<protocol>* is set to ospf.

1. Default value when this parameter is omitted:

All routes are to be filtered.

2. Range of values:

To specify the filtering settings, use the format `match <route type> [...]`.

For *<route type>*, specify the following parameters:

internal

Filters out internal AS routes.

external

Filters out type-1 and type-2 external AS routes.

external 1

Filters out type-1 external AS routes.

external 2

Filters out type-2 external AS routes.

`nssa-external`

Filters out `type-1` and `type-2` NSSA external AS routes.

`nssa-external 1`

Filters out `type-1` NSSA external AS routes.

`nssa-external 2`

Filters out `type-2` NSSA external AS routes.

`metric <metric>`

Specifies the metric for routes to be advertised.

1. Default value when this parameter is omitted:
The default value for BGP4 is used.
2. Range of values:
Specify 0 to 4294967295 in decimal.

`route-map <route map>`

Specifies the route-map that applies the filter criteria.

1. Default value when this parameter is omitted:
No route-map is used for filtering.
2. Range of values:
Specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

Routes learned by other protocols are not advertised.

Impact on communication

None

When the change is applied

The change is applied when the `clear ip bgp [vrf {<vrf id> | all}] * { out | both }` operation command is executed.

Notes

None

Related commands

`route-map`

redistribute (BGP4+)

Filters which routes learned by other protocols are to be advertised to BGP4+.

If you set the command in `config-router-af (ipv6)` mode, the setting applies to BGP4+ routes of the global network.

If you set the command in `config-router-af (ipv6 vrf)` mode, the setting applies to the BGP4+ routes of the specified VRF.

Syntax

To set, change, or add information:

```
redistribute <protocol> [<protocol option>] [metric <metric>] [route-map
<route map>]
```

To delete information:

```
no redistribute <protocol>
```

Input mode

```
(config-router-af) (ipv6)
(config-router-af) (ipv6 vrf)
```

Parameters

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

```
<protocol> := { connected | static | summary | rip | ospf <domain no.> | bgp | extra-vrf }
<domain no.>: 1 to 65535 in decimal
```

<protocol option>

Specifies the route type. You can specify this parameter only if *<protocol>* is set to `ospf`.

1. Default value when this parameter is omitted:

All routes are to be filtered.

2. Range of values:

To specify the filtering settings, use the format `match <route type> [. . .]`.

For *<route type>*, specify the following parameters:

`internal`

Filters out internal AS routes.

`external`

Filters out `type-1` and `type-2` external AS routes.

`external 1`

Filters out `type-1` external AS routes.

`external 2`

Filters out `type-2` external AS routes.

nssa-external

Filters out `type-1` and `type-2` NSSA external AS routes.

nssa-external 1

Filters out `type-1` NSSA external AS routes.

nssa-external 2

Filters out `type-2` NSSA external AS routes.

metric `<metric>`

Specifies the metric for routes to be advertised.

1. Default value when this parameter is omitted:

The default value for BGP4+ is used.

2. Range of values:

Specify 0 to 4294967295 in decimal.

route-map `<route map>`

Specifies the route-map that applies the filter criteria.

1. Default value when this parameter is omitted:

No route-map is used for filtering.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Routes learned by other protocols are not advertised.

Impact on communication

None

When the change is applied

The change is applied when the `clear ipv6 bgp [vrf {<vrfid> | all}] * { out | both }` operation command is executed.

Notes

None

Related commands

`route-map`

redistribute (OSPF)

Filters which routes learned by other protocols are to be injected to OSPF.

Syntax

To set, change, or add information:

```
redistribute <protocol> [<protocol option>] [metric <metric>] [metric-type
[1 | 2]] [tag <tag>] [route-map <route map>]
```

To delete information:

```
no redistribute <protocol>
```

Input mode

(config-router)

Parameters

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

<protocol> := { connected | static | summary | rip | ospf *<domain no.>* | bgp | extra-vrf }

<domain no.>: 1 to 65535 in decimal

<protocol option>

Specifies the route type. You can specify this parameter only if *<protocol>* is set to `ospf`.

1. Default value when this parameter is omitted:

All routes are to be filtered.

2. Range of values:

To specify the filtering settings, use the format `match <route type> [. . .]`.

For *<route type>*, specify the following parameters:

`internal`

Filters out internal AS routes.

`external`

Filters out `type-1` and `type-2` external AS routes.

`external 1`

Filters out `type-1` external AS routes.

`external 2`

Filters out `type-2` external AS routes.

`nssa-external`

Filters out `type-1` and `type-2` NSSA external AS routes.

`nssa-external 1`

Filters out `type-1` NSSA external AS routes.

nssa-external 2

Filters out `type-2` NSSA external AS routes.

metric <*metric*>

Specifies the metric for routes to be advertised.

1. Default value when this parameter is omitted:

The value set by the `default-metric` command is used. If the `default-metric` command has not been set, 0 or the metric for the learning source protocol is used.

2. Range of values:

Specify 0 to 16777214 in decimal.

metric-type [{1 | 2}]

Specifies the metric type for routes to be advertised.

1. Default value when this parameter is omitted:

type 2

2. Range of values:

None

tag <*tag*>

Specifies the tag value for routes to be advertised.

1. Default value when this parameter is omitted:

0

2. Range of values:

Specify 0 to 4294967295 in decimal.

route-map <*route map*>

Specifies the route-map that applies the filter criteria.

1. Default value when this parameter is omitted:

No route-map is used for filtering.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Routes learned by other protocols are not injected.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`route-map`

redistribute (OSPFv3)

Filters which routes learned by other protocols are to be advertised to OSPFv3.

Syntax

To set, change, or add information:

```
redistribute <protocol> [<protocol option>] [metric <metric>] [metric-type
[{1 | 2}]] [tag <tag>] [route-map <route map>]
```

To delete information:

```
no redistribute <protocol>
```

Input mode

(config-rtr)

Parameters

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

<protocol> := { connected | static | summary | rip | ospf *<domain no.>* | bgp | extra-vrf }

<domain no.>: 1 to 65535 in decimal

<protocol option>

Specifies the route type. You can specify this parameter only if *<protocol>* is set to ospf.

1. Default value when this parameter is omitted:

All routes are to be filtered.

2. Range of values:

To specify the filtering settings, use the format `match <route type> [. . .]`.

For *<route type>*, specify the following parameters:

internal

Filters out internal AS routes.

external

Filters out type-1 and type-2 external AS routes.

external 1

Filters out type-1 external AS routes.

external 2

Filters out type-2 external AS routes.

nssa-external

Filters out type-1 and type-2 NSSA external AS routes.

nssa-external 1

Filters out type-1 NSSA external AS routes.

nssa-external 2

Filters out `type-2` NSSA external AS routes.

metric <*metric*>

Specifies the metric for routes to be advertised.

1. Default value when this parameter is omitted:

The value set by the `default-metric` command is used. If the `default-metric` command has not been set, 0 or the metric for the learning source protocol is used.

2. Range of values:

Specify 0 to 16777214 in decimal.

metric-type [{1 | 2}]

Specifies the metric type for routes to be advertised.

1. Default value when this parameter is omitted:

No metric type is advertised.

2. Range of values:

None

tag <*tag*>

Specifies the tag value for routes to be advertised. Routes that have a tag value of 0 are not advertised in OSPFv3.

1. Default value when this parameter is omitted:

The tag value is set to 0.

2. Range of values:

Specify 0 to 4294967295 in decimal.

route-map <*route map*>

Specifies the route-map that applies the filter criteria.

1. Default value when this parameter is omitted:

No route-map is used for filtering.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Routes learned by other protocols are not advertised.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands`route-map`

redistribute (RIP)

Filters which routes learned by other protocols are to be advertised to RIP.

If you set the command in `config-router` mode, the setting applies to the global network.

If you set the command in `config-router-af` mode, the setting applies to the specified VRF.

Syntax

To set, change, or add information:

```
redistribute <protocol> [<protocol option>] [metric <metric>] [route-map
<route map>]
```

To delete information:

```
no redistribute <protocol>
```

Input mode

```
(config-router)
(config-router-af)
```

Parameters

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

<protocol> := { connected | static | summary | rip | ospf *<domain no.>* | bgp | extra-vrf }

<domain no.>: 1 to 65535 in decimal

<protocol option>

Specifies the route type. You can specify this parameter only if *<protocol>* is set to `ospf`.

1. Default value when this parameter is omitted:

All route types are to be filtered.

2. Range of values:

To specify the filtering settings, use the format `match <route type> [...]`.

For *<route type>*, specify the following parameters:

`internal`

Filters out internal AS routes.

`external`

Filters out `type-1` and `type-2` external AS routes.

`external 1`

Filters out `type-1` external AS routes.

`external 2`

Filters out `type-2` external AS routes.

`nssa-external`

Filters out `type-1` and `type-2` NSSA external AS routes.

nssa-external 1

Filters out `type-1` NSSA external AS routes.

nssa-external 2

Filters out `type-2` NSSA external AS routes.

metric <*metric*>

Specifies the metric for routes to be advertised.

1. Default value when this parameter is omitted:

The default value for RIP is used.

2. Range of values:

Specify 1 to 16 in decimal.

route-map <*route map*>

Specifies the route-map used for filtering.

1. Default value when this parameter is omitted:

No route-map is used for filtering.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

Routes learned by other protocols are not advertised.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`route-map`

redistribute (RIPng)

Filters which routes learned by other protocols are to be advertised to RIPng.

Syntax

To set, change, or add information:

```
redistribute <protocol> [<protocol option>] [metric <metric>] [route-map
<route map>]
```

To delete information:

```
no redistribute <protocol>
```

Input mode

(config-rtr-rip)

Parameters

<protocol>

Specifies the learning source protocol.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

<protocol> := { connected | static | summary | rip | ospf *<domain no.>* | bgp | extra-vrf }

<domain no.>: 1 to 65535 in decimal

<protocol option>

Specifies the route type. You can specify this parameter only if *<protocol>* is set to ospf.

1. Default value when this parameter is omitted:

All route types are to be filtered.

2. Range of values:

To specify the filtering settings, use the format `match <route type> [...]`.

For *<route type>*, specify the following parameters:

internal

Filters out internal AS routes.

external

Filters out `type-1` and `type-2` external AS routes.

external 1

Filters out `type-1` external AS routes.

external 2

Filters out `type-2` external AS routes.

nssa-external

Filters out `type-1` and `type-2` NSSA external AS routes.

nssa-external 1

Filters out `type-1` NSSA external AS routes.

nssa-external 2

Filters out `type-2` NSSA external AS routes.

metric <*metric*>

Sets the metric for routes to be advertised.

1. Default value when this parameter is omitted:
The default value for RIPng is used.
2. Range of values:
Specify 1 to 16 in decimal.

route-map <*route map*>

Specifies the route-map used for filtering.

1. Default value when this parameter is omitted:
No route-map is used for filtering.
2. Range of values:
Specify a name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

Routes learned by other protocols are not advertised.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

`route-map`

route-map

Configures a route map. Route-map allows you to use routing information to filter routes which are sent or received by a routing protocol, and to change routing information. After this command is entered, the mode changes to `config-route-map` mode.

Syntax

To set or change information (only the `permit` and `deny` settings can be changed):

```
route-map <id> {permit | deny} [<sequence>]
```

To delete information:

```
no route-map <id>
no route-map <id> {permit | deny} <sequence>
```

Input mode

(`config`)

Parameters

<id>

Specifies the identifier used to identify the route-map. This identifier is used to reference the route-map.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

{`permit` | `deny`}

Permits or denies access when filter criteria are met. Specify `permit` to permit access. Specify `deny` to deny access.

If an entry for the entered <id> value already exists, the parameter value is overwritten.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

<sequence>

Sets the sequence number for the order in which route-maps that have the same <id> value are applied.

1. Default value when this parameter is omitted:

If there is no entry for the specified <id>, 10 is set.

If there is only one entry line for the specified <id>, the mode changes to `config-route-map` mode without changing the <sequence> value for that entry.

If there are multiple lines of entries for the specified <id>, omitting the <sequence> parameter causes an error.

2. Range of values:

Specify 1 to 4294967295 in decimal.

Default behavior

No route-map is used.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

```

distribute-list in (RIP)
distribute-list in (OSPF)
distribute-list in (BGP4)
distribute-list in (RIPng)
distribute-list in (OSPFv3)
distribute-list in (BGP4+)
distribute-list out (RIP)
distribute-list out (OSPF)
distribute-list out (BGP4)
distribute-list out (RIPng)
distribute-list out (OSPFv3)
distribute-list out (BGP4+)
redistribute (RIP)
redistribute (OSPF)
redistribute (BGP4)
redistribute (RIPng)
redistribute (OSPFv3)
redistribute (BGP4+)
neighbor in (BGP4)
neighbor in (BGP4+)
neighbor out (BGP4)
neighbor out (BGP4+)

```

set as-path prepend count

Sets the number of AS_PATH numbers added to the routing information.

Syntax

To set or change information:

```
set as-path prepend count <count>
```

To delete information:

```
no set as-path prepend count
```

Input mode

(config-route-map)

Parameters

<count>

Specifies the number of AS_PATH numbers to be added.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 1 to 25 in decimal.

Default behavior

The number of AS_PATH numbers increases.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

set community

Replaces the Communities attribute of the route.

Syntax

To set or change information:

```
set community {<community> [...] [additive] | none}
```

To delete information:

```
no set community
```

Input mode

(config-route-map)

Parameters

```
{<community> [...] [additive] | none}
```

Specifies that the Communities attribute is to be replaced, added, or deleted.

```
<community> [...] [additive]
```

Specifies the Communities attribute. You can specify a maximum of 25 <community> parameters.

If you specify `additive`, the Communities attribute specified for <community> is added to the existing routing information.

If you do not specify `additive`, the Communities attribute specified for <community> replaces the existing routing information.

```
none
```

Deletes the existing Communities attribute.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

```
<community>:= {0-4294967295 (in decimal)| <0-65535>:<0-65535> (in decimal)|  
no-export | no-advertise | local-as}
```

Default behavior

The Communities attribute does not change.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

set community-delete

Deletes the Communities attribute of the route.

Syntax

To set or change information:

```
set community-delete <global> [...]
```

To delete information:

```
no set community-delete
```

Input mode

(config-route-map)

Parameters

<global>

Specifies the community to be deleted from the routing information. You can specify a maximum of 8 parameters.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

```
<global> := { * | 0-4294967295 | { <0-65535>|* } : { <0-65535>|* } | no-export |  
no-advertise | local-as }
```

An asterisk (*) indicates an arbitrary value.

Default behavior

The Communities attribute does not change.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

set distance

Sets the priority of the routing information.

Syntax

To set or change information:
`set distance <distance>`

To delete information:
`no set distance`

Input mode

(config-route-map)

Parameters

<distance>

Specifies the priority.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 2 to 255 in decimal. 2 indicates the highest priority, and 255 indicates the lowest priority.

Default behavior

The priority does not change.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

set local-preference

Sets the LOCAL_PREF attribute of the routing information.

Syntax

To set or change information:

```
set local-preference [{+ | -}] <preference>
```

To delete information:

```
no set local-preference
```

Input mode

(config-route-map)

Parameters

[{+ | -}]<preference>

Without {+ | -} specified, specifies the LOCAL_PREF attribute value to be set for the routing information.

With {+ | -} specified, specifies the LOCAL_PREF attribute value to be added to or subtracted from the routing information.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <preference>, specify 0 to 65535 in decimal.

If you specify +, the value of <preference> is added to the value of the LOCAL_PREF attribute.

If you specify -, the value of <preference> is subtracted from the value of the LOCAL_PREF attribute.

Default behavior

The LOCAL_PREF attribute value does not change.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

set metric

Assigns a metric to the routing information.

Syntax

To set or change information:

```
set metric [{+ | -}]<metric>
```

To delete information:

```
no set metric
```

Input mode

(config-route-map)

Parameters

[{+ | -}]<metric>

Without {+ | -} specified, specifies the metric to be set for the routing information.

With {+ | -} specified, specifies the metric to be added to or subtracted from the routing information.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <metric>, specify 0 to 4294967295 in decimal.

If you specify +, the value of <metric> is added to the metric value for the learning source protocol.

If you specify -, the value of <metric> is subtracted from the metric value for the learning source protocol.

Default behavior

The metric does not change.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

1. After all filtering has been completed, the metric for the last result is reduced to the upper or lower limit by each protocol.

Related commands

None

set metric-type

Sets the metric type or metric of the routing information.

Syntax

To set or change information:

```
set metric-type {internal | type-1 | type-2}
```

To delete information:

```
no set metric-type
```

Input mode

(config-route-map)

Parameters

{ internal | type-1 | type-2 }

Specifies the metric type to be set.

To use the metric value of the IGP route used for next-hop resolution in BGP4 or BGP4+, specify `internal`.

Use `type-1` or `type-2` to specify the metric type of external AS routes in OSPF or OSPFv3.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The metric type and metric are not changed.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

set origin

Sets the ORIGIN attribute of the routing information.

Syntax

To set or change information:
`set origin {igp | egp | incomplete}`

To delete information:
`no set origin`

Input mode

(config-route-map)

Parameters

{ igp | egp | incomplete }

Specifies the ORIGIN attribute to be set for the routing information.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The ORIGIN attribute does not change.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

set tag

Sets the tag value of the routing information.

Syntax

To set or change information:

```
set tag <tag>
```

To delete information:

```
no set tag
```

Input mode

(config-route-map)

Parameters

<tag>

Specifies the tag value to be set for the routing information.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify 0 to 4294967295 in decimal.

Default behavior

The tag does not change.

Impact on communication

None

When the change is applied

The change is applied immediately after setting values are changed.

Notes

None

Related commands

None

Chapter

23. IPv4 Multicast Routing Protocols

```
ip igmp group-limit (global)
ip igmp group-limit (interface)
ip igmp query-interval (global)
ip igmp query-interval (interface)
ip igmp router
ip igmp source-limit (global)
ip igmp source-limit (interface)
ip igmp ssm-map enable
ip igmp ssm-map static
ip igmp static-group
ip igmp version
ip multicast-routing
ip pim bsr-candidate
ip pim deletion-delay-time
ip pim keep-alive-time
ip pim max-interface
ip pim mcache-limit
ip pim message-interval (global)
ip pim message-interval (interface)
ip pim mroute-limit
ip pim negative-cache-time
ip pim override-interval (global)
ip pim override-interval (interface)
ip pim propagation-delay-time (global)
ip pim propagation-delay-time (interface)
ip pim query-interval (global)
ip pim query-interval (interface)
ip pim register-checksum
ip pim register-probe-time
ip pim rp-address
ip pim rp-candidate
ip pim rp-mapping-algorithm
ip pim sparse-mode
ip pim ssm
```

ip igmp group-limit (global)

Specifies the maximum number of multicast groups per interface that are allowed to join.

For an interface for which the `ip igmp group-limit (interface)` command is also specified, the specification of the `ip igmp group-limit (interface)` command has higher priority.

Syntax

To set or change information:

```
ip igmp [vrf <vrf id>] group-limit <number>
```

To delete information:

```
no ip igmp [vrf <vrf id>] group-limit
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

This command is valid only for the interface of the specified VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<number>`

Specifies the maximum number of multicast groups per interface that are allowed to join.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 256

Default behavior

For multicast group join, the number of multicast groups per interface that are allowed to join is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set a limit on the number of multicast groups per interface that are allowed to join, but do not guarantee operation up to the specified value.
2. If a change in configuration would cause the number of the multicast groups that are currently managed to exceed the limit that is set by this command, the multicast groups that currently join are retained until they are removed from the group. However, the removed groups cannot

join again until the number of managed multicast groups on the interface falls below the limit that is set by this command.

3. This functionality does not limit multicast group join that is due to changes in the configuration (via the static group join functionality). However, because static group joins are included in the count of the number of multicast groups, if the static group join functionality causes the limit to be exceeded, new join of receivers is limited.

Related commands

```
ip pim sparse-mode
```

ip igmp group-limit (interface)

Specifies the maximum number of multicast groups that are allowed to join on the interface.

Syntax

To set or change information:

```
ip igmp group-limit <number>
```

To delete information:

```
no ip igmp group-limit
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<number>

Specifies the maximum number of multicast groups that are allowed to join on the interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 256

Default behavior

The maximum number of multicast groups that are allowed to join on the interface is set to that specified by the `ip igmp group-limit (global)` command. If no value is specified, multicast group join is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set a limit on the number of multicast groups per interface that are allowed to join, but do not guarantee operation up to the specified value.
2. If a change in configuration would cause the number of the multicast groups that are currently managed to exceed the limit that is set by this command, the multicast groups that currently join are retained until they are removed from the group. However, the removed groups cannot join again until the number of managed multicast groups on the interface falls below the limit that is set by this command.
3. This functionality does not limit multicast group join that is due to changes in the configuration (via the static group join functionality). However, because static group joins are included in the count of the number of multicast groups, if the static group join functionality causes the limit to be exceeded, new join of receivers is limited.

Related commands

```
ip pim sparse-mode
```

ip igmp query-interval (global)

Sets the interval for sending IGMP Query messages that are regularly sent by IGMP on the Device.

For an interface for which the `ip pim query-interval (interface)` command is also specified, the specification of the `ip pim query-interval (interface)` command has higher priority.

Syntax

To set or change information:

```
ip igmp [vrf <vrf id>] query-interval <seconds>
```

To delete information:

```
no ip igmp [vrf <vrf id>] query-interval
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

This command is valid only for the interface of the specified VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<seconds>

Sets the interval (in seconds) for sending IGMP Query messages that IGMP regularly sends.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

60 to 3600

Default behavior

The interval for sending IGMP Query messages that IGMP on the Device regularly sends is 125 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim sparse-mode
ip igmp router
```

ip igmp query-interval (interface)

Sets the interval for sending IGMP Query messages that are regularly sent by IGMP on the corresponding interface.

Syntax

To set or change information:

```
ip igmp query-interval <seconds>
```

To delete information:

```
no ip igmp query-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Sets the interval (in seconds) for sending IGMP Query messages that IGMP regularly sends.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

60 to 3600

Default behavior

The value that is specified by the `ip igmp query-interval (global)` command is applied. If no value is specified, 125 (seconds) is used.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim sparse-mode
ip igmp router
```

ip igmp router

Runs IGMP on the specified interface.

Syntax

To set information:

```
ip igmp router
```

To delete information:

```
no ip igmp router
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. IGMP runs on interfaces on which the `ip pim sparse-mode` command is set, even if this command is not set.

Related commands

```
ip pim max-interface  
ip pim sparse-mode
```

ip igmp source-limit (global)

Specifies the maximum number of sources per interface that belong to the multicast groups that are allowed to join.

For an interface for which the `ip igmp source-limit (interface)` command is also specified, the specification of the `ip igmp source-limit (interface)` command has higher priority.

Syntax

To set or change information:

```
ip igmp [vrf <vrf id>] source-limit <number>
```

To delete information:

```
no ip igmp [vrf <vrf id>] source-limit
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

This command is valid only for the interface of the specified VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<number>`

Specifies the maximum number of sources per interface that belong to the multicast groups that are allowed to join.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 256

Default behavior

Source join on multicast group join is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set a limit on the number of sources per interface that belong to the multicast groups that are allowed to join, but do not guarantee operation up to the specified value.
2. If a change in configuration would cause the number of sources that belong to the multicast

groups that are currently managed to exceed the limit that is set by this command, the sources that belong to the multicast groups that currently join are retained until they are removed from the group. However, the removed groups cannot join again until the number of the sources that belong to the managed multicast groups on the interface falls below the limit that is set by this command.

3. This functionality does not limit source join that is due to changes in the configuration (via the static group join functionality or PIM-SSM Link Operation in IGMP). However, because such source joins are included in the count of the number of sources, if a configuration change causes the limit to be exceeded, new source join of receivers on multicast group join is limited.

Related commands

`ip pim sparse-mode`

ip igmp source-limit (interface)

Specifies the maximum number of sources that belong to the multicast groups that are allowed to join on the interface.

Syntax

To set or change information:

```
ip igmp source-limit <number>
```

To delete information:

```
no ip igmp source-limit
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<number>

Specifies the maximum number of sources that belong to the multicast groups that are allowed to join on the interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 256

Default behavior

The value that is specified by the `ip igmp source-limit (global)` command is applied. If the value is not specified, source join on multicast group join is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set a limit on the number of sources per interface that belong to the multicast groups that are allowed to join, but do not guarantee operation up to the specified value.
2. If a change in configuration would cause the number of sources that belong to the multicast groups that are currently managed to exceed the limit that is set by this command, the sources that belong to the multicast groups that currently join are retained until they are removed from the group. However, the removed groups cannot join again until the number of the sources that belong to the managed multicast groups on the interface falls below the limit that is set by this command.
3. This functionality does not limit source join that is due to changes in the configuration (via

the static group join functionality or PIM-SSM Link Operation in IGMP). However, because such source joins are included in the count of the number of sources, if a configuration change causes the limit to be exceeded, new source join of receivers on multicast group join is limited.

Related commands

```
ip pim sparse-mode
```

ip igmp ssm-map enable

Enables PIM-SSM Link Operation in IGMP.

PIM-SSM Link Operation in IGMP is the linkage between IGMPv2/IGMPv3 (EXCLUDE mode) and IPv4 PIM-SSM in the operation.

Syntax

To set information:

```
ip igmp [vrf <vrf id>] ssm-map enable
```

To delete information:

```
no ip igmp [vrf <vrf id>] ssm-map enable
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim ssm
ip igmp ssm-map static
```

ip igmp ssm-map static

Specifies the source address or addresses to the group address subject to PIM-SSM Link Operation in IGMP.

PIM-SSM Link Operation in IGMP is the linkage between IGMPv2/IGMPv3 (EXCLUDE mode) and IPv4 PIM-SSM in the operation.

Syntax

To set information:

```
ip igmp ssm-map [vrf <vrf id>] static <access list name> <source address>
```

To delete information:

```
no ip igmp ssm-map [vrf <vrf id>] static <access list name> <source address>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<access list name>

Specifies the access list of the group addresses (class-D IP addresses) used for IPv4 PIM-SSM.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an access list name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<source address>

Specifies the multicast source address (class-A to class-C IP address) used for IPv4 PIM-SSM.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify the source address (IP addresses in classes A to C).

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. This command is enabled when the `ip igmp ssm-map enable` command is specified.
2. For the addresses specified in *<access list name>*, use those within the range of the group addresses specified by the `ip pim ssm` command.
3. For *<access list name>*, specify access lists that were set by using the `ip access-list standard` command. Access lists that have been set by using commands other than this command cannot be specified.
4. If an access list that has not been set is specified, this command is not valid.
5. To specify a wildcard mask for *<access list name>*, specify a string of consecutive bits, starting from the most significant bit.

Related commands

```
ip pim ssm
ip igmp ssm-map enable
ip access-list standard
```

ip igmp static-group

Specifies the static group join functionality for the specified interface.

The static group join functionality configures static IGMPv2 group join settings in the configuration.

Syntax

To set or change information:

```
ip igmp static-group <group address>
```

To delete information:

```
no ip igmp static-group <group address>
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<group address>

Specifies a static group address represented by an IPv4 multicast address.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify a static group address represented by an IPv4 multicast address in dot notation.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim sparse-mode
```

ip igmp version

Specifies the IGMP version to be used by the corresponding interface.

Syntax

To set or change information:

```
ip igmp version {2 | 3 [only]}
```

To delete information:

```
no ip igmp version
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

{2 | 3 [only]}

The following table describes the version of the IGMP interface that is run depending on the specified value of this parameter.

Table 23-1: List of IGMP interface version types

Specified value of this parameter	IGMP version	IGMP operating mode
version 2	2	version 1, 2 mixed
version 3	3	version 1, 2, 3 mixed
version 3 only		version 3 fixed

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The version of IGMP to be used by the corresponding interface is the version 1, 2, 3 mixed mode.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim sparse-mode
```

ip multicast-routing

Enables the IPv4 multicast routing functionality.

Syntax

To set information:

```
ip multicast-routing [vrf <vrf id>]
```

To delete information:

```
no ip multicast-routing [vrf <vrf id>]
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. If you use the IPv4 multicast routing functionality on the Device, this setting is required.
2. To use the IPv4 multicast PIM-SM and PIM-SSM functionality on the Device, as well as the settings specified by this command, you need to configure the PIM-SM, PIM-SSM, and IGMP (`ip pim sparse-mode` command) settings on the global network or on more than one interface for each VRF.

Related commands

None

ip pim bsr-candidate

Sets the Device as an IPv4 PIM-SM bootstrap router candidate.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] bsr-candidate loopback <interface number> [priority <value>]
```

To delete information:

```
no ip pim [vrf <vrf id>] bsr-candidate loopback <interface number>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<interface number>

Specifies the loopback interface number.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 1024

priority <value>

Specifies the priority for determining the bootstrap router. The router with the highest priority is set as the bootstrap router.

1. Default value when this parameter is omitted:

0

2. Range of values:

0 to 255

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. To use this functionality on a VRF, make the settings so that the following conditions are satisfied.
 - For the VRF ID, set the same value as the VRF ID to which the loopback interface of the operation target belongs.
 - For the loopback interface number, set the same value as the loopback interface ID that is specified as the loopback interface of the operation target.

Related commands

```
ip pim sparse-mode  
interface loopback
```

ip pim deletion-delay-time

In IPv4 PIM-SM and PIM-SSM, upon reception of a PIM Prune message, sets the duration of time that remains until the multicast routing settings are deleted.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] deletion-delay-time <seconds>
```

To delete information:

```
no ip pim [vrf <vrf id>] deletion-delay-time
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:
Specifies the global network.
2. Range of values:
See *Specifiable values for parameters*.

<seconds>

In IPv4 PIM-SM and PIM-SSM, upon reception of a PIM Prune message, sets (in seconds) the duration of time that remains until the multicast routing settings are deleted.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
0 to 300

Default behavior

If 2 or more neighboring routers exist on the interface, and if neighboring routers that conform with RFC 2362 exist, the following value is used: the multicast relaying interface's retaining duration (Deletion-Delay-Time) after receiving the PIM Prune message, where the retaining duration is derived from the information (Holdtime option) included in a received PIM Prune message.

If two or more neighboring routers exist on the interface, and if no neighboring router that conforms with RFC 2362 exists, the following value is used: the time (J/P_Override_Interval) between receipt of the PIM Prune message and the stopping of multicast relaying, where said time is derived from the information (LAN Prune Delay option) included in a received PIM Hello message.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. If two or more neighboring routers exist on the interface, and if neighboring routers that

conform with RFC 2362 exist, setting the value of this command to a value shorter than the PIM Prune message transmission cycle of a downstream router might cause multicast packet relaying to be temporarily interrupted. This is because upon receipt of a PIM Prune message, relaying is stopped without waiting for PIM Join message reception from another downstream router. After that, upon receipt of a PIM Join message, relaying resumes.

2. If only 1 router other than the Device exists on the interface, multicast relaying is stopped upon receipt of a PIM Prune message regardless of the setting specified by this command.

Related commands

`ip pim sparse-mode`

ip pim keep-alive-time

Sets the keep-alive time for non-communication in IPv4 PIM-SM.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] keep-alive-time <seconds>
```

To delete information:

```
no ip pim [vrf <vrf id>] keep-alive-time
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<seconds>

Sets the keep-alive time (in seconds) for non-communication in IPv4 PIM-SM. If no multicast packet is relayed during the keep-alive time, IPv4 multicast relay entries are deleted.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0, or 60 to 43200 (where 0 means infinity)

Default behavior

The keep-alive time in PIM-SM for an idle communication link is 210 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Even during the keep-alive time (including cases where the keep-alive time is set to infinity), depending on the protocol, IPv4 multicast relay entries might be deleted. For example, if multicast routing information is deleted, IPv4 multicast relay entries that corresponding to that information are also deleted.
2. The deletion of IPv4 multicast forwarding entries that is caused by non-communication might lag behind the value of this setting for up to 90 seconds.
3. The keep-alive time in IPv4 PIM-SSM for an idle communication link is infinity.

Related commands

```
ip pim sparse-mode
```

ip pim max-interface

Sets the maximum number of interfaces for which IPv4 multicast can be configured.

Syntax

To set or change information:

```
ip pim max-interface <number>
```

To delete information:

```
no ip pim max-interface
```

Input mode

(config)

Parameters

<number>

Specifies the maximum number of interfaces per device for which IPv4 PIM and IGMP can be configured. The following table describes the maximum number of interfaces for IPv4 PIM and IGMP, which are set according to the value of this parameter.

Table 23-2: Maximum number of interfaces for which IPv4 PIM/IGMP can be configured

Specified value of this parameter	Configurable number of interfaces	
	IPv4 PIM	IGMP
255	255	255
4095	512	4095

If the value of this command is changed, the IPv4 multicast routing program automatically restarts.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

255, 4095

Default behavior

The maximum number of interfaces for which IPv4 PIM and IGMP can be configured is 255.

Impact on communication

When the value of this command is changed, the IPv4 multicast routing program restarts automatically. Therefore, IPv4 multicast relaying temporarily stops.

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip igmp router
```

```
ip pim sparse-mode
```

ip pim mcache-limit

Sets the maximum total number of IPv4 multicast forwarding entries and negative cache entries.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] mcache-limit <number>
```

To delete information:

```
no ip pim [vrf <vrf id>] mcache-limit
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<number>

Specifies the maximum total number per device of IPv4 multicast relay entries and negative cache entries.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 8000

Default behavior

There is no limit on the maximum total number of IPv4 multicast forwarding entries and negative cache entries.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set the maximum total number of IPv4 multicast forwarding entries and negative cache entries, but do not guarantee operation based on the specified value.
2. If the maximum total number of IPv4 multicast forwarding entries and negative cache entries exceeds the setting value of this command due to changes in the configuration, existing entries are maintained until they are deleted. If an entry is deleted in this state, it cannot be recreated until the number of entries becomes the value of this command or less.
3. When the total number of IPv4 multicast forwarding entries and negative cache entries

exceeds the maximum, the following actions are performed:

- For PIM-SM, IPv4 multicast forwarding entries cannot be created.
- For IPv4 PIM-SM, IPv4 multicast routing information cannot be created.

Related commands

```
ip pim sparse-mode
```

ip pim message-interval (global)

Sets the interval for sending PIM Join/Prune messages that IPv4 PIM-SM and PIM-SSM of the Device regularly send.

For an interface for which the `ip pim message-interval (interface)` command is also specified, the specification of the `ip pim message-interval (interface)` command has higher priority.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] message-interval <seconds>
```

To delete information:

```
no ip pim [vrf <vrf id>] message-interval
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

This command is valid only for the interface of the specified VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<seconds>`

Sets the interval (in seconds) for sending PIM Join/Prune messages that IPv4 PIM-SM and PIM-SSM of the Device regularly send.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

30 to 3600

Default behavior

The interval for sending PIM Join/Prune messages that IPv4 PIM-SM and PIM-SSM of the Device regularly send is 60 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ip pim sparse-mode`

ip pim message-interval (interface)

Sets the interval for sending PIM Join/Prune messages that IPv4 PIM-SM and PIM-SSM of the corresponding interface regularly send.

Syntax

To set or change information:

```
ip pim message-interval <seconds>
```

To delete information:

```
no ip pim message-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Sets (in seconds) the interval for sending PIM Join/Prune messages that IPv4 PIM-SM and PIM-SSM of the corresponding interface regularly send.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

30 to 3600

Default behavior

The value that is specified by the `ip pim message-interval (global)` command is applied. If no value is specified, 60 (seconds) is used.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim sparse-mode
```

ip pim mroute-limit

Specifies the maximum number of IPv4 multicast routing information items (total of (S, G) and (*, G) multicast routing information items).

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] mroute-limit <number>
```

To delete information:

```
no ip pim [vrf <vrf id>] mroute-limit
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:
Specifies the global network.
2. Range of values:
See *Specifiable values for parameters*.

<number>

Specifies the maximum number of IPv4 multicast routing settings per device.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
0 to 8000

Default behavior

The maximum number of IPv4 multicast routing settings is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set the limit for the maximum number of IPv4 multicast routing information, but do not guarantee operation up to the specified value.
2. If the number of IPv4 multicast routing settings exceeds the setting value of this command due to a change in the configuration, entries for which an IPv4 multicast routing setting has been configured are retained until the entry is deleted. If an entry is deleted in this state, it cannot be recreated until the number of entries becomes the value of this command or less.

Related commands

```
ip pim sparse-mode
```

ip pim negative-cache-time

Sets the retention time in IPv4 PIM-SM for negative cache entries.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] negative-cache-time <seconds>
```

To delete information:

```
no ip pim [vrf <vrf id>] negative-cache-time
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<seconds>

Sets (in seconds) the retention time in IPv4 PIM-SM for negative cache entries.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

10 to 3600

Default behavior

The retention time in IPv4 PIM-SM for negative cache entries is 210 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. The retention time in IPv4 PIM-SM for negative cache entries is fixed at 3600 seconds.

Related commands

```
ip pim sparse-mode
```

ip pim override-interval (global)

In IPv4 PIM-SM and PIM-SSM, sets the delay in transmission of PIM Join messages for invalidating PIM Prune messages sent by other routers.

For an interface for which the `ip pim override-interval (interface)` command is also specified, the specification of the `ip pim override-interval (interface)` command has higher priority.

Note that the value of this parameter is applied to the LAN Prune Delay option of PIM Hello messages that are sent through the interface.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] override-interval <milli seconds>
```

To delete information:

```
no ip pim [vrf <vrf id>] override-interval
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<milli seconds>`

Specifies (in milliseconds) the delay in transmission of PIM Join messages for invalidating PIM Prune messages sent by other routers.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

500 to 65535

Default behavior

2500 milliseconds is set.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ip pim sparse-mode`

ip pim override-interval (interface)

In IPv4 PIM-SM and PIM-SSM of applicable interfaces, sets the delay in transmission of PIM Join messages for invalidating PIM Prune messages sent by other routers.

Note that the value of this parameter is applied to the LAN Prune Delay option of PIM Hello messages that are sent through the interface.

Syntax

To set or change information:

```
ip pim override-interval <milli seconds>
```

To delete information:

```
no ip pim override-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<milli seconds>

Specifies (in milliseconds) the delay in transmission of PIM Join messages for invalidating PIM Prune messages sent by other routers.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

500 to 65535

Default behavior

2500 milliseconds is set.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim sparse-mode
```

ip pim propagation-delay-time (global)

In IPv4 PIM-SM and PIM-SSM, sets the delay in transmission of PIM Join/Prune messages.

For an interface for which the `ip pim propagation-delay-time (interface)` command is also specified, the specification of the `ip pim propagation-delay-time (interface)` command has higher priority.

Note that the value of this parameter is applied to the LAN Prune Delay option of PIM Hello messages that are sent through the interface.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] propagation-delay-time <milli seconds>
```

To delete information:

```
no ip pim [vrf <vrf id>] propagation-delay-time
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<milli seconds>`

Specifies (in milliseconds) the delay in transmission of PIM Join/Prune messages.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

500 to 32767

Default behavior

500 milliseconds is set.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ip pim sparse-mode`

ip pim propagation-delay-time (interface)

In IPv4 PIM-SM and PIM-SSM of applicable interfaces, sets the delay in transmission of PIM Join/Prune messages.

Note that the value of this parameter is applied to the LAN Prune Delay option of PIM Hello messages that are sent through the interface.

Syntax

To set or change information:

```
ip pim propagation-delay-time <milli seconds>
```

To delete information:

```
no ip pim propagation-delay-time
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<milli seconds>

Specifies (in milliseconds) the delay in transmission of PIM Join/Prune messages.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

500 to 32767

Default behavior

500 milliseconds is set.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim sparse-mode
```

ip pim query-interval (global)

Sets the interval for sending PIM Hello messages that IPv4 PIM-SM and PIM-SSM of the Device regularly send.

For an interface for which the `ip pim query-interval (interface)` command is also specified, the specification of the `ip pim query-interval (interface)` command has higher priority.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] query-interval <seconds>
```

To delete information:

```
no ip pim [vrf <vrf id>] query-interval
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

This command is valid only for the interface of the specified VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<seconds>`

Specifies (in seconds) the interval for sending PIM Hello messages that IPv4 PIM-SM and PIM-SSM regularly send.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

5 to 3600 (seconds)

Default behavior

The interval for sending PIM Hello messages that IPv4 PIM-SM and PIM-SSM of the Device regularly send is 30 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ip pim sparse-mode`

ip pim query-interval (interface)

Sets the interval for sending PIM Hello messages that IPv4 PIM-SM and PIM-SSM of the corresponding interface regularly send.

Syntax

To set or change information:

```
ip pim query-interval <seconds>
```

To delete information:

```
no ip pim query-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Sets (in seconds) the interval for sending PIM Hello messages that IPv4 PIM-SM and PIM-SSM of the corresponding interface regularly send.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

5 to 3600

Default behavior

The value that is specified by the `ip pim query-interval (global)` command is applied. If no value is specified, 30 seconds is used.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim sparse-mode
```

ip pim register-checksum

In IPv4 PIM-SM, sets the range of PIM checksum calculation at the time of transmission of PIM Register messages (IP-encapsulated packets).

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] register-checksum {header | all}
```

To delete information:

```
no ip pim [vrf <vrf id>] register-checksum
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

{header | all}

If `header` is specified, checksums are calculated for only the PIM message part (8 bytes) during the transmission of PIM Register messages (IP encapsulation packets). If `all` is specified, the checksum for both the PIM message (8 bytes) section and the IP-encapsulated multicast packet is calculated at the time of transmission of the PIM Register message (IP-encapsulated packet).

If the Device is not configured as the rendezvous point, and multicast communication is not possible due to checksum error, specify `all`.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

Performs operation when the `header` parameter is specified.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ip pim sparse-mode
```

ip pim register-probe-time

In IPv4 PIM-SM, sets the time to start sending PIM Null-Register messages according to the PIM Register message-sending suppression time.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] register-probe-time <seconds>
```

To delete information:

```
no ip pim [vrf <vrf id>] register-probe-time
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<seconds>

Specifies (in milliseconds) the time to start sending PIM Null-Register messages according to the PIM Register message-sending suppression time.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

5 to 60 (seconds)

Default behavior

The time to start sending PIM Null-Register messages according to the PIM Register message-sending suppression time is set to 5 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. If the remaining time of Register-Suppression-Timer falls below the value specified by this parameter, PIM Null-Register messages are sent every 5 seconds.

Related commands

```
ip pim sparse-mode
```

ip pim rp-address

Configures the settings for the static rendezvous point functionality used for IPv4 PIM-SM.

The static rendezvous point functionality allows rendezvous points to be set in the configuration.

When an address that is set to the global network in which the settings are configured or that is set to the loopback interface in VRF is specified, the Device functions as a rendezvous point.

Syntax

To set information:

```
ip pim [vrf <vrf id>] rp-address <rp address> [<access list name>]
```

To delete information:

```
no ip pim [vrf <vrf id>] rp-address <rp address>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<rp address>

Specifies the IPv4 address of the rendezvous point.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify the IPv4 address in dot notation.

<access list name>

Specifies an access list for the IPv4 group addresses to be managed at the corresponding rendezvous point.

1. Default value when this parameter is omitted:

224.0.0.0/4 (the group address is 224.0.0.0, and the mask length is 4)

2. Range of values:

Specify an access list name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. For *<access list name>*, specify access lists that were set by using the `ip access-list standard` command. Access lists that have been set by using commands other than this command cannot be specified.
2. If an access list that has not been is specified, this command's behavior will be the same as when the access list parameter is omitted.
3. To set the Device as a rendezvous point, specify the IPv4 address of the loopback interface.
4. To specify a wildcard mask for *<access list name>*, specify a string of consecutive bits, starting from the most significant bit.

Related commands

```
ip pim sparse-mode  
ip access-list standard
```

ip pim rp-candidate

Sets the Device as an IPv4 PIM-SM rendezvous point candidate.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] rp-candidate loopback <interface number> [priority
<value>] [group-list <access list name>]
```

To delete information:

```
no ip pim [vrf <vrf id>] rp-candidate loopback <interface number>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<interface number>

Specifies the loopback interface number.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 1024

priority <value>

Specifies the priority for determining the rendezvous point. The router that has the lowest priority becomes the rendezvous point.

1. Default value when this parameter is omitted:

255

2. Range of values:

0 to 255

group-list <access list name>

Specifies the access list of the group addresses (Class-D IP addresses) that the rendezvous point is to manage.

1. Default value when this parameter is omitted:

224.0.0.0/4 (the group address is 224.0.0.0, and the mask length is 4)

2. Range of values:

Specify an access list name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. For *<access list name>*, specify access lists that were set by using the `ip access-list standard` command. Access lists that have been set by using commands other than this command cannot be specified.
2. If an access list that has not been is specified, this command's behavior will be the same as when the access list parameter is omitted.
3. To use this command, set an IPv4 address for the loopback interface.
4. To use this functionality on VRFs, make the settings so that the following conditions are satisfied.
 - For the VRF ID, set the same value as the VRF ID to which the loopback interface of the operation target belongs.
 - For the loopback interface number, set the same value as the loopback interface ID that is specified as the operation target loopback interface.
5. To specify a wildcard mask for *<access list name>*, specify a string of consecutive bits, starting from the most significant bit.

Related commands

```
ip pim sparse-mode
interface loopback
ip access-list standard
```

ip pim rp-mapping-algorithm

Specifies the rendezvous point selection algorithm to be used by IPv4 PIM-SM.

Syntax

To set or change information:

```
ip pim [vrf <vrf id>] rp-mapping-algorithm {method1 | method2}
```

To delete information:

```
no ip pim [vrf <vrf id>] rp-mapping-algorithm
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

This command is valid only for the interface of the specified VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

{method1 | method2}

Specifies the rendezvous point selection algorithm to be used by IPv4 PIM-SM.

method1

Uses the algorithm described in RFC 2362.

method2

Uses the algorithm described in RFC 4601.

Adds the longest match for the group addresses managed at the rendezvous point as the selection condition of `method1`.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The rendezvous point selection algorithm used by IPv4 PIM-SM is the algorithm described in RFC 4601.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ip pim sparse-mode`

ip pim sparse-mode

Makes IPv4 PIM-SM, PIM-SSM, and IGMP run on applicable interfaces.

Syntax

To set information:

```
ip pim sparse-mode
```

To delete information:

```
no ip pim sparse-mode
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. If you use IPv4 PIM-SM, PIM-SSM, or IGMP on the corresponding interface, this setting is required.

Related commands

```
ip igmp router  
ip multicast-routing
```

ip pim ssm

Sets the range of group addresses to be used for IPv4 PIM-SSM.

Syntax

To set information:

```
ip pim [vrf <vrf id>] ssm {default | range <access list name>}
```

To delete information:

```
no ip pim [vrf <vrf id>] ssm {default | range <access list name>}
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

default

The group address to be used for IPv4 PIM-SSM is 232.0.0.0/8 (the group address is 232.0.0.0, and the mask length is 8).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

range <access list name>

Specifies an access list for the group addresses to be used for IPv4 PIM-SSM.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an access list name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Specify a single group address for the access list. If multiple group addresses are specified, which group address is to be used is undefined.

2. For *<access list name>*, specify access lists that were set by using the `ip access-list standard` command. Access lists that have been set by using commands other than this command cannot be specified.
3. If an access list that has not been set is specified, this command is not valid.
4. To specify a wildcard mask for *<access list name>*, specify a string of consecutive bits, starting from the most significant bit.

Related commands

```
ip pim sparse-mode  
ip access-list standard
```


Chapter

24. IPv6 Multicast Routing Protocols

```
ipv6 mld fast-leave
ipv6 mld group-limit (global)
ipv6 mld group-limit (interface)
ipv6 mld query-interval (global)
ipv6 mld query-interval (interface)
ipv6 mld router
ipv6 mld source-limit (global)
ipv6 mld source-limit (interface)
ipv6 mld ssm-map enable
ipv6 mld ssm-map static
ipv6 mld static-group
ipv6 mld version
ipv6 multicast-routing
ipv6 multicast join-prune-event logging enable
ipv6 pim
ipv6 pim assert-metric
ipv6 pim assert-preference
ipv6 pim bsr candidate bsr
ipv6 pim bsr candidate rp
ipv6 pim deletion-delay-time
ipv6 pim direct
ipv6 pim hello-interval (global)
ipv6 pim hello-interval (interface)
ipv6 pim join-prune-interval (global)
ipv6 pim join-prune-interval (interface)
ipv6 pim keep-alive-time
ipv6 pim max-interface
ipv6 pim mcache-limit
ipv6 pim mroute-limit
ipv6 pim negative-cache-time
ipv6 pim override-interval (global)
ipv6 pim override-interval (interface)
ipv6 pim propagation-delay-time (global)
ipv6 pim propagation-delay-time (interface)
ipv6 pim register-probe-time
ipv6 pim rp-address
ipv6 pim rp-mapping-algorithm
ipv6 pim ssm
```

ipv6 mld fast-leave

Upon multicast group or source detachment (upon reception of an MLDv1 Done message for MLDv1/upon reception of an MLDv2 Report (leave request) message for MLDv2), on applicable interfaces, deletes multicast groups or sources without a check of other receivers.

Syntax

To set information:

```
ipv6 mld fast-leave
```

To delete information:

```
no ipv6 mld fast-leave
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

Upon multicast group or source detachment (upon reception of an MLDv1 Done message for MLDv1/upon reception of an MLDv2 Report (leave request) message for MLDv2), on applicable interfaces, multicast groups or sources are deleted after a check of other receivers.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. This functionality can be used when 1 receiver is connected on the interface. Do not use this functionality when multiple operation terminals are connected.

Related commands

```
ipv6 mld router
```

ipv6 mld group-limit (global)

Specifies the maximum number of multicast groups per interface that are allowed to join.

For an interface for which the `ipv6 mld group-limit (interface)` command is also specified, the specification of the `ipv6 mld group-limit (interface)` command has higher priority.

Syntax

To set or change information:

```
ipv6 mld [vrf <vrf id>] group-limit <number>
```

To delete information:

```
no ipv6 mld [vrf <vrf id>] group-limit
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

This command is valid only for the interface of the specified VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<number>`

Specifies the maximum number of multicast groups per interface that are allowed to join.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 256

Default behavior

For multicast group join, the maximum number of multicast groups per interface that are allowed to join is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set a limit on the number of multicast groups per interface that are allowed to join, but do not guarantee operation up to the specified value.
2. If a change in configuration would cause the number of the multicast groups that are currently managed to exceed the limit that is set by this command, the multicast groups that currently join are retained until they are removed from the group. However, the removed groups cannot

join again until the number of managed multicast groups on the interface falls below the limit that is set by this command.

3. This functionality does not limit multicast group join that is due to changes in the configuration (via the static group join functionality). However, because static group joins are included in the count of the number of multicast groups, if the static group join functionality causes the limit to be exceeded, new join of receivers is limited.

Related commands

`ipv6 mld router`

ipv6 mld group-limit (interface)

Specifies the maximum number of multicast groups that are allowed to join on the interface.

Syntax

To set or change information:

```
ipv6 mld group-limit <number>
```

To delete information:

```
no ipv6 mld group-limit
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<number>

Specifies the maximum number of multicast groups that are allowed to join on the interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 256

Default behavior

The maximum number of multicast groups that are allowed to join on the interface is set to that specified by the `ipv6 mld group-limit (global)` command. If no value is specified, multicast group join is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set a limit on the number of multicast groups per interface that are allowed to join, but do not guarantee operation up to the specified value.
2. If a change in configuration would cause the number of the multicast groups that are currently managed to exceed the limit that is set by this command, the multicast groups that are currently join are retained until they are removed from the group. However, the removed groups cannot join again until the number of managed multicast groups on the interface falls below the limit that is set by this command.
3. This functionality does not limit multicast group join that is due to changes in the configuration (via the static group join functionality). However, because static group joins are included in the count of the number of multicast groups, if the static group join functionality causes the limit to be exceeded, new group join of receivers is limited.

Related commands

`ipv6 mld router`

ipv6 mld query-interval (global)

Sets the interval for sending MLD Query messages that MLD of the Device regularly sends.

For an interface for which the `ipv6 mld query-interval (interface)` command is also specified, the specification of the `ipv6 mld query-interval (interface)` command has higher priority.

Syntax

To set or change information:

```
ipv6 mld [vrf <vrf id>] query-interval <seconds>
```

To delete information:

```
no ipv6 mld [vrf <vrf id>] query-interval
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

This command is valid only for the interface of the specified VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<seconds>`

Sets (in seconds) the interval for sending MLD Query messages that are sent regularly by MLD.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

60 to 3600

Default behavior

The interval for sending MLD Query messages that MLD of the Device regularly sends is 125 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ipv6 mld router`

ipv6 mld query-interval (interface)

Sets the interval for sending MLD Query messages that MLD of the corresponding interface regularly sends.

Syntax

To set or change information:

```
ipv6 mld query-interval <seconds>
```

To delete information:

```
no ipv6 mld query-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Sets the interval for (in seconds) sending MLD Query messages that MLD of the corresponding interface regularly sends.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

60 to 3600

Default behavior

The value that is specified by the `ipv6 mld query-interval (global)` command is applied. If no value is specified, 125 (seconds) is used.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ipv6 mld router
```

ipv6 mld router

Runs MLD on the specified interface.

Syntax

To set information:

```
ipv6 mld router
```

To delete information:

```
no ipv6 mld router
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. MLD runs on interfaces on which the `ipv6 pim` command is set, even if this command is not set.

Related commands

```
ipv6 multicast-routing  
ipv6 pim
```

ipv6 mld source-limit (global)

Specifies the maximum number of sources per interface that belong to the multicast groups that are allowed to join.

For an interface for which the `ipv6 mld source-limit (interface)` command is also specified, the specification of the `ipv6 mld source-limit (interface)` command has higher priority.

Syntax

To set or change information:

```
ipv6 mld [vrf <vrf id>] source-limit <number>
```

To delete information:

```
no ipv6 mld [vrf <vrf id>] source-limit
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<number>

Specifies the maximum number of sources per interface that belong to the multicast groups that are allowed to join.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 256

Default behavior

Source join on multicast group join is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set a limit on the number of sources per interface that belong to the multicast groups that are allowed to join, but do not guarantee operation up to the specified value.
2. If a change in configuration would cause the number of sources that belong to the multicast groups that are currently managed to exceed the limit that is set by this command, the sources

that belong to the multicast groups that currently join are retained until they are removed from the group. However, the removed groups cannot join again until the number of the sources that belong to the managed multicast groups on the interface falls below the limit that is set by this command.

3. This functionality does not limit source join that is due to changes in the configuration (via the static group join functionality or PIM-SSM Link Operation in MLD). However, because such source joins are included in the count of the number of sources, if a configuration change causes the limit to be exceeded, new source join of receivers on multicast group join is restricted.

Related commands

`ipv6 mld router`

ipv6 mld source-limit (interface)

Specifies the maximum number of sources that belong to the multicast groups that are allowed to join on the interface.

Syntax

To set or change information:

```
ipv6 mld source-limit <number>
```

To delete information:

```
no ipv6 mld source-limit
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<number>

Specifies the maximum number of sources that belong to the multicast groups that are allowed to join on the interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 256

Default behavior

The value that is specified by the `ipv6 mld source-limit (global)` command is applied. If the value is not specified, source join on multicast group join is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set a limit on the number of sources per interface that belong to the multicast groups that are allowed to join, but do not guarantee operation up to the specified value.
2. If a change in configuration would cause the number of sources that belong to the multicast groups that are currently managed to exceed the limit that is set by this command, the sources that belong to the multicast groups that currently join are retained until they are removed from the group. However, the removed groups cannot join again until the number of the sources that belong to the managed multicast groups on the interface falls below the limit that is set by this command.
3. This functionality does not limit source join that is due to changes in the configuration (via

the static group join functionality or PIM-SSM Link Operation in MLD). However, because such source joins are included in the count of the number of sources, if a configuration change causes the limit to be exceeded, new source join of receivers on multicast group join is limited.

Related commands

```
ipv6 mld router
```

ipv6 mld ssm-map enable

Enables PIM-SSM Link Operation in MLD.

PIM-SSM Link Operation in MLD is the functionality that links operation of MLDv1/MLDv2 (EXCLUDE mode) and IPv6 PIM-SSM.

Syntax

To set information:

```
ipv6 mld [vrf <vrf id>] ssm-map enable
```

To delete information:

```
no ipv6 mld [vrf <vrf id>] ssm-map enable
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ipv6 mld router  
ipv6 mld ssm-map static
```

ipv6 mld ssm-map static

Specifies the source address or addresses for the group address that is subject to PIM-SSM Link Operation in MLD.

PIM-SSM Link Operation in MLD is the functionality that links operation of MLDv1/MLDv2 (EXCLUDE mode) and IPv6 PIM-SSM.

Syntax

To set information:

```
ipv6 mld ssm-map [vrf <vrf id>] static <access list name> <source address>
```

To delete information:

```
no ipv6 mld ssm-map [vrf <vrf id>] static <access list name> <source address>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<access list name>

Specifies an access list for the group addresses to be used for IPv6 PIM-SSM.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an access list name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

<source address>

Specifies the source address for the multicast to be used for IPv6 PIM-SSM.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. This command is enabled when the `ipv6 mld ssm-map enable` command is specified.
2. For the access-list addresses specified in *<access list name>*, use those within the range of the group addresses specified by the `ipv6 pim ssm` command.
3. For *<access list name>*, specify access lists that were set by using the `ipv6 access-list` command. Access lists that have been set by using commands other than this command cannot be specified.
4. If an access list that has not been set is specified, this command is not valid.
5. For the access-list address specified in *<access list name>*, use the destination IPv6 address of the corresponding access list.

Related commands

```
ipv6 mld router  
ipv6 mld ssm-map enable  
ipv6 access-list
```

ipv6 mld static-group

Specifies the static group join functionality for the specified interface.

The static group join functionality configures static MLDv1 group join settings in the configuration.

Syntax

To set information:

```
ipv6 mld static-group <access list name>
```

To delete information:

```
no ipv6 mld static-group <access list name>
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<access list name>

Specifies an access list for the group addresses to be used in the static group join functionality.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an access list name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. The mask length for the access list is fixed at 128 (bits). Do not specify a mask length that is 127 (bits) or less for the access list. If the mask length is specified as 127 (bits) or less, the corresponding address is ignored.
2. For <access list name>, specify access lists that were set by using the `ipv6 access-list` command. Access lists that have been set by using commands other than this command cannot be specified.
3. If an access list that has not been set is specified, this command is not valid.
4. For the access-list address specified in <access list name>, use the destination IPv6 address of the corresponding access list.

Related commands

```
ipv6 mld router  
ipv6 access-list
```

ipv6 mld version

Specifies the MLD version to be used by the corresponding interface.

Syntax

To set or change information:

```
ipv6 mld version { 1 | 2 [ only ] }
```

To delete information:

```
no ipv6 mld version
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

{1 | 2 [only]}

The following table describes the version of the MLD interface that is run according to the value specified for this parameter.

Table 24-1: List of MLD interface versions

Value set	Version	MLD operating mode
version 1	1	version 1 fixed
version 2	2	version 1, 2 mixed
version 2 only		version 2 fixed

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The MLD version to be used by the corresponding interface is the version 1, 2 mixed mode.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ipv6 mld router
```

ipv6 multicast-routing

Enables the IPv6 multicast routing functionality.

Syntax

To set information:

```
ipv6 multicast-routing [vrf <vrf id>]
```

To delete information:

```
no ipv6 multicast-routing [vrf <vrf id>]
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. If you use the IPv6 multicast routing functionality on the Device, this setting is required.
2. If you use the IPv6 multicast routing functionality on the Device, you must set an address on a loopback interface for the corresponding VRF.
3. If you use the IPv6 multicast routing functionality on the Device, you must also specify the IPv6 PIM (`ipv6 pim` command) setting for 1 or more interfaces on the global network or on each VRF.

Related commands

```
interface loopback
```

ipv6 multicast join-prune-event logging enable

Enables the setting that outputs system messages about an output interface that is added to or removed from an IPv6 multicast relay entry. Executing the command to enable the setting allows system messages of the message type MULTI-INFO to be output.

Syntax

To set or change information:

```
ipv6 multicast join-prune-event logging enable
```

To delete information:

```
no ipv6 multicast join-prune-event logging enable
```

Input mode

(config)

Parameters

None

Default behavior

No system message is output about an output interface that is added to or removed from an IPv6 multicast relay entry.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ipv6 multicast-routing
```

ipv6 pim

Makes IPv6 PIM-SM, PIM-SSM, and MLD run on applicable interfaces.

Syntax

To set information:

```
ipv6 pim
```

To delete information:

```
no ipv6 pim
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

None

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. If you use IPv6 PIM-SM, PIM-SSM, or MLD on the corresponding interface, this setting is required.

Related commands

```
ipv6 mld router  
ipv6 multicast-routing
```

ipv6 pim assert-metric

Specifies the metric to be used in IPv6 PIM-SM PIM Assert messages.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] assert-metric {<metric> | unicast-routing}
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] assert-metric
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

{<metric> | unicast-routing}

Specifies the metric used in PIM Assert messages.

<metric>

Uses the specified value as the metric on the PIM Assert message whether the source address is of a direct connection or an indirect connection.

unicast-routing

Uses the first metric, which is obtained with the unicast routing protocol, as the metric on the PIM Assert message whether the source address is of a direct connection or an indirect connection.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For <metric>, specify a value in the range from 0 to 65535.

Default behavior

The metric used in PIM Assert messages is 0 for directly-connected source addresses, or 1024 for indirectly-connected source addresses.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ipv6 pim`

ipv6 pim assert-preference

The `ipv6 pim assert-preference` command specifies the preference information to be used for IPv6 PIM-SM PIM Assert messages.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] assert-preference {<preference> | unicast-routing}
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] assert-preference
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`{<preference> | unicast-routing}`

Specifies the preference information to be used in PIM Assert messages.

`<preference>`

Uses the specified value used as the preference value on the PIM Assert message whether the source address is of a direct connection or an indirect connection.

`unicast-routing`

Uses the unicast first distance value, which is obtained with the unicast routing protocol, as the preference value on the PIM Assert message whether the source address is of a direct connection or an indirect connection.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

For `<preference>`, specify a value in the range from 0 to 255.

Default behavior

The preference value used in PIM Assert messages is 0 for directly-connected source addresses, or 101 for indirectly-connected source addresses.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

ipv6 pim

ipv6 pim bsr candidate bsr

Sets the Device as an IPv6 PIM-SM bootstrap router candidate.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] bsr candidate bsr <ipv6 address> [priority <value>]
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] bsr candidate bsr <ipv6 address>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<ipv6 address>

Specifies the address set for the loopback interface of the Device.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv6 global address in colon notation.

priority <value>

Specifies the priority for determining the bootstrap router. The router with the highest priority is set as the bootstrap router.

1. Default value when this parameter is omitted:

0

2. Range of values:

0 to 255

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Specify the same address for all of the loopback interface addresses of the Device that is

specified in the `ipv6 pim bsr candidate bsr` or `ipv6 pim bsr candidate rp` command.

2. To use this functionality on VRFs, perform the settings so that the following conditions are satisfied.
 - For the VRF ID, set the same value as the VRF ID to which the operation target loopback interface belongs.
 - Specify the same address as that assigned to the target loopback interface.

Related commands

```
ipv6 pim
interface loopback
```

ipv6 pim bsr candidate rp

Sets the Device as an IPv6 PIM-SM rendezvous point candidate.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] bsr candidate rp <ipv6 address> [priority <value>]
[group-list <access list name>]
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] bsr candidate rp <ipv6 address>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<ipv6 address>

Specifies the address set for the loopback interface of the Device.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv6 global address in colon notation.

priority <value>

Specifies the priority for determining the rendezvous point. The router that has the lowest priority becomes the rendezvous point.

1. Default value when this parameter is omitted:

255

2. Range of values:

0 to 255 (in decimal)

group-list <access list name>

Specifies an access list for the IPv6 group addresses to be managed at the corresponding rendezvous point.

1. Default value when this parameter is omitted:

ff00::/8 (all group addresses)

2. Range of values:

Specify an access list name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Specify the same address for all of the loopback interface addresses of the Device that is specified in the `ipv6 pim bsr candidate bsr` or `ipv6 pim bsr candidate rp` command.
2. For *<access list name>*, specify access lists that were set by using the `ipv6 access-list` command. Access lists that have been set by using commands other than this command cannot be specified.
3. If an access list that has not been is specified, this command's behavior will be the same as when the access list parameter is omitted.
4. For the access-list address specified in *<access list name>*, use the destination IPv6 address of the corresponding access list.
5. To use this command, set an IPv6 address for the loopback interface.
6. If an access list is specified for the command, changing the command by specifying another access list is not possible.
7. To use this functionality on a VRF, perform the settings so that the following conditions are satisfied.
 - For the VRF ID, set the same value as the VRF ID to which the operation target loopback interface belongs to.
 - Specify the same address as that assigned to the target loopback interface.

Related commands

```
ipv6 pim
interface loopback
ipv6 access-list
```

ipv6 pim deletion-delay-time

In IPv6 PIM-SM and PIM-SSM, upon reception of a PIM Prune message, sets the duration of time that remains until the multicast routing settings are deleted.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] deletion-delay-time <seconds>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] deletion-delay-time
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:
Specifies the global network.
2. Range of values:
See *Specifiable values for parameters*.

<seconds>

In IPv6 PIM-SM and PIM-SSM, upon reception of a PIM Prune message, specifies (in seconds) the duration of time remaining until multicast routing settings are deleted.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
0 to 300

Default behavior

If 2 or more neighboring routers exist on the interface, and if neighboring routers that conform with RFC 2362 exist, the following value is used: the multicast relaying interface's retaining duration (Deletion-Delay-Time) after receiving the PIM Prune message, where the retaining duration is derived from the information (Holdtime option) included in a received PIM Prune message.

If 2 or more neighboring routers exist on the interface, and if no neighboring router that conforms with RFC 2362 exists, the following value is used: the time (J/P_Override_Interval) between receipt of the PIM Prune message and the stopping of multicast relaying, where said time is derived from the information (LAN Prune Delay option) included in a received PIM Hello message.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. If 2 or more neighboring routers exist on the interface, and if neighboring routers that conform with RFC 2362 exist, setting the value of this command to a value shorter than the PIM Prune

message transmission cycle of a downstream router might cause multicast packet relaying to be temporarily interrupted. This is because upon receipt of a PIM Prune message, relaying is stopped without waiting for PIM Join message reception from another downstream router. After that, upon receipt of a PIM Join message, relaying resumes.

2. If only 1 router other than the Device exists on the interface, multicast relaying is stopped upon receipt of a PIM Prune message regardless of the setting specified by this command.

Related commands

`ipv6 pim`

ipv6 pim direct

Sets a multicast server virtual connection setting.

The multicast server virtual connection functionality causes the addresses of multicast servers that are not directly connectable to be handled as directly-connected servers, and allows the Device to function as the first hop router for the target address.

Syntax

To set information:

```
ipv6 pim direct <access list name>
```

To delete information:

```
no ipv6 pim direct <access list name>
```

Input mode

(config-if)

Parameters

<access list name>

Specifies the access list for addresses of the multicast packet sources to be treated as directly-connected servers by the Device. A maximum of 16 source addresses are valid.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
Specify an access list name of no more than 31 characters.
For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. For <access list name>, specify access lists that were set by using the `ipv6 access-list` command. Access lists that have been set by using commands other than this command cannot be specified.
2. If an access list that has not been set is specified, this command is not valid.
3. For the access-list address specified in <access list name>, use the source IPv6 address of the corresponding access list.
4. This command cannot configure identical IPv6 source addresses on more than one interface.
5. If this command is specified for more than one interface in the global network or VRF, do not make settings that include identical IPv6 source addresses. If the same IPv6 source address is used for multiple interfaces, some of the settings will become invalid.

Related commands

ipv6 pim

```
ipv6 access-list
```

ipv6 pim hello-interval (global)

Sets the interval for sending PIM Hello messages that IPv6 PIM of the Device regularly sends.

For an interface for which the `ipv6 pim hello-interval (interface)` command is also specified, the specification of the `ipv6 pim hello-interval (interface)` command has higher priority.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] hello-interval <seconds>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] hello-interval
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

This command is valid only for the interface of the specified VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<seconds>`

Specifies the interval (in seconds) for sending PIM Hello messages that IPv6 PIM regularly sends.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

5 to 3600

Default behavior

The interval for sending PIM Hello messages that IPv6 PIM of the Device regularly sends is 30 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ipv6 pim`

ipv6 pim hello-interval (interface)

Sets the interval for sending PIM Hello messages that are sent regularly by IPv6 PIM of the corresponding interface.

Syntax

To set or change information:

```
ipv6 pim hello-interval <seconds>
```

To delete information:

```
no ipv6 pim hello-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Sets the interval for (in seconds) sending PIM Hello messages that IPv6 PIM of the corresponding interface regularly sends.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

5 to 3600

Default behavior

The value that is specified by the `ipv6 pim hello-interval (global)` command is applied. If no value is specified, 30 (seconds) is used.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ipv6 pim
```

ipv6 pim join-prune-interval (global)

Sets the interval for sending PIM Join/Prune messages that IPv6 PIM of the Device regularly sends.

For an interface for which the `ipv6 pim join-prune-interval (interface)` command is also specified, the specification of the `ipv6 pim join-prune-interval (interface)` command has higher priority.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] join-prune-interval <seconds>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] join-prune-interval
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<seconds>`

Sets the interval (in seconds) for sending PIM Join/Prune messages that IPv6 PIM of the Device regularly sends.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

30 to 3600

Default behavior

The interval for sending PIM Join/Prune messages that IPv6 PIM of the Device regularly sends is 60 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ipv6 pim`

ipv6 pim join-prune-interval (interface)

Sets the interval for sending PIM Join/Prune messages that are sent regularly by IPv6 PIM of the corresponding interface.

Syntax

To set or change information:

```
ipv6 pim join-prune-interval <seconds>
```

To delete information:

```
no ipv6 pim join-prune-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<seconds>

Sets the interval (in seconds) for sending PIM Join/Prune messages that are sent regularly by IPv6 PIM of the corresponding interface.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

30 to 3600

Default behavior

The value that is specified by the `ipv6 pim join-prune-interval (global)` command is applied. If no value is specified, 60 (seconds) is used.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ipv6 pim
```

ipv6 pim keep-alive-time

Sets the keep-alive time for non-communication in IPv6 PIM-SM.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] keep-alive-time <seconds>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] keep-alive-time
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<seconds>

Sets the keep-alive time (in seconds) for non-communication in IPv6 PIM-SM. If no multicast packet is relayed during the keep-alive time, IPv6 multicast relay entries are deleted.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0, or 60 to 43200 (where 0 means infinity)

Default behavior

The keep-alive time in IPv6 PIM-SM for an idle communication link is 210 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Even during the keep-alive time (even when it is infinite), depending on the protocol, IPv6 multicast relay entries might be deleted. For example, if multicast routing information is deleted, IPv6 multicast relay entries corresponding to it are also deleted.
2. The deletion of IPv6 multicast relay entries that is caused by non-communication might lag behind this setting value for up to 90 seconds.
3. The keep-alive time in IPv6 PIM-SM for an idle communication link is infinity.

Related commands

ipv6 pim

ipv6 pim max-interface

Sets the maximum number of interfaces for which IPv6 multicast can be configured.

Syntax

To set or change information:

```
ipv6 pim max-interface <number>
```

To delete information:

```
no ipv6 pim max-interface
```

Input mode

(config)

Parameters

<number>

Specifies the maximum number of interfaces per device for which IPv6 PIM and MLD can be configured. The following table describes the maximum allowable number of interfaces for IPv6 PIM and MLD, which are set according to the value of this parameter.

Table 24-2: Maximum number of interfaces for which IPv6 PIM/MLD can be configured

Specified value of this parameter	Configurable number of interfaces	
	IPv6 PIM	MLD
255	255	255
4095	512	4095

When the value of this command is changed, the IPv6 multicast routing program restarts automatically.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

255, 4095

Default behavior

The maximum number of interfaces for which IPv6 PIM and MLD can be configured is 255.

Impact on communication

When the value of this command is changed, the IPv6 multicast routing program restarts automatically. Therefore, IPv6 multicast relaying temporarily stops.

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ipv6 mld router
ipv6 pim
```

ipv6 pim mcache-limit

Sets the maximum total number of IPv6 multicast forwarding entries and negative cache entries.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] mcache-limit <number>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] mcache-limit
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<number>

Specifies the maximum total number per device of IPv6 multicast relay entries and negative cache entries.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

0 to 8000

Default behavior

There is no limit on the maximum total number of IPv6 multicast forwarding entries and negative cache entries.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set the maximum total number of IPv6 multicast forwarding entries and negative cache entries, but do not guarantee operation based on the specified value.
2. If the maximum total number of IPv6 multicast forwarding entries and negative cache entries exceeds the setting value of this command due to changes in the configuration, existing entries are maintained until they are deleted. If an entry is deleted in this state, it cannot be recreated until the number of entries becomes the value of this command or less.
3. If the total number of IPv6 multicast relay entries and negative cache entries exceeds the

maximum, the following actions are performed:

- For IPv6 PIM-SM, IPv6 multicast relay entries cannot be created.
- For IPv6 PIM-SM, IPv6 multicast routing information cannot be created.

Related commands

`ipv6 pim`

ipv6 pim mroute-limit

Specifies the maximum number of IPv6 multicast routing information items (total of (S, G) and (*, G) multicast routing information items).

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] mroute-limit <number>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] mroute-limit
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:
Specifies the global network.
2. Range of values:
See *Specifiable values for parameters*.

<number>

Specifies the maximum number of IPv6 multicast routing settings per device.

1. Default value when this parameter is omitted:
This parameter cannot be omitted.
2. Range of values:
0 to 8000

Default behavior

The maximum number of IPv6 multicast routing settings is unlimited. However, you must operate multicast routing entries within the described capacity limits.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Values specified by using this command set the limit on the maximum number of IPv6 multicast routing information items, but do not guarantee operation up to the specified value.
2. If the number of IPv6 multicast routing settings exceeds the setting value of this command due to a change in the configuration, entries for which an IPv6 multicast routing setting has been configured are retained until the entry is deleted. If an entry is deleted in this state, it cannot be recreated until the number of entries becomes the value of this command or less.

Related commands

ipv6 pim

ipv6 pim negative-cache-time

Sets the retention time in IPv6 PIM-SM for negative cache entries.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] negative-cache-time <seconds>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] negative-cache-time
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<seconds>

Sets (in seconds) the retention time in IPv6 PIM-SM for negative cache entries.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

10 to 3600

Default behavior

The retention time in IPv6 PIM-SM for negative cache entries is 210 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. The retention time in IPv6 PIM-SM for negative cache entries is fixed at 3600 seconds.

Related commands

ipv6 pim

ipv6 pim override-interval (global)

In IPv6 PIM, sets the delay in transmission of PIM Join messages for invalidating PIM Prune messages sent by other routers.

For an interface for which the `ipv6 pim override-interval (interface)` command is also specified, the specification of the `ipv6 pim override-interval (interface)` command has higher priority.

Note that the value of the parameter specified by this command is applied to the LAN Prune Delay option of PIM Hello messages that are sent through the interface.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] override-interval <milli seconds>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] override-interval
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<milli seconds>`

Specifies (in milliseconds) the delay in transmission of PIM Join messages for invalidating PIM Prune messages sent by other routers.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

500 to 65535

Default behavior

2500 milliseconds is set.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ipv6 pim`

ipv6 pim override-interval (interface)

In IPv6 PIM of applicable interfaces, sets the delay in transmission of PIM Join messages for invalidating PIM Prune messages sent by other routers.

Note that the value of the parameter specified by this command is applied to the LAN Prune Delay option of PIM Hello messages that are sent through the interface.

Syntax

To set or change information:

```
ipv6 pim override-interval <milli seconds>
```

To delete information:

```
no ipv6 pim override-interval
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<milli seconds>

Specifies (in milliseconds) the delay in transmission of PIM Join messages for invalidating PIM Prune messages sent by other routers.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

500 to 65535

Default behavior

2500 milliseconds is set.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ipv6 pim
```

ipv6 pim propagation-delay-time (global)

In IPv6 PIM, sets the delay in transmission of PIM Join/Prune messages.

For an interface for which the `ipv6 pim propagation-delay-time (interface)` command is also specified, the specification of the `ipv6 pim propagation-delay-time (interface)` command has higher priority.

Note that the value of the parameter specified by this command is applied to the LAN Prune Delay option of PIM Hello messages that are sent through the interface.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] propagation-delay-time <milli seconds>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] propagation-delay-time
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`<milli seconds>`

Specifies (in milliseconds) the delay in transmission of PIM Join/Prune messages.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

500 to 32767

Default behavior

500 milliseconds is set.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

`ipv6 pim`

ipv6 pim propagation-delay-time (interface)

In IPv6 PIM of applicable interfaces, sets the delay in transmission of PIM Join/Prune messages.

Note that the value of the parameter specified by this command is applied to the LAN Prune Delay option of PIM Hello messages that are sent through the interface.

Syntax

To set or change information:

```
ipv6 pim propagation-delay-time <milli seconds>
```

To delete information:

```
no ipv6 pim propagation-delay-time
```

Input mode

(config-if)

Ethernet interface or port channel interface

(config-subif)

Ethernet subinterface or port channel subinterface

Parameters

<milli seconds>

Specifies (in milliseconds) the delay in transmission of PIM Join/Prune messages.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

500 to 32767

Default behavior

500 milliseconds is set.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands

```
ipv6 pim
```

ipv6 pim register-probe-time

In IPv6 PIM-SM, sets the time to start sending PIM Null-Register messages according to the PIM Register message-sending suppression time.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] register-probe-time <seconds>
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] register-probe-time
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<seconds>

Specifies (in milliseconds) the time to start sending PIM Null-Register messages according to the PIM Register message-sending suppression time

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

5 to 60

Default behavior

The time to start sending PIM Null-Register messages according to the PIM Register message-sending suppression time is set to 5 seconds.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. If the remaining time of Register-Suppression-Timer falls below the value specified by this parameter, PIM Null-Register messages are sent every 5 seconds.

Related commands

ipv6 pim

ipv6 pim rp-address

Configures the settings for the static rendezvous point functionality used for IPv6 PIM-SM.

The static rendezvous point functionality allows rendezvous points to be set in the configuration.

When an address that is set to the global network in which the settings are configured or that is set to the loopback interface in VRF is specified, the Device functions as a rendezvous point.

Syntax

To set information:

```
ipv6 pim [vrf <vrf id>] rp-address <rp address> [<access list name>]
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] rp-address <rp address>
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

<rp address>

Specifies the IPv6 address of the rendezvous point.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an IPv6 global address in colon notation.

<access list name>

Specifies an access list for the IPv6 group addresses to be managed at the rendezvous point.

1. Default value when this parameter is omitted:

ff00::/8 (all group addresses)

2. Range of values:

Specify an access list name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. For *<access list name>*, specify access lists that were set by using the `ipv6 access-list` command. Access lists that have been set by using commands other than this command cannot be specified.
2. If an access list that has not been is specified, this command's behavior will be the same as when the access list parameter is omitted.
3. For the access-list address specified in *<access list name>*, use the destination IPv6 address of the corresponding access list.
4. To set the Device as a rendezvous point, specify the IPv6 address of the loopback interface.

Related commands

```
ipv6 pim  
ipv6 access-list
```

ipv6 pim rp-mapping-algorithm

Specifies the rendezvous point selection algorithm to be used by IPv6 PIM-SM.

Syntax

To set or change information:

```
ipv6 pim [vrf <vrf id>] rp-mapping-algorithm { method1 | method2 }
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] rp-mapping-algorithm
```

Input mode

(config)

Parameters

vrf <vrf id>

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

{ method1 | method2 }

Specifies the rendezvous point selection algorithm to be used by IPv6 PIM-SM.

method1

Uses the algorithm described in RFC 2362.

method2

Uses the algorithm described in RFC 4601.

Adds the longest match for the group addresses managed at the rendezvous point as the selection condition of `method1`.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

None

Default behavior

The rendezvous point selection algorithm used by IPv6 PIM-SM is the algorithm described in RFC 4601.

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

None

Related commands`ipv6 pim`

ipv6 pim ssm

Uses IPv6 PIM-SSM on interfaces on which the `ipv6 pim` command is set.

Sets the range of group addresses to be used for IPv6 PIM-SSM.

Syntax

To set information:

```
ipv6 pim [vrf <vrf id>] ssm { default | range <access list name> }
```

To delete information:

```
no ipv6 pim [vrf <vrf id>] ssm { default | range <access list name> }
```

Input mode

(config)

Parameters

`vrf <vrf id>`

Specifies the target VRF.

1. Default value when this parameter is omitted:

Specifies the global network.

2. Range of values:

See *Specifiable values for parameters*.

`default`

The group address to be used for IPv6 PIM-SSM is ff30::/12 (the group address is ff30::, and the mask length is 12).

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

`range <access list name>`

Specifies an access list for the group addresses to be used for IPv6 PIM-SSM.

1. Default value when this parameter is omitted:

This parameter cannot be omitted.

2. Range of values:

Specify an access list name of no more than 31 characters.

For details, see *Specifiable values for parameters*.

Default behavior

None

Impact on communication

None

When the change is applied

The change is applied immediately after the setting value is changed.

Notes

1. Specify a single group address for the access list. If multiple group addresses are specified,

which group address is to be used is undefined.

2. For details about addresses that cannot be specified in the access list, see *26.3.1 Addresses not subject to IPv6 multicast forwarding* in the manual *Configuration Guide Vol. 3 For Version 12.1*.
3. For *<access list name>*, specify access lists that were set by using the `ipv6 access-list` command. Access lists that have been set by using commands other than this command cannot be specified.
4. If an access list that has not been set is specified, this command is not valid.
5. For the access-list address specified in *<access list name>*, use the destination IPv6 address of the corresponding access list.

Related commands

```
ipv6 pim  
ipv6 access-list
```


Chapter

25. Error Messages Displayed When Editing the Configuration

- 25.1 Common errors
- 25.2 Errors when specifying IPv4, ARP, or ICMP settings
- 25.3 Errors when specifying IPv6, NDP, or ICMPv6 settings
- 25.4 Errors when specifying VRF settings
- 25.5 Errors when specifying uRPF settings
- 25.6 Errors when specifying policy-based routing settings
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- 25.8 Errors when specifying the DHCP/BOOTP relay agent settings
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- 25.10 Errors when specifying VRRP settings
- 25.11 Errors when specifying route summarization settings
- 25.12 Errors when specifying static routing settings
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25.1 Common errors

For details about error messages that are common to all functionality, see *17.1 Common errors* in the manual *Configuration Command Reference Vol. 1 For Version 12.1*.

25.2 Errors when specifying IPv4, ARP, or ICMP settings

Table 25-1: Error messages displayed when specifying IPv4, ARP, or ICMP settings

Message	Description
A network address is duplicated.	An IPv4 address that is of the same network address or that is in an inclusive relationship is set. Set the IPv4 address so that all network addresses are unique.
A secondary IP address cannot be set on an interface that does not have a primary IP address.	An attempt is being made to set a secondary IP address on an interface on which a primary IP address is not set. Set a primary IP address first.
An IP address cannot be assigned to a loopback interface for which a VRF ID is not set.	An IPv4 address cannot be assigned to a loopback interface for which the VRF ID is not set. Specify the VRF ID for the loopback interface.
An IP address cannot be set because a channel-group is already set.	The IPv4 address cannot be set because it is already set as a channel group. To use the IPv4 address as a port channel interface, assign the IPv4 address to the port channel interface. To use the IPv4 address as an Ethernet interface, delete it from the channel group, and then set the IPv4 address.
An IP address cannot be set because subinterface configuration has already been set.	The IPv4 address cannot be set because a subinterface configuration exists. Delete the stack-related configuration.
An IP address cannot be set because VLAN ID has not set.	The IPv4 address cannot be set because no VLAN ID is set for the subinterface. To set the IPv4 address in subinterface mode, first set the VLAN ID for the <code>encapsulation dot1q</code> command.
An IP address is duplicated in the interface and in a static ARP entry.	An address set by using IP information and an address set by using ARP information are duplicated. Set addresses that do not duplicate each other.
An IP address is duplicated.	The same IPv4 address is set. Make sure that all IPv4 addresses are unique.
The following items conflict: addresses in the IP information and in the ARP information.	There is an inconsistency between the network addresses of an address set in the IP information and an address set in the ARP information. Specify the network addresses correctly.
The following items conflict: the IP address and the default peer IP address.	The relationship between the IPv4 address and the destination IPv4 address is inconsistent. Check the specified address again.
The following items conflict: the IP address and the local address.	The relationship between the IPv4 address and the local address is inconsistent. Specify an IPv4 address that is different from the local address.
The following items conflict: the IP address and the target address in the virtual router configuration.	The relationship between the IPv4 address and the virtual IP address of the virtual router is inconsistent. Check the specified address again.
The IP address cannot be changed because the following items conflict: the IP address and the IPv4 policy-based routing list configuration.	The IPv4 address cannot be changed for one of the following reasons: <ul style="list-style-type: none"> Due to a change to the IPv4 address, the changed IPv4 address and the next-hop address that is set in the IPv4 policy-based routing list are not on the same network. When the IPv4 address is changed, the next hop address that is set for the IPv4 policy-based routing list becomes the direct broadcast address of the network connecting to the specified destination interface. To change the IPv4 address, first delete the next-hop address in the relevant IPv4 policy-based routing list.

Message	Description
The IP address cannot be deleted because the following items conflict: the IP address and the IPv4 policy-based routing list configuration.	The IPv4 address cannot be deleted because the relevant IPv4 address is specified as the next-hop address in the IPv4 policy-based routing list. To delete the IPv4 address, first delete the next hop address in the relevant IPv4 policy-based routing list.
The IP address cannot be deleted from the interface because there is an access list or a QoS flow list including the 'own-prefix' parameter or the 'own-address' parameter.	The IPv4 address cannot be deleted from the interface because a QoS flow list or access list that includes the <code>own-prefix</code> parameter or <code>own-address</code> parameter is applied. An IPv4 access list, Advance access list, IPv4 QoS flow list, or Advance QoS flow list that specifies the <code>own-prefix</code> parameter and <code>own-address</code> parameter for the target interface is applied. Deleting the application of the IPv4 access list, Advance access list, IPv4 QoS flow list, or Advance QoS flow list from the target interface, and then delete the IPv4 address.
The IP configuration cannot be deleted because an NTP broadcast configuration has been set.	NTP broadcast information exists. Delete the NTP broadcast information, and then delete the IP information.
The IP configuration cannot be deleted because the ARP configuration has been set.	ARP information exists. Delete the ARP information, and then delete the IP information.
The IP information cannot be deleted because it is referenced by a virtual router configuration.	Virtual router information exists. Delete the virtual router information, and then delete the IP information.
The IP subnetmask cannot be changed because an NTP broadcast configuration has been set.	NTP broadcast information exists. Delete the NTP broadcast information, and then change the IP subnet information.
The number of IP addresses exceeds the maximum.	No more IPv4 addresses can be set. Check the network configuration again.
The number of primary IP addresses exceeds the maximum.	No more primary IP addresses can be set. Check the network configuration again.
The primary IP address cannot be deleted because a secondary IP address has been set.	A secondary IP address exists. Delete the secondary IP address, and then delete the primary IP address.
The static ARP cannot be deleted because an entry assigned to the same IP address exists.	The static ARP entry cannot be deleted because a static ARP entry that has the same IPv4 address exists. When a static ARP entry that has the same IPv4 address exists, specify the static ARP entry to be deleted including the interface.
The VRF ID for a loopback interface that has an assigned IP address cannot be added, changed, or deleted.	The VRF ID of a loopback interface for which an IPv4 address has been set cannot be added, changed or deleted. Delete the IPv4 address of the loopback interface.
The VRF ID for an interface that has an assigned IP address cannot be added, changed, or deleted.	The VRF ID of an interface for which an IPv4 address has been set cannot be added, changed or deleted. Delete the IPv4 address of the interface.
The VRF ID of another loopback interface is duplicated.	The VRF ID duplicates the VRF ID of another loopback interface. Specify a unique VRF ID.
This IPv4 address cannot be set to this interface because this IPv4 address is specified as a destination IPv4 address of the access list specified by IPv4 policy-based routing.	This IPv4 address is specified as the destination IPv4 address for a flow detection condition for the access list that specifies IPv4 policy-based routing. Therefore, this IPv4 address cannot be used for the interface. An Advance access list or IPv4 access list that specifies an IPv4 policy-based routing entry for the interface is applied. The same IPv4 address as the destination IPv4 address that is specified as a flow detection condition for the access list cannot be used for the interface. Delete the application of the IPv4 access list and Advance access list from the target interface, and then set the IPv4 address.

25.3 Errors when specifying IPv6, NDP, or ICMPv6 settings

Table 25-2: Error messages displayed when specifying IPv6, NDP, or ICMPv6 settings

Message	Description
A configuration referenced by the IPv6 policy-based routing list configuration cannot be deleted.	The IPv6 address cannot be disabled because it is assigned to the destination interface in the IPv6 policy-based routing list settings. To disable the IPv6 address, first delete the next-hop address in the relevant IPv6 policy-based routing list.
A prefix is duplicated.	An IPv6 address that has the same prefix or that is in an inclusive relationship is set. Set the IPv6 address so that all prefixes are unique.
A static NDP cannot be deleted because an entry assigned to the same IPv6 address exists.	The static NDP entry cannot be deleted because a static NDP entry that has the same IPv6 address exists. When a static NDP entry that has the same IPv6 address exists, specify the static NDP entry to be deleted including the interface.
An IPv6 address cannot be assigned to a loopback interface for which a VRF ID is not set.	An IPv6 address cannot be assigned to a loopback interface for which the VRF ID is not set. Specify the VRF ID for the loopback interface.
An IPv6 address cannot be set because a channel-group is already set.	The IPv6 address cannot be set because it is already set as a channel group. To use the IPv6 address as a port channel interface, assign the IPv6 address to the port channel interface. To use the IPv6 address as an Ethernet interface, delete it from the channel group, and then set the IPv6 address.
An IPv6 address cannot be set because subinterface configuration has already been set.	The IPv6 address cannot be set because a subinterface configuration exists. Delete the subinterface configuration.
An IPv6 address cannot be set because VLAN ID has not set.	The IPv6 address cannot be set because no VLAN ID is set for the subinterface. To set the IPv6 address in subinterface mode, first set the VLAN ID for the encapsulation dot1q command.
An IPv6 address is duplicated in the interface and in a static NDP entry.	An address set by using IP information and an address set by using NDP information are duplicated. Set addresses that do not duplicate each other.
An IPv6 address is duplicated.	The same IPv6 address is set. Make sure that all IPv6 addresses are unique.
The following items conflict: the IPv6 address and the local address.	The relationship between the IPv6 address and the local address is inconsistent. Specify an IPv6 address that is different from the local address.
The following items conflict: the IPv6 address and the NDP information.	There is an inconsistency between the address prefixes of an address set in the IP information and an address set in the NDP information. Specify the address prefixes correctly.
The following items conflict: the IPv6 address and the target address in the virtual router configuration.	The relationship between the IPv6 address and the virtual IP address of the virtual router is inconsistent. Check the specified address again.

Message	Description
The interface cannot have more than one IPv6 address because there is an access list or a QoS flow list including the 'own-prefix' parameter or the 'own-address' parameter.	Multiple IPv6 addresses cannot be assigned to the interface because a QoS flow list or access list that includes the <code>own-prefix</code> parameter or <code>own-address</code> parameter is applied. An IPv6 access list, Advance access list, IPv6 QoS flow list, or Advance QoS flow list that specifies the <code>own-prefix</code> parameter and <code>own-address</code> parameter for the target interface is applied. Delete the application of the IPv6 access list, Advance access list, IPv6 QoS flow list, or Advance QoS flow list from the target interface, and then add the IPv6 address.
The IP address cannot be changed because the following items conflict: the IP address and the IPv6 policy-based routing list configuration.	The IPv6 address cannot be changed because the next-hop address that is set in the IPv6 policy-based routing list is not on the same network. To change the IPv6 address, first delete the next-hop address in the relevant IPv6 policy-based routing list.
The IP address cannot be deleted because the following items conflict: the IP address and the IPv6 policy-based routing list configuration.	The IPv6 address cannot be deleted because the relevant IPv6 address is specified as the next-hop address in the IPv6 policy-based routing list. To delete the IPv6 address, first delete the next-hop address in the relevant IPv6 policy-based routing list.
The IPv6 address cannot be deleted from the interface because there is an access list or a QoS flow list including the 'own-prefix' parameter or the 'own-address' parameter.	The IPv6 address cannot be deleted from the interface because a QoS flow list or access list that includes the <code>own-prefix</code> parameter or <code>own-address</code> parameter is applied. An IPv6 access list, Advance access list, IPv6 QoS flow list, or Advance QoS flow list that specifies the <code>own-prefix</code> parameter and <code>own-address</code> parameter for the target interface is applied. Delete the application of the IPv6 access list, Advance access list, IPv6 QoS flow list, or Advance QoS flow list from the target interface, and then delete the IPv6 address.
The IPv6 configuration cannot be deleted because the NDP configuration has been set.	NDP information exists. Delete the NDP information, and then delete the IP information.
The IPv6 information cannot be deleted because it is referenced by a virtual router configuration.	Virtual router information exists. Delete the virtual router information, and then delete the IP information.
The number of IPv6 addresses exceeds the maximum.	No more IPv6 addresses can be set. Check the network configuration again.
The number of linklocal addresses exceeds the maximum.	No more link-local addresses can be set. Check the network configuration again.
The VRF ID of a loopback interface that has an assigned IPv6 address cannot be added, changed, or deleted.	The VRF ID of a loopback interface for which an IPv6 address is set cannot be added, changed or deleted. Delete the IPv6 address of the loopback interface.
The VRF ID of an interface that has an assigned IPv6 address cannot be added, changed, or deleted.	The VRF ID of an interface for which an IPv6 address is set cannot be added, changed or deleted. Delete the <code>ipv6 enable</code> and <code>ipv6 address</code> commands of the interface.
This IPv6 address cannot be set to this interface because this IPv6 address is specified as a destination IPv6 address of the access list specified by IPv6 policy-based routing.	This IPv6 address is specified as the destination IPv6 address for a flow detection condition for the access list that specifies IPv6 policy-based routing. Therefore, this IPv6 address cannot be used for the interface. An Advance access list or IPv6 access list that specifies an IPv6 policy-based routing entry for the interface is applied. The same IPv6 address as the destination IPv6 address that is specified as a flow detection condition for the access list cannot be used for the interface. Delete the application of the IPv6 access list and Advance access list from the target interface, and then set the IPv6 address.

25.4 Errors when specifying VRF settings

Table 25-3: Error messages displayed when specifying VRF settings

Message	Description
The VRF ID cannot be changed because a reference to this interface exists in another configuration.	The VRF cannot be changed because a reference to this interface exists in other configurations. Delete all references to this interface that exist in other configurations.

25.5 Errors when specifying uRPF settings

Table 25-4: Error messages displayed when specifying uRPF settings

Message	Description
The following items conflict: the uRPF modes of IPv4 and IPv6.	The uRPF operating mode is inconsistent between IPv4 and IPv6. Assign the same uRPF operating mode.
The uRPF functionality cannot be used because the maximum number of ECMP paths exceeds the maximum that can be set when the uRPF functionality is used.	The uRPF functionality cannot be used because the maximum number of paths set exceeds the maximum number of paths that can be set when the uRPF functionality is in use. To use the uRPF functionality, set the maximum number of paths to a number that is equal to or less than 8.

25.6 Errors when specifying policy-based routing settings

Table 25-5: Error messages displayed when specifying policy-based routing settings

Message	Description
The IPv4 policy-based routing list cannot be set because the specified interface is invalid.	The destination interface for the IPv4 policy-based routing list cannot be set for one of the following reasons: <ul style="list-style-type: none"> The specified destination interface does not exist. No IPv4 address is specified for the specified destination interface. Resolve the issue, and then retry the configuration.
The IPv4 policy-based routing list cannot be set because the specified next-hop address is invalid.	The specified next-hop address cannot be used because it is not supported by the IPv4 policy-based routing list. For the next-hop address, specify a host address in the network that connects to the specified destination interface. However, you cannot specify a direct broadcast address of a network that is connected to the specified destination interface.
The IPv6 policy-based routing list cannot be set because the specified interface is invalid.	The destination interface for the IPv6 policy-based routing list cannot be set for one of the following reasons: <ul style="list-style-type: none"> The specified destination interface does not exist. IPv6 functionality is not enabled for the specified destination interface. Resolve the issue, and then retry the configuration.
The IPv6 policy-based routing list cannot be set because the specified next-hop address is invalid.	The specified next-hop address cannot be used because it is not supported by the IPv6 policy-based routing list. For the next-hop address, specify a host address in the network that connects to the specified destination interface.
The number of 'ip policy-list' entries exceeds the maximum.	The number of entries in the IPv4 policy-based routing list exceeds the capacity limit.
The number of 'ipv6 policy-list' entries exceeds the maximum.	The number of entries in the IPv6 policy-based routing list exceeds the capacity limit.
The number of 'policy-interface' entries exceeds the maximum.	The number of next-hop addresses in the policy-based routing list exceeds the capacity limit.
The policy-based routing list cannot be deleted because the following items conflict: the policy-based routing list and the access-list configuration.	The specified policy-based routing list cannot be deleted because it is being used in the access list. To delete the specified policy-based routing list, first delete the relevant policy-based routing list from the access list.
The priority number exceeds the maximum value.	The priority exceeds the maximum value. To set the next-hop address, first execute the <code>ip policy-list rearrange</code> command or <code>ipv6 policy-list rearrange</code> command, and then try again.

25.7 Errors when specifying RA settings

Table 25-6: Error messages displayed when specifying RA settings

Message	Description
An RA prefix is duplicated or overlapped with other RA prefixes on the interfaces.	Either the same prefix is already in use, or the prefix is included in another prefix.
The 'ra-interval' maximum value (<second> sec.) must not exceed the 'preferred-lifetime' value (<second> sec.).	The preferred lifetime value sent by router advertisement is set to a smaller value than the maximum RA sending interval. Adjust the preferred lifetime value sent by router advertisement so that it is larger than the maximum RA sending interval.
The 'ra-interval' maximum value (<second> sec.) must not exceed the 'valid-lifetime' value (<second> sec.).	The valid lifetime value sent by router advertisement is set to a smaller value than the maximum RA sending interval. Adjust the valid lifetime value sent by router advertisement so that it is larger than the maximum RA sending interval.
The 'ra-interval' maximum value (<second> sec.) must not exceed the period of router advertisement validity (<second> sec.).	The valid time of the default route for terminals sent by router advertisement is set to a smaller value than the maximum RA sending interval. Adjust the valid time of the default route for terminals sent by router advertisement so that it is larger than the maximum RA sending interval.
The 'ra-interval' minimum value (<second> sec.) must not exceed 75% of the 'ra-interval' maximum value (<second> sec.).	The minimum value of the RA sending interval exceeded 75% of the maximum value.
The following items conflict: the IPv6 prefix and the prefix length. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The number of RA prefixes exceeds the permitted maximum (7).	The number of specified prefixes exceeds the permitted maximum number. Make sure that the number of prefixes is within the limit of seven.

25.8 Errors when specifying the DHCP/BOOTP relay agent settings

Table 25-7: Error messages displayed when specifying the DHCP/BOOTP relay agent settings

Message	Description
A DHCP/BOOTP server address is already configured on the interface.	The IPv4 address of the DHCP or BOOTP server of the interface is duplicated. Use a different IPv4 address for the DHCP or BOOTP server of the interface.
No IP address is configured on the interface.	No IPv4 address is set for the interface. Specify an IPv4 address for the interface.
The DHCP/BOOTP relay agent address (giaddr) does not match any of the IP addresses on the interface.	The DHCP/BOOTP relay agent IP address (giaddr) does not match any of the IPv4 addresses of the interface. Specify a DHCP/BOOTP relay agent IP address (giaddr) that matches one of the IPv4 addresses of the interface.
The IP address cannot be deleted because a DHCP/BOOTP relay agent is already configured on the interface.	The IPv4 address cannot be deleted because a DHCP/BOOTP relay agent is already set for the interface. Delete the DHCP/BOOTP relay agent from the interface.
The number of the DHCP/BOOTP servers exceeds the maximum.	The number of IPv4 addresses on the DHCP and BOOTP server exceeds the maximum limit. Check the network configuration again.

25.9 Errors when specifying the DHCPv6 relay agent settings

Table 25-8: Error messages displayed when specifying the DHCPv6 relay agent settings

Message	Description
An IPv6 address is not configured on the interface.	No IPv6 address is set for the interface. Specify an IPv6 address for the interface.
An IPv6 address of the DHCPv6 server is already configured on the interface.	The IPv6 address of the DHCPv6 server of the interface is duplicated. Use a different IPv6 address for the IPv6 address of the DHCPv6 server of the interface.
The IPv6 address cannot be deleted because a DHCPv6 relay agent is already configured on the interface.	The IPv6 address cannot be deleted because a DHCPv6 relay agent is already set for the interface. Delete the DHCPv6 relay agent from the interface.
The number of the DHCPv6 servers exceeds the maximum.	The number of IPv6 addresses on the DHCPv6 server exceeds the maximum limit. Check the network configuration again.

25.10 Errors when specifying VRRP settings

Table 25-9: Error messages displayed when specifying VRRP settings

Message	Description
A Follow virtual router cannot become the address owner.	A follower virtual router cannot be the address owner. When assigning an IP address to the interface or a virtual IP address to the follower virtual router, or when setting a following primary virtual router, make sure that the follower virtual router does not become the address owner.
In the accept mode, the network prefix of the VRRP virtual IP address differs from the network prefix of the actual IP address.	The network addresses of the VRRP virtual and real IP addresses are different. When specifying accept mode or if accept mode has already been specified, virtual and real IP network addresses must match.
In the accept mode, the network prefix of the VRRP virtual IPv6 address differs from the network prefix of the actual IPv6 address.	The network prefixes of the VRRP virtual and real IPv6 addresses are different. When specifying accept mode or if accept mode has already been specified, the network prefixes of the virtual and real IPv6 addresses must match.
The number of primary virtual routers exceeds the maximum.	The number of primary virtual routers exceeds the maximum limit.
The virtual router cannot follow a Follow virtual router.	The follower virtual router cannot be followed. As the follower virtual router, do not use the virtual router specified as the primary virtual router.
The virtual router IP address cannot be set because another IP address is already set for a different address family.	The virtual IP address cannot be set because a virtual IP address of a different address family has already been set. Check the virtual IP address settings.
The virtual router IPv6 address is invalid.(IPv6 address = <valueI>)	The virtual IPv6 address is invalid. Check the virtual IP address.
	<valueI>: Virtual IPv6 address
This mode cannot be set for the address family of this virtual router.	This mode is not available for the address family of the current virtual router. Check the specified mode.

25.11 Errors when specifying route summarization settings

Table 25-10: Error messages displayed when specifying route summarization settings

Message	Description
The following items conflict: the IPv4 prefix and the mask. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The following items conflict: the IPv6 prefix and the prefix length. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.

25.12 Errors when specifying static routing settings

Table 25-11: Error messages displayed when specifying static routing settings

Message	Description
The following items conflict: the IPv4 prefix and the mask. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The following items conflict: the IPv6 prefix and the prefix length. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The value specified for the maximum number of IPv4 static paths cannot be set because the uRPF functionality is being used, and the specified value exceeds the maximum that can be set when the uRPF functionality is being used.	Because the uRPF functionality is in use, the maximum number of IPv4 static paths cannot exceed the maximum number of paths that can be set when the uRPF functionality is in use.
The value specified for the maximum number of IPv6 static paths cannot be set because the uRPF functionality is being used, and the specified value exceeds the maximum that can be set when the uRPF functionality is being used.	Because the uRPF functionality is in use, the maximum number of IPv6 static paths cannot exceed the maximum number of paths that can be set when the uRPF functionality is in use.

25.13 Errors when specifying RIP or RIPng settings

Table 25-12: Error messages displayed when specifying RIP or RIPng settings

Message	Description
The following items conflict: the IPv4 prefix and the wildcard masked bits. The wildcard masked bits must be zero.	1 is set for the wildcard mask bits of the specified prefix. Set 0 for the wildcard mask bits.

25.14 Errors when specifying OSPF or OSPFv3 settings

Table 25-13: Error messages displayed when specifying OSPF or OSPFv3 settings

Message	Description
The area is already configured as a stub area.	The area is configured as a stub area. Configure an NSSA after deleting the stub area by using the <code>no area stub</code> command.
The area is already configured as an NSSA.	The area is configured as an NSSA. Configure a stub area after deleting the NSSA by using the <code>no area nssa</code> command.
The area network range value is invalid. (prefix/mask = <IPv4-Prefix>/<Mask>)	An invalid value (0.0.0.0) is specified for the network range of the area. Make sure that the <Mask> range of <IPv4-Prefix> is not 0.0.0.0. <IPv4-Prefix>: Specified network <Mask>: Specified mask
The area network range value is invalid. (prefix/prefix length = <Prefix>/<Prefixlen>)	An invalid value (::/0) is specified for the network range of the area. Make sure that the <Prefixlen> range of <Prefix> is not ::/0. <Prefix>: Specified prefix <Prefixlen>: Specified prefix length
The following items conflict: the IPv4 prefix and the mask. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The following items conflict: the IPv4 prefix and the wildcard masked bits. The wildcard masked bits must be zero.	1 is set for the wildcard mask bits of the specified prefix. Set 0 for the wildcard mask bits.
The following items conflict: the IPv6 prefix and the prefix length. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The number of domain entries exceeds the maximum.	The number of domain entries that can be assigned to the global network has reached the limit. Specify the existing domain number for the <code>router ospf</code> command.
The number of domain entries for the VRF <value> exceeds the maximum.	The number of domain entries that can be assigned to a network with <value> as VRF ID has reached the limit. Specify the existing domain number for the <code>router ospf</code> command. <value>: VRF ID
The router ID of a neighbor in a virtual link and the source router ID must be different.	The source router ID and the neighbor router ID of a virtual link must be different. Specify a different value from the source router ID.
The value specified for the maximum number of OSPF paths cannot be set because the uRPF functionality is being used, and the specified value exceeds the maximum that can be set when the uRPF functionality is being used.	Because the uRPF functionality is in use, the maximum number of OSPF paths cannot exceed the maximum number of paths that can be set when the uRPF functionality is in use.
The value specified for the maximum number of OSPFv3 paths cannot be set because the uRPF functionality is being used, and the specified value exceeds the maximum that can be set when the uRPF functionality is being used.	Because the uRPF functionality is in use, the maximum number of OSPFv3 paths cannot exceed the maximum number of paths that can be set when the uRPF functionality is in use.

25. Error Messages Displayed When Editing the Configuration

Message	Description
Virtual links cannot be assigned to a stub area.	Because a stub area is set, the area cannot be specified as an area through which a virtual link passes. Do not specify the area as an area through which a virtual link passes.
Virtual links cannot be assigned to an NSSA.	Because an NSSA is set, the area cannot be specified as an area through which a virtual link passes. Do not specify the area as an area through which a virtual link passes.

25.15 Errors when specifying BGP4 or BGP4+ settings

Table 25-14: Error messages displayed when specifying BGP4 or BGP4+ settings

Message	Description
'neighbor always-nexthop-self' is specified for an external peer or peer group. Specify it only for an internal peer or peer group.	The <code>neighbor always-nexthop-self</code> command is specified for an external peer or a peer between member ASs, or a peer group of external peers and peers between member ASs. Specify the <code>neighbor always-nexthop-self</code> command for an internal peer or a peer group of internal peers.
'neighbor as-override' is not supported for this peer or peer group type.	The <code>neighbor as-override</code> command is specified for an internal peer or the peer group of internal peers. Specify the <code>neighbor as-override</code> command for an external peer or a peer between member ASs, and the peer group of external peers or the peer group of peers between member ASs.
'neighbor ebgp-multihop' is not supported for this peer or peer group type.	The <code>neighbor ebgp-multihop</code> command is specified for an internal peer or a peer group of internal peers. Specify the <code>neighbor ebgp-multihop</code> command for an external peer or a peer between member ASs, and the peer group of external peers and peers between member ASs.
'neighbor permit-asloop' is not supported for this peer or peer group type.	The <code>neighbor permit-asloop</code> command is specified for an internal peer or the peer group of internal peers. Specify the <code>neighbor permit-asloop</code> command for an external peer or a peer between member ASs, and the peer group of external peers or the peer group of peers between member ASs.
'neighbor remote-as' cannot be set because it is already set for a peer or peer group.	The <code>neighbor remote-as</code> command cannot be set. It is already being set for a peer group or a peer belonging to a peer group.
'neighbor remove-private-as' is not supported for this peer or peer group type.	The <code>neighbor remove-private-as</code> command is specified for an internal peer or the peer group of internal peers. Specify the <code>neighbor remove-private-as</code> command for an external peer or a peer between member ASs, and the peer group of external peers or the peer group of peers between member ASs.
'neighbor route-reflector-client' is specified for an external peer or peer group. Specify it only for an internal peer or peer group.	The <code>neighbor route-reflector-client</code> command is specified for an external peer or a peer between member ASs, or the peer group of external peers and peers between member ASs. Specify the <code>neighbor route-reflector-client</code> command for an internal peer or the peer group of internal peers.
If 'all-as' is specified for 'maximum-paths', 'bgp always-compare-med' must be set.	To specify multipath by using the <code>maximum-paths</code> command with the <code>all-as</code> parameter, you need to set the <code>bgp always-compare-med</code> command first. To specify multipath by using the <code>maximum-paths</code> command with the <code>all-as</code> parameter, set the <code>bgp always-compare-med</code> command first.
Members of a peer group must be all BGP4 or all BGP4+.	BGP4 and BGP4+ cannot be set to the same peer group. Set BGP4 and BGP4+ to different peer groups.
Members of a peer group must be all internal peers or all external peers.	Internal peers and external peers cannot be set in the same group. Set internal peers and external peers in different groups.
Only one of 'keepalive' or 'holdtime' is set to 0. Set both of them to 0.	Only one side of the interval for sending KEEPALIVE messages and the hold time value is specified to 0. If you specify 0, specify both of the values as 0.
Set a graceful restart ('bgp graceful-restart mode') before the restart time ('bgp graceful-restart restart-time').	The <code>bgp graceful-restart mode</code> command is not set. Set the <code>bgp graceful-restart mode</code> command, and then the <code>bgp graceful-restart restart-time</code> command.

25. Error Messages Displayed When Editing the Configuration

Message	Description
Set a graceful restart ('bgp graceful-restart mode') before the stalepath time ('bgp graceful-restart stalepath-time').	The <code>bgp graceful-restart mode</code> command is not set. Set the <code>bgp graceful-restart mode</code> command, and then the <code>bgp graceful-restart stalepath-time</code> command.
The 'keepalive' timer value must be less than the 'holdtime' value.	The interval for sending KEEPALIVE messages is larger than the hold timer. Specify a value which is smaller than the hold timer for the interval for sending KEEPALIVE messages.
The 'max-suppress-time' value must be greater than the 'half-life' value.	The value of <code>Max-suppress-time</code> is equal to or less than the value of <code>Half-life</code> . Specify a value for <code>Max-suppress-time</code> value that is greater than the value of <code>Half-life</code> .
The 'suppress' value must be greater than the 'reuse' value.	The value of <code>Suppress</code> is equal to or less than the value of <code>Reuse</code> . Specify the <code>Suppress</code> value as larger than the <code>Reuse</code> value.
The following items conflict: the IPv4 prefix and the mask. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The following items conflict: the IPv6 prefix and the prefix length. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The mask length is invalid. The mask length specified with 'le' must be equal to or greater than that of the specified prefix. The mask length specified with 'ge' must not be greater than that specified with 'le'.	The specified range of the mask length of the <code>network</code> command is invalid. <ul style="list-style-type: none"> Make sure that the mask length specified with <code>le</code> is equal to or longer than that of the specified prefix. Make sure that the mask length specified with <code>ge</code> is equal to or shorter than that of the mask length specified with <code>le</code>.
The peer option is link-local addresses, but an internal peer does not support link-local address peers.	A link-local address is set for the peer address of the internal peer. Set a global address for the peer address of the internal peer.
The specified member AS number is the same as the confederation AS number.	The specified member AS number is the same as the AS number of a confederation. Do not specify the AS number of a confederation for the member AS number.
The specified member AS number is the same as the self-member AS number.	The specified member AS number is the same as the self member AS number. Do not specify the self member AS number for the member AS number.
The value specified for the maximum number of BGP4 paths cannot be set because the uRPF functionality is being used, and the specified value exceeds the maximum that can be set when the uRPF functionality is being used.	Because the uRPF functionality is in use, the maximum number of BGP4 paths cannot exceed the maximum number of paths that can be set when the uRPF functionality is in use.
The value specified for the maximum number of BGP4+ paths cannot be set because the uRPF functionality is being used, and the specified value exceeds the maximum that can be set when the uRPF functionality is being used.	Because the uRPF functionality is in use, the maximum number of BGP4+ paths cannot exceed the maximum number of paths that can be set when the uRPF functionality is in use.

25.16 Errors when specifying route filtering settings

Table 25-15: Error messages displayed when specifying route filtering settings

Message	Description
'access-list' and 'prefix-list' cannot both be specified in 'match ip address'.	access-list and prefix-list cannot both be specified for match ip address. Specify either access-list or prefix-list for match ip address.
	access-list and prefix-list cannot both be specified for match ipv6 address. Specify either access-list or prefix-list for match ipv6 address.
	access-list and prefix-list cannot both be specified for match ip route-source. Specify either access-list or prefix-list for match ip route-source.
	access-list and prefix-list cannot both be specified for match ipv6 route-source. Specify either access-list or prefix-list for match ipv6 route-source.
The 'permit'/'deny' setting cannot be changed.	The permit/deny setting cannot be changed. Delete the entry, and then add the new entry.
The following items conflict: the IPv4 prefix and the mask. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The following items conflict: the IPv6 prefix and the prefix length. Non-masked bits must be zero.	1 is set for the unmasked bits of the specified prefix. Set 0 for the unmasked bits.
The IP community list type is already configured as a different type.	The specified ip community-list type is different from the type that has already been specified. Make sure that the ip community-list type matches the type that has already been specified.
The mask length is invalid. The mask length specified with 'ge' must not be longer than that specified with 'le'.	The specified range of the mask length is invalid. Make sure that the mask length specified with ge is equal to or shorter than that of the mask length specified with le.
	The specified range of the prefix length is invalid. Make sure that the prefix length specified with ge is equal to or shorter than that of the prefix length specified with le.
The mask length is invalid. The mask length specified with 'le' must be equal to or greater than that of the specified prefix.	The specified range of the mask length is invalid. Make sure that the mask length specified with le is equal to or longer than that of the specified prefix.
	The specified range of the prefix length is invalid. Make sure that the prefix length specified with le is equal to or longer than that of the specified prefix.
The number of specified tag values must not exceed 16.	More than 16 tag values cannot be specified for match tag. Tag values to be specified for match tag must be within 16.
The sequence number exceeds the maximum value. Specify a sequence number.	Because the sequence number exceeds the upper limit, it cannot be omitted. Do not omit the sequence number.

25. Error Messages Displayed When Editing the Configuration

Message	Description
The total number of 'access-list' and 'prefix-list' specifications must not exceed 16.	More than 16 <code>access-list</code> or <code>prefix-list</code> items cannot be specified for <code>match ip address</code> . Make sure that 16 or fewer <code>access-list</code> or <code>prefix-list</code> items are specified for <code>match ip address</code> .
	More than 16 <code>access-list</code> or <code>prefix-list</code> items cannot be specified for <code>match ipv6 address</code> . Make sure 16 or fewer <code>access-list</code> or <code>prefix-list</code> items are specified for <code>match ipv6 address</code> .
	More than 16 <code>access-list</code> or <code>prefix-list</code> items cannot be specified for <code>match ip route-source</code> . Make sure that 16 or fewer <code>access-list</code> or <code>prefix-list</code> items are specified for <code>match ip route-source</code> .
	More than 16 <code>access-list</code> or <code>prefix-list</code> items cannot be specified for <code>match ipv6 route-source</code> . Make sure that 16 or fewer <code>access-list</code> or <code>prefix-list</code> items are specified for <code>match ipv6 route-source</code> .
The total number of 'ip as-path access-list' specifications in 'match as-path' must not exceed 16.	More than 16 <code>ip as-path access-list</code> items are specified for <code>match as-path</code> . Make sure that the number of <code>ip as-path access-list</code> specified for <code>match as-path</code> does not exceed 16.
The total number of community-list specifications in 'match community' must not exceed 16.	More than 16 <code>ip community-list</code> items are specified for <code>match community</code> . Make sure that the number of <code>ip community-list</code> specified for <code>match community</code> does not exceed 16.
The total number of interface specifications must not exceed 16.	More than 16 interfaces cannot be specified for <code>match interface</code> . Interfaces to be specified for <code>match interface</code> must be within 16.
The total number of specified protocols must not exceed 16.	More than 16 protocols cannot be specified for <code>match protocol</code> . Specify 16 or fewer protocols for <code>match protocol</code> .
The total number of specified VRFs must not exceed 16.	More than 16 VRFs cannot be specified for <code>match vrf</code> . Specify 16 or fewer VRFs for <code>match vrf</code> .

25.17 Errors when specifying IPv4 and IPv6 multicast routing settings

Table 25-16: Error messages displayed when specifying IPv4 and IPv6 multicast routing settings

Message	Description
The group-list has already been used as a candidate Rendezvous Point list of IPv4 multicast.	The specified group list is already in use as a group list for the rendezvous point candidate setting.
The group-list has already been used as a candidate Rendezvous Point list of IPv6 multicast.	The specified group list is already in use as a group list for the rendezvous point candidate setting.
The number of IPv4 multicast interfaces exceeds the maximum specified by 'ip pim max-interface'.	The total number of multicast interfaces exceeds the configurable number of interfaces that is defined by the value specified by using the <code>ip pim max-interface</code> command. Revise the total number of multicast interfaces so that it is within the range of the configurable number of interfaces that is defined by the value specified by using the <code>ip pim max-interface</code> command.
The number of IPv6 multicast interfaces exceeds the maximum specified by 'ipv6 pim max-interface'.	The total number of multicast interfaces exceeds the configurable number of interfaces that is defined by the value specified by using the <code>ipv6 pim max-interface</code> command. Revise the total number of multicast interfaces so that it is within the range of the configurable number of interfaces that is defined by the value specified by using the <code>ipv6 pim max-interface</code> command.
The number of static IGMP joins exceeds the maximum in the interface.	The number of static group joins per interface exceeds the maximum. Revise the number of static group joins so that it is within the limit.
The number of static MLD joins exceeds the maximum in the interface.	The number of static group joins per interface exceeds the maximum. Revise the number of static group joins so that it is within the limit.

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