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Chapter 1 Commands for Routing Policy

Explanation:

The layer 3 switch in this chapter represents the a general sense of router or wireless controller which is running routing protocol.

1.1 ip prefix-list description

Command: ip prefix-list <list_name> description <description>

no ip prefix-list <list_name> description

Function: Configure the description of the prefix-list. The “no ip prefix-list <list_name> description” command deletes the description contents.

Parameter: <list_name> is the name of the prefix-list; <description> is the description contents.

Default: None.

Command Mode: Global Mode

Usage Guide: This command can be used for explaining and describing a prefix-list, e.g. the application and attention matters of the prefix-list.

Example:

```
Switch#config terminal
```

```
Switch(config)#ip prefix-list 3 description This list is used by BGP
```

1.2 ip prefix-list seq

Command: ip prefix-list <list_name> [seq <sequence_number>] <deny | permit> <any | ip_addr/mask_length [ge <min_prefix_len>] [le <max_prefix_len>]>

no ip prefix-list <list_name> [seq <sequence_number>] [<deny | permit> <any | ip_addr/mask_length [ge <min_prefix_len>] [le <max_prefix_len>]>]

Function: Configure the prefix-list. The “no ip prefix-list <list_name> [seq <sequence_number>] [<deny | permit> <any | ip_addr/mask_length [ge <min_prefix_len>] [le <max_prefix_len>]>]” command deletes the prefix-list.

Parameter: <list_name> is the name of prefix-list, “seq” shows the following parameters is the sequence number, <sequence_number> is the sequence number, “deny” means

deny this route, “permit” means permit this route, “any” means adaptive to all packets with any prefix as well as any mask length, *ip_addr/mask_length* shows the prefix address (dotted decimal notation) and the length of mask, “ge” means greater than or equal to, *<min_prefix_len>* is the minimum length of prefix to be matched (ranging between 0~32), “le” means less than or equal to, *<max_prefix_len>* is the maximum length of prefix to be matched (ranging between 0~32).

Default: None.

Command Mode: Global Mode

Usage Guide: A prefix-list is identified by a prefix-list name. Each prefix-list may include several items each of which independently specifies a matching scope of network prefix-list type which is identified with a sequence-number. sequence-number specifies the sequence of matching check in the prefix-list. In the matching process the switch check in turn every items identified by “sequence-number” ascending. Once certain item obtains the conditions then the prefix-list filter is passed (without proceeding into the next item check).

Attentions should be paid on that at least one item match mode should be “permit” when more than one prefix-list items is defined. The deny mode items can be previously defined so to remove the unsuitable routing messages fast. However if all items are at deny mode then none of the routes would be able to pass the filter of this prefix-list. We here can define a “permit 0.0.0.0/0 ge 0 le 32” item after several defined “deny mode” items so to grant the passage for all other routing messages.

Example:

```
Switch#config terminal
```

```
Switch(config)#ip prefix-list mylist seq 12345 deny 10.0.0.0/8 le 22 ge 14
```

1.3 ip prefix-list sequence-number

Command: ip prefix-list sequence-number

no ip prefix-list sequence-number

Function: Enable the sequence-number auto-creation function, the “no ip prefix-list sequence-number” command closes the prefix-list sequence-number.

Parameter: None.

Default: Sequence-number auto-creation enabled.

Command Mode: Global Mode

Usage Guide: The command can be used to close the prefix-list sequence-number.

Example:

```
Switch(config)#no ip prefix-list sequence-number
```

1.4 match as-path

Command: `match as-path <list-name>`

`no match as-path [<list-name>]`

Function: Configure the AS path domain for matching the BGP routing messages. The “no match as-path [<list-name>]” deletes this configuration.

Parameter: `<list-name >` is the name of access-list.

Command Mode: route-map mode

Usage Guide: This command matches the AS path domain of the BGP routing message following the rules specified in the as-path list. If the matching succeeded, then the “permit” or “deny” action in the route-map is performed.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#match as-path 60
```

1.5 match community

Command: `match community <community-list-name | community-list-num>`
`[exact-match]`

`no match community [<community-list-name | community-list-num>`
`[exact-match]]`

Function: Configure the community attributes of BGP routing messages. The “no match community [<community-list-name | community-list-num > [exact-match]]” command deletes this configuration.

Parameter: `<community-list-name >` is the name of the community-list, `<community-list-num >` is the community-list sequence number, ranging between 1~99 (Standard ACL) or 100~199 (Extended ACL), `[exact-match]` means precise matching.

Command Mode: route-map mode

Usage Guide: This command matches the community attributes of the BGP routing message following the rules specified in the community list. If the matching succeeded, then the “permit” or “deny” action in the route-map is performed.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#match community 100 exact-match
```

1.6 match interface

Command: `match interface <interface-name >`

`no match interface [<interface-name >]`

Function: Configure to match the interfaces. The “`no match interface [<interface-name >]`” deletes this configuration.

Parameter: “`<interface-name >`” is the name of the interface.

Command Mode: route-map mode

Usage Guide: This command matches according to the next-hop messages in the route. If the matching succeeded, then the “permit” or “deny” action in the route-map is performed. This command is only used in RIP and OSPF protocols.

Example:

```
Switch#config terminal
```

```
Switch(config)#route-map r1 permit 5
```

```
Switch(config-route-map)#match interface vlan1
```

1.7 match ip

Command: `match ip <address / next-hop> <ip-acl -name / ip-acl -num / prefix-list list-name>`

`no match ip <address / next-hop> [<ip-acl -name / ip-acl -num / prefix-list list-name>]`

Function: Configure the routing prefix or next-hop. The “`no match ip <address / next-hop> [<ip-acl -name / ip-acl -num / prefix-list list-name>]`” deletes this configuration.

Parameter: `<address >` means matching the routing prefix, `<next-hop>` means matching the routing next-hop, `<ip-acl -name >` is the name of ip access-list, `<ip-acl -num >` is the ip access-list sequence number, ranging between 1~199 or 1300~2699 (extension scope), `prefix-list` means the matching should follow the prefix-list rules, `list-name` is the name of prefix-list.

Command Mode: route-map mode

Usage Guide: This command matches according to the next-hop messages or routing prefix in the route. If the matching succeeded, then the “permit” or “deny” action in the route-map is performed.

Example:

```
Switch#config terminal
```

```
Switch(config)#route-map r1 permit 5
```

```
Switch(config-route-map)#match ip address prefix-list mylist
```

1.8 match ipv6 address

Command: `match ipv6 address <ipv6-acl-name / prefix-list list-name>`

`no match ipv6 address [<ipv6-acl-name / prefix-list list-name>]`

Function: Configure the prefix for ipv6 routing. If the no form command is enabled, the configuration will be removed.

Parameters: **address** is the routing prefix to be matched. **<ipv6-acl-name>** is the name of ipv6 access list. Or when the **prefix-list** is configured. **list-name** will be the list name to be matched.

Command Mode: route map mode

Usage Guide: When this command is enabled, the prefix-list in the routing table will be used for routing decision. And if matched, the permit deny operation in the route map will be executed.

Example:

```
Switch#config terminal
```

```
Switch(config)#route-map r1 permit 5
```

```
Switch(config-route-map)#match ipv6 address prefix-list mylist
```

1.9 match ipv6 next-hop

Command: `match ipv6 next-hop <ipv6-address>`

`no match ipv6 next-hop [<ipv6-address>]`

Function: Configure the next hop for ipv6 routing. The **no** form command will disable the configuration.

Parameters: **next-hop** is the next station for routing. **ipv6-address** is the ipv6 address for the ip address of the interface on the next station.

Command Mode: route map mode

Usage Guide: If this command is configured, packets will be delivered according to the next hop information in the routing table. If matched, the permit or deny operation in the route map will be executed.

Example:

```
Switch#config terminal
```

```
Switch(config)#route-map r1 permit 5
```

```
Switch(config-route-map)# match ipv6 next-hop 2000::1
```

1.10 match metric

Command: `match metric <metric-val >`

`no match metric [<metric-val >]`

Function: Match the metric value in the routing message. The “`no match metric [<metric-val >]`” deletes the configuration.

Parameter: `<metric-val >` is the metric value, ranging between 0~4294967295.

Command Mode: route-map mode

Usage Guide: This command matches according to metric value in the route. If the matching succeeded, then the “permit” or “deny” action in the route-map is performed.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#match metric 60
```

1.11 match origin

Command: `match origin <egp | igp | incomplete >`

`no match origin <egp | igp | incomplete >`

Function: Configure to matching with the origin of the BGP routing message. The “`no match origin <egp | igp | incomplete >`” deletes the configuration.

Parameter: `egp` means the route is learnt from the external gateway protocols, `igp` means the route is learnt from the internal gateway protocols, `incomplete` means the route origin is uncertain.

Command Mode: route-map mode

Usage Guide: This command matches according to origin message in the BGP route. If the matching succeeded, then the “permit” or “deny” action in the route-map is performed.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#match origin egp
```

1.12 match route-type

Command: `match route-type external <type-1 / type-2 >`

`no match route-type external [<type-1 / type-2 >]`

Function: Configure to matching with the route type of OSPF routing message. The “`no`”

match route-type external [*<type-1 / type-2 >*] deletes the configuration.

Parameter: **type-1** means match with the OSPF type 1 external route, **type-2** means match with the OSPF type 2 external route.

Command Mode: route-map mode

Usage Guide: This command matches according to the type of OSPF routes (OSPF AS-external LSA type is either type 1 or type 2). If the matching succeeded, then the “permit” or “deny” action in the route-map is performed.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#match route-type external type-1
```

1.13 match tag

Command: **match tag *<tag-val >***

no match tag [*<tag-val >*]

Function: Configure to matching with the tag domain of the OSPF routing message. The “no match tag [*<tag-val >*] deletes this configuration.

Parameter: ***<tag-val >*** is the tag value, ranging between 0~4294967295.

Command Mode: route-map mode

Usage Guide: This command matches according to the tag value in the OSPF route. If the matching succeeded, then the “permit” or “deny” action in the route-map is performed.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#match tag 60
```

1.14 route-map

Command: **route-map *<map_name >* {deny | permit} *<sequence_num >***

no route-map *<map_name >* [{deny | permit} *<sequence_num >*]

Function: Configure the route-map and entering the route-map mode. The “no route-map *<map_name >* [{deny | permit} *<sequence_num >*] command deletes route-map.

Parameter: ***<map_name >*** is the name of route-map, **permit** sets route-map matching mode to permit mode, **deny** sets route-map matching mode to deny mode (**set** sub will not be executed under this mode), ***<sequence_num >*** is the route-map sequence number,

ranging between 1~65535.

Default: None

Command Mode: Global Mode

Usage Guide: A route-map may consist of several nodes each of which is a check unit. The check sequence among nodes is identified by *sequence-number*. “permit” means the node filter will be passed if all match subs are obtained by current route and then further all the set sub of this node will be executed without entering the check in the next node; if the match subs can not be met, the proceed to the check in next node. Relation among different node should be “or”, namely one node check passed then the route filter is passed when the switch checks each node in turn in the route-map.

Attentions should be paid on that at least one node match mode should be “permit” when more than one node is defined. When a route-map is used for filtering routing messages, if certain routing message can not pass any node check, then it is considered denied by the route-map. If all nodes in the route-map are set to deny mode, then all routing message should not be able to pass that route-map.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#match as-path 60
Switch(config-route-map)#set weight 30
```

1.15 set aggregator

Command: set aggregator as <as-number> <ip_addr>

no set aggregator as [<as-number> <ip_addr>]

Function: Assign an AS number for BGP aggregator. The “no set aggregator as [<as-number> <ip_addr>]” deletes this configuration.

Parameter: <as-number> is the AS number, <ip_addr> is the ip address of the aggregator shown in decimal notation.

Command Mode: route-map mode

Usage Guide: To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set aggregator as 200 10.1.1.1
```

1.16 set as-path

Command: set as-path prepend <as-num>

no set as-path prepend [<as-num>]

Function: Add AS numbers in the AS path domain of the BGP routing message. The “no set as-path prepend [<as-num>]” command deletes this configuration.

Parameter: <as-num > is the AS number, ranging from 1 to 4294967295, it can be shown in decimal notation (such as 6553700) or delimiter method (such as 100.100), circulating inputting several numbers is available.

Command Mode: route-map mode

Usage Guide: To add AS number in the AS domain of the BGP, the AS path length should be lengthened so to affect the best neighbor path option. To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
```

```
Switch(config)#route-map r1 permit 5
```

```
Switch(config-route-map)#set as-path prepend 200 100.100
```

1.17 set atomic-aggregate

Command: set atomic-aggregate

no set atomic-aggregate

Function: Configure the atomic aggregate attributes. The “no set atomic-aggregate” command deletes this configuration.

Parameter: None

Command Mode: route-map mode

Usage Guide: The BGP informs other BGP speaker by the atomic aggregate attributes. Local system selects a sub-specified route other than the more specified routes included in it. To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
```

```
Switch(config)#route-map r1 permit 5
```

```
Switch(config-route-map)#set atomic-aggregate
```

1.18 set comm-list

Command: set comm-list <community-list-name | community-list-num > delete

no set comm-list <community-list-name | community-list-num > delete

Function: Configure to delete the community attributes from the inbound or outbound routing messages. The “**no set comm-list <community-list-name | community-list-num > delete**” command deletes the configuration.

Parameter: **<community-list-name >** is the name of community list, **<community-list-num >** is the sequence number of community list, ranging between 1~99 (standard community list) or 100~199 (extended community list).

Command Mode: route-map mode

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set comm-list 100 delete
```

1.19 set community

Command: **set community [AA:NM] [internet] [local-AS] [no-advertise] [no-export] [none] [additive]**

no set community [AA:NM] [internet] [local-AS] [no-advertise] [no-export] [none] [additive]

Function: Configure the community attributes of the BGP routing message. The “**no set community [AA:NM] [internet] [local-AS] [no-advertise] [no-export] [none] [additive]**” command deletes this configuration.

Parameter: **[AA:NM]** is the community attribute value, **[internet]** is the internet scope, **[local-AS]** means this route do not announce outside the local AS (but can announce among the sub AS within the confederation), **[no-advertise]** means this route do not send to any neighbor, **[no-export]** means this route do not send to EBGp neighbors, **[none]** means delete the community attributes from the prefix of this route, **[additive]** means add following existing community attributes.

Command Mode: route-map mode

Usage Guide: To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set community local-as additive
```

1.20 set extcommunity

Command: set extcommunity <rt | soo> <AA:NN>

no set extcommunity <rt | soo> [<AA:NN>]

Function: Configure the extended community attributes of the BGP routing message. The “no set extcommunity <rt | soo> [<AA:NN>]” command deletes this configuration.

Parameter: <rt> is the route target, <soo> is the site of origin, <AA:NN> is the value of community attributes, amongst AA is AS number, ranging from 1 to 4294967295, it can be shown in decimal notation (such as 6553700) or delimiter method (such as 100.100), NN is a random two byte number.

Command Mode: route-map mode

Usage Guide: To use this command, one match clause should at first be defined.

Example: Set rt as 100:10

```
Switch#config terminal
```

```
Switch(config)#route-map r1 permit 5
```

```
Switch(config-route-map)#set extcommunity rt 100:10
```

Set soo as 200.200:10

```
Switch(config)#route-map r1 permit 10
```

```
Switch(config-route-map)#set extcommunity soo 200.200:10
```

1.21 set ip next-hop

Command: set ip next-hop <ip_addr>

no set ip next-hop [<ip_addr>]

Function: Configure the next-hop of the route. The “no set ip next-hop [<ip_addr>]” command deletes the configuration.

Parameter: <ip_addr> is the ip address of next-hop shown with dotted decimal notation.

Command Mode: route-map mode

Example:

```
Switch#config terminal
```

```
Switch(config)#route-map r1 permit 5
```

```
Switch(config-route-map)#set ip next-hop 10.2.2.2
```

1.22 set local-preference

Command: set local-preference <pre_val>

no set local-preference [*<pre_val>*]

Function: Configure the local priority of BGP route. The “**no set local-preference [*<pre_val>*]**” command deletes this configuration.

Parameter: *<pre_val>* is the value of local priority, ranging between 0~4294967295.

Command Mode: route-map mode

Usage Guide: The local priority attribute is the priority level of a route. A route with a higher local priority level when compared with other route of the same destination, will be more preferred than other route. The local priority validates only within this AS and will not be transported to EBGp neighbors. To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set local-preference 60
```

1.23 set metric

Command: **set metric <metric_val>**

no set metric [*<metric_val>*]

Function: Configure the metric value of the route. The “**no set metric [*<metric_val>*]**” command deletes the configuration.

Parameter: *<metric_val>* is the metric value, ranging between 1~4294967295.

Command Mode: route-map mode

Usage Guide: The metric value only affects the path option from external neighbors to local AS. The less the metric value is the higher is the priority. Under normal circumstances only the path metric value of the neighbors of the same AS will be compared. To extend the comparison to the metric values of different neighbor path, the `bgp always-compare-med` command should be configured. To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set metric 60
```

1.24 set metric-type

Command: **set metric-type <type-1 / type-2>**

no set metric-type [*<type-1 / type-2>*]

Function: Configure the metric type of the OSPF routing message. The “**no set metric-type** [*<type-1 / type-2>*]” command deletes this configuration.

Parameter: **type-1** means matches the OSPF type 1 external route; **type-2** means matches the OSPF type 2 external route.

Command Mode: route-map mode

Usage Guide: To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set metric-type type-1
```

1.25 set origin

Command: **set origin** *<egp / igp / incomplete >*

no set origin [*<egp / igp / incomplete >*]

Function: Configure the origin code of the BGP routing message. The “**no set origin** [*<egp / igp / incomplete >*]” command deletes this configuration.

Parameter: **egp** means the route is learnt from the external gateway protocols, **igp** means the route is learnt from the internal gateway protocols, **incomplete** means the route origin is uncertain.

Command Mode: route-map mode

Usage Guide: To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set origin egp
```

1.26 set originator-id

Command: **set originator-id** *<ip_addr>*

no set originator-id [*<ip_addr>*]

Function: Configure the origin ip address of the BGP routing message. The “**no set originator-id** [*<ip_addr>*]” command deletes the configuration.

Parameter: *<ip_addr>* is the ip address of the route source shown by dotted decimal notation.

Command Mode: route-map mode

Usage Guide: To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set originator-id 10.1.1.1
```

1.27 set tag

Command: set tag <tag_val>

no set tag [<tag_val>]

Function: Configure the tag domain of OSPF routing messages. The “no set tag [<tag_val>]” command deletes this configuration.

Parameter: <tag-val > is the tag value, ranging between 0~4294967295.

Command Mode: route-map mode

Usage Guide: There is a route-tag domain at the AS-external-LSA type LSA. The domain is normally identified by other routing protocols. To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set tag 60
```

1.28 set vpnv4 next-hop

Command: set vpnv4 next-hop <ip_addr>

no set vpnv4 next-hop [<ip_addr>]

Function: Configure the next-hop of BGP VPNv4 routing message. The no command deletes the configuration.

Parameter: <ip_addr> is the next-hop ip address of VPNv4 route shown by dotted decimal notation.

Command Mode: route-map mode

Usage Guide: To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set vpnv4 next-hop 10.1.1.1
```

1.29 set weight

Command: set weight <weight_val>

no set weight [<weight_val>]

Function: Configure the weight value of BGP routing message. The “no set weight [<weight_val>]” command deletes this configuration.

Parameter: <weight_val> is weight value, ranging between 0~4294967295

Command Mode: route-map mode

Usage Guide: Weight value is adopted to facilitate the best path option and validates only within the local switch. While there are several route to the same destination the one with higher priority is more preferred. To use this command, one match clause should at first be defined.

Example:

```
Switch#config terminal
Switch(config)#route-map r1 permit 5
Switch(config-route-map)#set weight 60
```

1.30 show ip prefix-list <list-name>

Command: show ip prefix-list [<list-name> [<ip_addr/len> [first-match | longer] | seq <sequence-number>]]

Function: Show by prefix-list names.

Parameter: <list-name> is the name of prefix-list, <ip_addr/len> is the prefix ip address and the length of mask, **first-match** stands for the first route table matched with specified ip address, **longer** means longer prefix is required, **seq** means show by sequence number, <sequence-number> is the sequence number, ranging between 0 ~ 4294967295.

Default: None

Command Mode: Admin mode

Usage Guide: All prefix-list will be listed when no prefix-list name is specified.

Example:

```
Switch#show ip prefix-list
ip prefix-list 1: 1 entries
deny any
ip prefix-list mylist: 1 entries
deny 1.1.1.1/8
Switch#show ip prefix-list mylist 1.1.1.1/8
```

seq 5 deny 1.1.1.1/8 (hit count: 0, recount: 0)

Displayed information	Explanation
ip prefix-list mylist: 1 entries	Show a prefix-list named mylist which includes 1 instance.
seq 5 deny 1.1.1.1/8 (hit count: 0, recount: 0)	Show the prefix-list contents sequence numbered 5. hit count: 0 means being hit 0 time, recount: 0 means referred 0 time.

1.31 show ip prefix-list <detail | summary>

Command: show ip prefix-list [*<detail / summary>*] [*<list-name>*]

Function: Display the contents of the prefix list.

Parameters: When **detail** is enabled, detail of prefix-list will be displayed. For **summary**, it is similar but a summary will be displayed. **<list-name>** is the name of the prefix list.

Default: None.

Command Mode: Privileged mode and configuration mode

Usage Guide: If no prefix list name is specified, all the prefix list will be displayed.

Example:

```
Switch#show ip prefix-list detail mylist
ip prefix-list mylist:
count: 2, range entries: 0, sequences: 5 - 10
seq 5 deny 1.1.1.1/8 (hit count: 0, recount: 0)
seq 10 permit 2.2.2.2/8 (hit count: 0, recount: 0)
Switch#show ip prefix-list summary mylist
ip prefix-list mylist:
count: 2, range entries: 0, sequences: 5 - 10
```

Displayed information	Explanation
ip prefix-list mylist:	To display the prefix list which named mylist.
count: 2, range entries: 0, sequences: 5 - 10	count : 2 means there are two prefix list instances. sequences: 5-10 means the sequence number. 5 is the starting sequence number, while 10 is the ending.
deny 1.1.1.1/8 (hit count: 0, recount: 0)	deny 1.1.1.1/8 is contents of the prefix list. hit count:0 means the rule has been

	matched for zero times. And refcount:0 means the rule is referenced for zero times.
--	---

1.32 show route-map

Command: show route-map

Function: Show the content of route-map.

Parameter: None

Default: None

Command Mode: Admin mode

Usage Guide: None

Example:

```
Switch# show route-map
route-map a, deny, sequence 10
Match clauses:
as-path 60
Set clauses:
metric 10
```

Displayed information	Explanation
route-map a, deny, sequence 10	route-map a means the name of route map is a, deny means the deny mode, sequence 10 means the sequence number is 10
Match clauses:	Match sub
as-path 60	Detailed contents in the Match sub
Set clauses:	Set sub
metric 10	Detailed content in the Set clause

1.33 show router-id

Command: show router-id

Function: Show the content of router-id.

Default: None

Command Mode: Admin and Configuration Mode

Example:

1:

Switch#show router-id

Router ID: 20.1.1.1 (automatic)

2:

Switch#show router-id

Router ID: 20.1.1.2 (config)

Chapter 2 Commands for Static Route

2.1 ip route

Command: ip route {<ip-prefix> <mask> | <ip-prefix>/<prefix-length>} [<gateway-address> | <gateway-interface>] [<distance>]

no ip route {<ip-prefix> <mask> | <ip-prefix>/<prefix-length>} [<gateway-address> | <gateway-interface>] [<distance>]

Function: Configure the static route. The “no ip route {<ip-prefix> <mask> | <ip-prefix>/<prefix-length>} [<gateway-address> | <gateway-interface>] [<distance>]” command deletes the static route.

Parameter: The <ip-prefix> and <mask> are respectively destination IP address and subnet mask, shown in dotted decimal notation; <ip-prefix> and <prefix-length> are respectively the destination IP address and the length of prefix; <gateway-address> is the next-hop IP address shown in dotted decimal notation; <gateway-interface> is the next-hop interface, < distance > is the manage distance of route management, ranging between 1~255.

Default: The management distance of static routing is defaulted at 1.

Command Mode: Global Mode.

Usage Guide: When configuring the next-hop of static routing, both by specifying the next-hop IP address of the route data packet and the exit interface are available.

The default distance values of each route type in the layer 3 switch of our company are listed below:

Route Type	Distance Value
Direct Route	0
Static Route	1
OSPF	110
RIP	120
IBGP	200
EBGP	20

The direct route has the highest priority when each route management distance value remain unchanged and followed by static route, EBGP, OSPF, RIP, IBGP.

Example:

Example 1. Add a static route

```
Switch(config)#ip route 1.1.1.0 255.255.255.0 2.1.1.1
```

Example 2. Add default route

Switch(config)#ip route 0.0.0.0 0.0.0.0 2.2.2.1

2.2 show ip route

Command: show ip route [*<destination>*]*<destination >**<length>***|connected | static | rip| ospf | bgp | isis| kernel| statistics| database [connected | static | rip| ospf | bgp | isis| kernel] [fib[statistics]]**

Function: Show the route table.

Parameter: *<destination>* is the destination network address; *<destination >/<length>* is the destination network address plus the length of prefix; **connected** is direct route; **static** is static route; **rip** is RIP route; **ospf** is OSPF route; **bgp** is BGP route; **isis** is ISIS route; **kernel** is kernel route; **statistics** shows the number of routes; **database** is route database; **fib** is kernel route table.

Command Mode: All modes

Usage Guide: Show all the contents in the route table including: route type, destination network, mask, next-hop address, interface, etc

Example: switch#show ip route

Codes: K - kernel, C - connected, S - static, R - RIP, B - BGP

O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

* - candidate default

Gateway of last resort is 210.0.0.3 to network 0.0.0.0

```
S*   0.0.0.0/0 [1/0] via 210.0.0.3, Vlan1
C    127.0.0.0/8 is directly connected, Loopback
O IA  172.16.11.0/24 [110/40] via 210.14.0.1, Vlan3014, 00:00:47
O IA  172.16.12.0/24 [110/40] via 210.14.0.1, Vlan3014, 00:00:47
O IA  172.16.13.0/24 [110/40] via 210.14.0.1, Vlan3014, 00:00:47
O IA  172.16.14.0/24 [110/40] via 210.14.0.1, Vlan3014, 00:00:47
O IA  172.16.15.0/24 [110/50] via 210.14.0.1, Vlan3014, 00:00:47
O E2  172.16.100.0/24 [110/0] via 210.14.0.1, Vlan3014, 00:00:46
```

Displayed information	Explanation
C –connected	Direct route, namely the segment directly connected with the layer 3 switch
S –static	Static route, the route manually configured by users
R - RIP derived	RIP route, acquired by layer 3 switch

	through the RIP protocol.
O - OSPF derived	OSPF route, acquired by layer 3 switch through the OSPF protocol
A- OSPF ASE	Route introduced by OSPF
B- BGP derived	BGP route, acquired by the BGP protocol.
Destination	Target network
Mask	Target network mask
Nexthop	Next-hop IP address
Interface	Next-hop pass-by layer 3 switch interfaces
Preference	Route priority. If other types of route to the target network exists, the kernel route will only shows those with high priority.

2.3 show ip route fib

This command is not supported by the switch.

Chapter 3 Commands for RIP

3.1 accept-lifetime

Command: `accept-lifetime <start-time> {<end-time>| duration<seconds>| infinite}`
`no accept-lifetime`

Function: Use this command to specify a key accept on the key chain as a valid time period. The “`no accept-lifetime`” command deletes this configuration.

Parameter: `<start-time>` parameter specifies the start time of the time period, of which the form should be:

`<start-time>={<hh:mm:ss> <month> <day> <year>|<hh:mm:ss> <day>
<month> <year>}`

`<hh:mm:ss>` specify the concrete valid time of `accept-lifetime` in hours, minutes and second

`<day>` specifies the date of valid, ranging between 1 -31

`<month>` specifies the month of valid shown with the first three letters of the month, such as Jan

`<year>` specifies the year of valid start, ranging between 1993 - 2035

`<end-time>` specifies the due of the time period, of which the form should be:

`<end-time>={<hh:mm:ss> <month> <day> <year>|<hh:mm:ss> <day>
<month> <year>}`

`<hh:mm:ss>` specify the concrete valid time of `accept-lifetime` in hours, minutes and second

`<day>` specifies the date of valid, ranging between 1 -31

`<month>` specifies the month of valid shown with the first three letters of the month, such as Jan

`<year>` specifies the year of valid start, ranging between 1993 - 2035

`<seconds>` the valid period of the key in seconds, ranging between 1-2147483646

Infinite means the key will never be out of date.

Default: No default configuration.

Command Mode: keychain-key mode

Usage Guide: None.

Example: The example below shows the `accept-lifetime` configuration of key 1 on the keychain named mychain.

```
Switch# config terminal
Switch(config)# key chain mychain
Switch(config-keychain)# key 1
Switch(config-keychain-key)# accept-lifetime 03:03:01 Dec 3 2004 04:04:02 Oct 6 2006
```

Related Command:**key****key-string****key chain****send-lifetime**

3.2 address-family ipv4

This command is not supported by switch.

3.3 clear ip rip route

Command: `clear ip rip route {<A.B.C.D/M> | kernel | static | connected | rip | ospf | isis | bgp | all}`

Function: Clear specific route in the RIP route table.

Parameter: `<A.B.C.D/M>` Clear the routes which match the destination address from the RIP route table. Specifies the IP address prefix and its length of the destination address

kernel delete kernel routes from the RIP route table

static delete static routes from the RIP route table

connected delete direct routes from the RIP route table

rip only delete RIP routes from the RIP route table

ospf only delete OSPF routes from the RIP route table

isis only delete ISIS routes from the RIP route table

bgp only delete BGP routes from the RIP route table

all delete all routes from the RIP route table

Default: No default configurations.

Command Mode: Admin mode

Usage Guide: Use this command with the all parameter will delete all learnt route in the RIP route which will be immediately recovered except for rip route. The dynamic learnt RIP route can only be recovered by studying one more time.

Example: `Switch# clear ip rip route 10.0.0.0/8`

`Switch# clear ip rip route ospf`

3.4 debug rip

Command: `debug rip [events| nsm| packet[recv|send][detail]] all`

`no debug rip [events| nsm| packet[recv|send][detail]] all`

Function: Open various RIP adjustment switches and show various adjustment debugging messages. The “`no debug rip [events| nsm| packet[recv|send][detail]] all`” command closes corresponding debugging switch.

Parameter: `events` shows the debugging messages of RIP events

`nsm` shows the communication messages between RIP and NSM

`packet` shows the debugging messages of RIP data packets

`recv` shows the messages of the received data packets

`send` shows the messages of the sent data packets

`detail` shows the messages of received or sent data packets

Default: Debug switch closed.

Command Mode: Admin mode and global mode

Example: Switch# debug rip packet

```
Switch#1970/01/01 01:01:43 IMI: SEND[Vlan1]: Send to 224.0.0.9:520
```

```
1970/01/01 01:01:43 IMI: SEND[Vlan1]: Send to 224.0.0.9:520
```

```
1970/01/01 01:01:47 IMI: RECV[Vlan1]: Receive from 20.1.1.2:520
```

3.5 debug rip redistribute message send

Command: `debug rip redistribute message send`

`no debug rip redistribute message send`

Function: To enable the debugging of sending messages for routing redistribution messages from OSPF process or BGP protocol for RIP. The no form of this command will disable the debugging messages.

Parameter: None.

Default: Close the debug by default.

Command Mode: Admin Mode.

Usage Guide: None.

Example:

```
Switch#debug rip redistribute message send
```

```
Switch#no debug rip redistribute message send
```

3.6 debug rip redistribute route receive

Command: debug rip redistribute route receive
no debug rip redistribute route receive

Function: To enable debugging of received messages from NSM for RIP. The no form of this command will disable debugging of received messages from NSM for RIP.

Parameter: None.

Default: Close the debug by default.

Command Mode: Admin Mode.

Usage Guide: None.

Example:

```
Switch#debug rip redistribute route receive
```

```
Switch#no debug rip redistribute route receive
```

3.7 default-information originate

Command: default-information originate
no default-information originate

Function: Allow the network 0.0.0.0 to be redistributed into the RIP. The “no default-information originate” disables this function.

Parameter: None

Default: Disabled

Command Mode: Router mode and address-family mode

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# default-information originate
```

3.8 default-metric

Command: default-metric <value>
no default-metric

Function: Set the default metric value of the introduced route. The “no default-metric” command restores the default value to 1.

Parameter: <value> is the metric value to be set, ranging between 1~16.

Default: Default route metric value is 1.

Command Mode: Router mode and address-family mode

Usage Guide: **default-metric** command is used for setting the default route metric value of the routes from other routing protocols when distributed into the RIP routes. When using the **redistribute** commands for introducing routes from other protocols, the default route metric value specified by **default-metric** will be adopted if no specific route metric value is set.

Example: Set the default route metric value to 3 for introducing routes from other routing protocols into the RIP routes.

```
Switch(config-router)#default-metric 3
```

Relevant Commands: **redistribute**

3.9 distance

Command: **distance** *<number>* [*<A.B.C.D/M>*] [*<access-list-name* | *access-list-number >*]
no distance [*<A.B.C.D/M>*]

Function: Set the managing distance with this command. The “**no distance** [*<A.B.C.D/M>*]” command restores the default value to 120.

Parameter: *<number>* specifies the distance value, ranging from 1 to 255. *<A.B.C.D/M>* specifies the network prefix and its length. *<access-list-name* | *access-list-number >* specifies the access-list number or name applied.

Default: The default managing distance of RIP is 120.

Command Mode: Router mode and address-family mode

Usage Guide: In case there are routes from two different routing protocols to the same destination, the managing distance is then used for selecting routes. The less the managing distance of the route protocol is, the more reliable will be the route acquired from the protocol.

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# distance 8 10.0.0.0/8 mylist
```

3.10 distribute-list

Command: **distribute-list** {*<access-list-number* | *access-list-name>*
|*prefix<prefix-list-name>*} {*in|out*} [*<ifname>*]
no distribute-list {*<access-list-number|* *access-list-name>*
|*prefix<prefix-list-name>*} {*in|out*} [*<ifname>*]

Function: This command uses access-list or prefix-list to filter the route update packets

sent and received. The “**no distribute-list {<access-list-number> | <access-list-name> | <prefix-list-name>}** {in|out} [<ifname>]” command cancels this route filter function.

Parameter: <access-list-number | <access-list-name> is the name or access-list number to be applied. <prefix-list-name> is the name of the prefix-list to be applied. <ifname> specifies the name of interface to be applied with route filtering.

Default: The function in default situation is disabled.

Command Mode: Router mode and address-family mode

Usage Guide: The filter will be applied to all the interfaces in case no specific interface is set.

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# distribute-list prefix myfilter in vlan 1
```

3.11 exit-address-family

This command is not supported by switch.

3.12 ip rip aggregate-address

Command: ip rip aggregate-address A.B.C.D/M

no ip rip aggregate-address A.B.C.D/M

Function: To configure RIP aggregation route. The **no** form of this command will delete this configuration.

Parameter: A.B.C.D/M:IPv4 address and mask length.

Command Mode: Router Mode or Interface Configuration Mode.

Default: Disabled.

Usage Guide: If to configure aggregation route under router mode, RIP protocol must be enabled. If configured under interface configuration mode, RIP protocol may not be enabled, but the aggregation router can operation after the RIP protocol be enabled on interface.

Example: To configure aggregation route as 192.168.20.0/22 globally.

```
Switch(config)#router rip
```

```
Switch(config-router) #ip rip agg 192.168.20.0/22
```

3.13 ip rip authentication key-chain

Command: ip rip authentication key <name-of-chain>

no ip rip authentication key-chain

Function: Use this command to enable RIPV2 authentication on an interface and further configures the adopted key chain. The “no ip rip authentication key-chain” command cancels the authentication.

Parameter: <name-of-chain> is the name of the adopted key chain. There may be spaces in the string. The input ends with an enter and the string should not be longer than 256 bytes.

Default: Not configured.

Command Mode: Interface Configuration Mode.

Usage Guide: If the authentication is only configured without configuring the key chain or password used by the interface, the authentication does no effect. If mode has not been configured prior to configuring this command, the mode will be set to plaintext authentication. The “no ip rip authentication key” command will cancel the authentication which only cancels the authentication process when sending or receiving data packet other than set non authentication mode.

Example: Switch# config terminal

```
Switch(config)# interface vlan 1
```

```
Switch(Config-if-Vlan1)# ip rip authentication key my key
```

Relevant Commands: key, key chain

3.14 ip rip authentication mode

Command: ip rip authentication mode {text|md5}

no ip rip authentication mode {ext|md5}

Function: Configure the authentication mode; the “no ip rip authentication mode {ext|md5}” command restores the default authentication mode namely text authentication mode.

Parameter: text means text authentication; md5 means MD5 authentication.

Default: Not configured authentication.

Command Mode: Interface Configuration Mode.

Usage Guide: RIP-I do not support authentication which the RIP-II supports two authentication modes: text authentication (i.e. Simple authentication) and data packet authentication (i.e. MD5 authentication). This command should be used associating the ip rip authentication key or ip rip authentication string. Independently configuration will not

lead to authentication process.

Example: Switch# config terminal

```
Switch(config)# interface vlan 1
```

```
Switch(Config-if-Vlan1)# ip rip authentication mode md5
```

Related Command: ip rip authentication key-chain, ip rip authentication string

3.15 ip rip authentication string

Command: ip rip authentication string <text>

no ip rip authentication string

Function: Set the password used in RIP authentication. The “**no ip rip authentication string**” cancels the authentication.

Parameter: <text> is the password used in authentication of which the length should be 1-16 characters with space available. The password should end with enter.

Command Mode: Interface mode

Usage Guide: The ip rip authentication key will not be able to be configured when this command is configured, key id value is required in MD5 authentication which is 1 when use this command. The mode will be set to plaintext authentication in case no mode configuration is available. The “**no ip rip authentication string**” command will cancel the authentication which only cancels the authentication process when sending or receiving data packet other than set non authentication mode. Input ip rip authentication string aaa aaa to set the password as aaa aaa which is 7 characters.

Example: Switch# config terminal

```
Switch(config)# interface vlan 1
```

```
Switch(Config-if-Vlan1)# ip rip authentication string guest
```

Related Command: ip rip authentication mode

3.16 ip rip authentication cisco-compatible

Command: ip rip authentication cisco-compatible

no ip rip authentication cisco-compatible

Function: After configured this command, the cisco RIP packets will be receivable by configuring the plaintext authentication or MD5 authentication.

Parameter: None

Default: Not configured

Command Mode: Interface mode

Usage Guide: After authentication is configured on the cisco router, the RIP packets will

exceeds the length of the defined standard length of the protocol once the number of route items is greater than 25. By configuring this command the over-lengthen RIP packets will be receivable other than denied.

Example: Switch# config terminal

```
Switch(config)# interface vlan 1
```

```
Switch(Config-if-Vlan1)# ip rip authentication cisco-compatible
```

Related Command: ip rip authentication mode

3.17 ip rip receive-packet

Command: ip rip receive-packet

no ip rip receive-packet

Function: Set the interface to be able to receiveable RIP packets; the “no ip rip receive-packet” command sets the interface to be unable to receiveable RIP packets.

Default: Interface receives RIP packets.

Command Mode: Interface Configuration Mode.

Example: Switch# config terminal

```
Switch(config)# interface vlan 1
```

```
Switch(Config-if-Vlan1)# ip rip receive-packet
```

Related Command: ip rip send-packet

3.18 ip rip receive version

Command: ip rip receive version { 1 | 2|1 2 }

no ip rip receive version

Function: Set the version information of the RIP packets the interface receives. The default version is 2; the “no ip rip receive version” command restores the value set by using the version command.

Parameter: 1 and 2 respectively stands for RIP version 1 and RIP version 2, 1 2 stands for the RIP versions 1, 2.

Default: Version 2

Command Mode: Interface Configuration Mode.

Example: Switch# config terminal

```
Switch(config)# interface vlan 1
```

```
Switch(Config-if-Vlan1)# ip rip receive version 1 2
```

Related Command: version

3.19 ip rip send-packet

Command: ip rip send-packet

no ip rip send-packet

Function: Set the Interface to be able to receive the RIP packets; the “**no ip rip send-packet**” sets the interface to be unable to receive the RIP packets.

Default: Interface sends RIP packets.

Command Mode: Interface Configuration Mode.

Example: Switch# config terminal

```
Switch(config)# interface vlan 1
```

```
Switch(Config-if-Vlan1)# ip rip send-packet
```

Related Command: ip rip receive-packet

3.20 ip rip send version

Command: ip rip send version { 1 | 2 | 1-compatible | 1 2 }

no ip rip send version

Function: Set the version information of the RIP packets the interface receives. The default version is 2; the “**no ip rip send version**” command restores the value set by using the version command.

Parameter: 1 and 2 respectively stands for RIP version 1 and RIP version 2, 1 2 stands for the RIP versions 1, 2.

Default: Version 2

Command Mode: Interface Configuration Mode.

Example: Switch# config terminal

```
Switch(config)# interface vlan 1
```

```
Switch(Config-if-Vlan1)# ip rip send version 1
```

Related Command: version

3.21 ip rip split-horizon

Command: ip rip split-horizon [poisoned]

no ip rip split-horizon

Function: Enable split horizon. The “**no ip rip split-horizon**” disables the split horizon.

Parameter: [poisoned] means configure the split horizon with poison reverse.

Default: Split Horizon with poison reverse by default.

Command Mode: Interface Configuration Mode.

Usage Guide: The split horizon is for preventing the Routing Loops, namely preventing the layer 3 switches from broadcasting the routes which is learnt from the same interface on which the route to be broadcasted.

Example: Switch# config terminal
Switch(config)# interface vlan 1
Switch(Config-if-Vlan1)# ip rip split-horizon poisoned

3.22 key

Command: `key <keyid>`
`no key <keyid>`

Function: This command is for managing and adding keys in the key chain. The “**no key <keyid>**” command deletes one key.

Parameter: `<keyid>` is key ID, ranging between 0-2147483647.

Command Mode: Keychain mode and keychain-key mode

Usage Guide: The command permits entering the keychain-key mode and set the passwords corresponding to the keys.

Example: Switch# config terminal
Switch(config)# key chain mychain
Switch(config-keychain)# key 1
Switch(config-keychain-key)#

Relevant Commands: `key chain`, `key-string`, `accept-lifetime`, `send-lifetime`

3.23 key chain

Command: `key chain <name-of-chain>`
`no key chain < name-of-chain >`

Function: This command is for entering a keychain manage mode and configure a keychain. The “**no key chain < name-of-chain >**” deletes one keychain.

Parameter: `<name-of-chain>` is the name string of the keychain the length of which is not specifically limited.

Command Mode: Global Mode

Example: Switch# config terminal
Switch(config)# key chain mychain
Switch(config-keychain)#

Relevant Commands: `key`, `key-string`, `accept-lifetime`, `send-lifetime`

3.24 key-string

Command: `key-string <text>`

`no key-string <text>`

Function: Configure a password corresponding to a key. The “`no key-string <text>`” command deletes the corresponding password.

Parameter: `<text>` is a character string without length limit. However when referred by RIP authentication only the first 16 characters will be used.

Command Mode: Keychain-key mode

Usage Guide: This command is for configure different passwords for keys with different ID.

Example: Switch# config terminal

```
Switch(config)# key chain mychain
```

```
Switch(config-keychain)# key 1
```

```
Switch(config-keychain-key)# key-string prime
```

Related Command: `key`, `key chain`, `accept-lifetime`, `send-lifetime`

3.25 maximum-prefix

Command: `maximum-prefix <maximum-prefix> [<threshold>]`

`no maximum-prefix`

Function: Configure the maximum number of RIP routes in the route table. The “`no maximum-prefix`” command cancels the limit.

Parameter: `<maximum-prefix>` the maximum number of RIP route, ranging between 1-65535; a warning is given when the number rate of current route exceeds `<threshold>` ranging between 1-100, default at 75.

Command Mode: router mode

Usage Guide: The maximum RIP route only limits the number of routes learnt through RIP but not includes direct route or the RIP static route configured by the route command. The base on which the comparison is performed is the number of route marked R in the show ip route database, and also the number of RIP routes displayed in the show ip route statistics command.

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# maximum-prefix 150
```

3.26 neighbor

Command: neighbor <A.B.C.D>

no neighbor <A.B.C.D>

Function: Specify the destination address requires targeted-peer sending. The “no neighbor <A.B.C.D>” command cancels the specified address and restores all gateways to trustable.

Parameter: <A.B.C.D> is the specified destination address for the sending, shown in dotted decimal notation.

Default: Not sending to any targeted-peer destination address.

Command Mode: Router mode

Usage Guide: When used accompany with passive-interface command it can be configured to only sending routing messages to specific neighbor.

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# neighbor 1.1.1.1
```

Related Command: passive-interface

3.27 network

Command: network <A.B.C.C/M|ifname>

no network <A.B.C.C/M|ifname>

Function: Configure the RIP protocol network.

Parameter: <A.B.C.C/M|> is the IP address prefix and its length in the network.

<ifname> is the name of a interface.

Default: Not running RIP protocol

Command Mode: Router mode and address-family mode

Usage Guide: Use this command to configure the network for sending or receiving RIP update packets. If the network is not configured, all interfaces of the network will not be able to send or receive data packets.

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# network 10.0.0.0/8
```

```
Switch(config-router)# network vln 1
```

Related Command: show ip rip, clear ip rip

3.28 offset-list

Command: `offset-list <access-list-number [access-list-name] {in|out} <number > [<ifname>]`

`no offset-list <access-list-number [access-list-name] {in|out} <number > [<ifname>]`

Function: Add an offset value to the metric value of the routes learnt by RIP. The “`no offset-list <access-list-number [access-list-name] {in|out} <number > [<ifname>]`” command disables this function.

Parameter: `< access-list-number [access-list-name]>` is the access-list or name to be applied. `<number >` is the added offset value, ranging between 0-16; `<ifname>` is the specific interface name

Default: Default offset value is the metric value defined by the system.

Command Mode: Router mode and address-family mode

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# offset-list 1 in 5 vlan 1
```

Related Command: `access-list`

3.29 passive-interface

Command: `passive-interface <ifname>`

`no passive-interface <ifname>`

Function: Set the RIP layer 3 switch blocks RIP broadcast on specified interface, on which the RIP data packets will only be sent to layer 3 switches configured with neighbor.

Parameter: `<ifname>` is the name of specific interface.

Default: Not configured

Command Mode: Router mode

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# passive-interface vlan 1
```

Related Command: `show ip rip`

3.30 recv-buffer-size

Command: `recv-buffer-size<size>`

`no recv-buffer-size`

Function: This command configures the size of UDP receiving buffer zone of RIP; the “no **recv-buffer-size**” command restores the system default.

Parameter: **<size>** is the buffer zone size in bytes, ranging between 8192-2147483647.

Default: 8192 bytes.

Command Mode: Router mode

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# recv-buffer-size 23456789
```

3.31 redistribute

Command: redistribute {kernel |connected| static| ospf [**<process-id>**] | isis| bgp}
[metric**<value>**] [route-map**<word>**]

no redistribute {kernel |connected| static| ospf [**<process-id>**] | isis| bgp}
[metric**<value>**] [route-map**<word>**]

Function: Introduce the routes learnt from other routing protocols into RIP.

Parameter: **kernel** introduce from kernel routes;

connected introduce from direct routes;

static introduce from static routes;

ospf introduce from OSPF routes. process-id is OSPF process ID, if there is no parameter that means the process by default, range between 1 to 65535;

isis introduce from ISIS routes;

bgp introduce from BGP routes;

<value> is the metric value assigned to the introduced route, ranging between 0 to 16;

<word> is the probe pointing to the route map for introducing routes.

Command Mode: Router Mode and address-family Mode

Usage Guide: Under the address-family mode, the parameter kernel and ISIS is unavailable.

Example:

```
Switch# config terminal
```

```
Switch(config)# router rip
```

```
Switch(config-router)# redistribute kernel route-map ipi
```

To redistribute OSPFv2 routing information to RIP.

```
Switch(config)# router rip
```

```
Switch(config-router)# redistribute ospf 2
```

3.32 redistribute ospf (vrf command)

This command is not supported by the switch.

3.33 route

Command: route <A.B.C.D/M>

no route <A.B.C.D/M>

Function: This command configures a static RIP route. The “no route <A.B.C.D/M>” command deletes this route.

Parameter: Specifies this destination IP address prefix and its length.

Command Mode: Router mode

Usage Guide: The command adds a static RIP route, and is mainly used for debugging. Routes configured by this command will not appear in kernel route table but in the RIP route database.

Example: Switch# config terminal

```
Switch(config)# router rip
```

```
Switch(config-router)# route 1.0.0.0/8
```

3.34 router rip

Command: router rip

no router rip

Function: Enable the RIP routing process and enter the RIP mode; the “no router rip” command closes the RIP routing protocol.

Default: Not running RIP route.

Command Mode: Global mode

Usage Guide: This command is the switch for starting the RIP routing protocol which is required to be open before configuring other RIP protocol commands.

Example: Enable the RIP protocol mode

```
Switch(config)#router rip
```

```
Switch(config-router)#
```

3.35 send-lifetime

Command: send-lifetime <start-time> {<end-time>| duration<seconds>| infinite}

no send-lifetime

Function: Use this command to specify a key on the keychain as the time period of sending keys. The “**no send-lifetime**” cancels this configuration.

Parameter: **<start-time>** parameter specifies the starting time of the time period, which is:

<start-time>={<hh:mm:ss> <month> <day> <year>|<hh:mm:ss> <day> <month> <year>}

<hh:mm:ss> Specify the concrete valid time of **accept-lifetime** in hours, minutes and second

<day> Specifies the date of valid, ranging between 1 -31

<month> Specifies the month of valid shown with the first three letters of the month, such as Jan

<year> Specifies the year of valid start, ranging between 1993 - 2035

<end-time> Specifies the due of the time period, of which the form should be:

<end-time>={<hh:mm:ss> <month> <day> <year>|<hh:mm:ss> <day> <month> <year>}

<hh:mm:ss> Specify the concrete valid time of **accept-lifetime** in hours, minutes and second

<day> Specifies the date of valid, ranging between 1 -31

<month> Specifies the month of valid shown with the first three letters of the month, such as Jan

<year> Specifies the year of valid start, ranging between 1993 -2035

<seconds> is the valid period of the key in seconding and ranging between 1-2147483646

Default: No default configuration

Command Mode: Keychain-key mode

Usage Guide: Refer to the 3.13 RIP authentication section.

Example: The example below shows the send-lifetime configuration on the keychain named mychain for key 1.

```
Switch# config terminal
```

```
Switch(config)# key chain mychain
```

```
Switch(config-keychain)# key 1
```

```
Switch(config-keychain-key)# send-lifetime 03:03:01 Dec 3 2004 04:04:02 Oct 6 2006
```

Related Command: **key, key-string, key chain, accept-lifetime**

3.36 show debugging rip

Command: **show debugging rip**

Function: Show RIP event debugging, RIP packet debugging and RIP nsm debugging status.

Command Mode: Any mode.

Example: Switch# show debugging rip

RIP debugging status:

RIP event debugging is on

RIP packet detail debugging is on

RIP NSM debugging is on

3.37 show ip protocols rip

Command: show ip protocols rip

Function: Show the RIP process parameter and statistics information.

Command Mode: Any mode.

Example:

show ip protocols rip

Routing Protocol is "rip"

Sending updates every 30 seconds with +/-50%, next due in 8 seconds

Timeout after 180 seconds, garbage collect after 120 seconds

Outgoing update filter list for all interface is not set

Incoming update filter list for all interface is not set

Default redistribution metric is 1

Redistributing: static

Default version control: send version 2, receive version 2

Interface	Send	Recv	Key-chain
Vlan1	2	2	

Vlan1 2 2

Routing for Networks:

Vlan1

Vlan2

Routing Information Sources:

Gateway	Distance	Last Update	Bad Packets	Bad Routes
20.1.1.1	120	00:00:31	0	0

Distance: (default is 120)

Displayed information	Explanation
Sending updates every 30 seconds with +/-50%, next due in 8 seconds	Sending update every 30 secs
Timeout after 180 seconds, garbage collect after 120 seconds	The route time-out event period is 180 secs, the

	garbage collect time is 120 seconds												
Outgoing update filter list for all interface is not set	Outgoing update filter list for all interface is not set												
Incoming update filter list for all interface is not set	Incoming update filter list for all interface is not set												
Default redistribution metric is 1	Default redistribution metric is 1												
Redistributing: static	Redistributing the static route into the RIP route												
Default version control: send version 2, receive version 2 <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Interface</th> <th>Send</th> <th>Recv</th> <th>Key-chain</th> </tr> </thead> <tbody> <tr> <td>Ethernet1/0/3</td> <td>2</td> <td>2</td> <td></td> </tr> </tbody> </table>	Interface	Send	Recv	Key-chain	Ethernet1/0/3	2	2		The configuration of interface receiving and sending packets. Receive version is 2, keychain 1 not configured.				
Interface	Send	Recv	Key-chain										
Ethernet1/0/3	2	2											
Routing for Networks: Vlan1 Vlan2	The segment running RIP is the Vlan 1 and Vlan 2												
Routing Information Sources: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Gateway</th> <th>Distance</th> <th>Last Update</th> <th>Bad</th> <th>Packets</th> <th>Bad</th> </tr> </thead> <tbody> <tr> <td>20.1.1.1</td> <td>120</td> <td>00:00:31</td> <td>0</td> <td></td> <td>0</td> </tr> </tbody> </table>	Gateway	Distance	Last Update	Bad	Packets	Bad	20.1.1.1	120	00:00:31	0		0	Routing information sources The badpacketand bad routes from the gateway 20.1.1.1 are all 0. 31 seconds have passed since the last route update. The manage distance is 120
Gateway	Distance	Last Update	Bad	Packets	Bad								
20.1.1.1	120	00:00:31	0		0								
Distance: (default is 120)	Default manage distance is 120												

3.38 show ip rip

Command: show ip rip

Function: Show the routes in the RIP route data base.

Command Mode: Any mode.

Example:

show ip rip

Codes: R - RIP, K - Kernel, C - Connected, S - Static, O - OSPF, I - IS-IS,

B - BGP

Network	Next Hop	Metric From	If	Time
---------	----------	-------------	----	------

```
R 12.1.1.0/24      20.1.1.1          2 20.1.1.1      Vlan1 02:51
R 20.1.1.0/24          1                Vlan1
```

Amongst R stands for RIP route, namely a RIP route with the destination network address 12.1.1.0, the network prefix length as 24, next-hop address at 20.1.1.1. It is learnt from the Ethernet port E1/0/3 with a metric value of 2, and still has 2 minutes 51 seconds before time out.

3.39 show ip rip database

Command: show ip rip database

Function: Show the routes in the RIP route database.

Command Mode: Any mode

Example: Switch# show ip rip database

Codes: R - RIP, K - Kernel, C - Connected, S - Static, O - OSPF, I - IS-IS,
B -BGP

	Network	Next Hop	Metric From	If	Time
R	10.1.1.0/24		1	Vlan1	
R	20.1.1.0/24		1	Vlan2	

Command: show ip rip

3.40 show ip rip database vrf

This command is not supported by the switch.

3.41 show ip rip interface

Command: show ip rip interface [*<ifname>*]

Function: Show the RIP related messages.

Parameter: *<ifname>* is the name of the interface to show the messages.

Command Mode: Any mode.

Example: Switch# show ip rip interface vlan 1

Vlan1 is up, line protocol is up

Routing Protocol: RIP

Receive RIP packets

Send RIP packets

Passive interface: Disabled

Split horizon: Enabled with Poisoned Reversed

IP interface address:10.1.1.1/24

3.42 show ip rip interface vrf

This command is not supported by the switch.

3.43 show ip rip aggregate

Command: show ip rip aggregate

Function: To display the information of IPv4 aggregation route.

Parameter: None.

Command Mode: Admin and Configuration Mode.

Default: None.

Usage Guide: This command is used to display which interface the aggregation route be configured, Metric, Count, Suppress and so on. If configured under global mode, then the interface display “----”, “Metric” is metric. “Count” is the number of learned aggregation routes. “Suppress” is the times of aggregation.

Example: To display the information of IPv4 aggregation route.

```
Switch(Config-if-Vlan1)#show ip rip agg
```

Aggregate information of rip

Network	Aggregated Ifname	Metric	Count	Suppress
192.168.0.0/16	Vlan1	1	2	0
192.168.4.0/22	----	1	2	0
192.168.4.0/24	----	1	1	1
	Vlan1	1	1	1

Displayed information	Explanation
Network	Route prefix and prefix length.
Aggregated Ifname	To configure the interface name of the aggregation route. If the route aggregated globally, then display “----”.
Metric	Metric of aggregation route.
Count	The number of learned aggregation route.
Suppress	The times of aggregated for aggregation route.

3.44 show ip rip redistribute

This command is not supported by the switch.

3.45 show ip vrf

This command is not supported by the switch.

3.46 timers basic

Command: `timers basic <update> <invalid> <garbage>`
`no timers basic`

Function: Adjust the RIP timer update, timeout, and garbage collecting time. The “**no timers basic**” command restores each parameter to their default values.

Parameter: `<update>` time interval of sending update packet, shown in seconds and ranging between 5-2147483647; `<invalid>` time period after which the RIP route is advertised dead, shown in seconds and ranging between 5-2147483647; `<garbage>` is the hold time in which the a route remains in the routing table after advertised dead, shown in seconds and ranging between 5-2147483647.

Default: `<update>` defaulted at 30; `<invalid>` defaulted at 180; `<garbage>` defaulted at 120

Command Mode: Router mode

Usage Guide: The system is defaulted broadcasting RIPv4 update packets every 30 seconds; and the route is considered invalid after 180 seconds but still exists for another 120 seconds before it is deleted from the routing table.

Example: Set the RIP update time to 20 seconds and the timeout period to 80 second, the garbage collecting time to 60 seconds.

```
Switch(Config-Router)#timers basic 20 80 60
```

3.47 version

Command: `version {1| 2}`
`no version`

Function: Configure the version of all RIP data packets sent/received by router interfaces: the “**no version**” restores the default configuration.

Parameter: **1** is version 1 rip; **2** is version 2 rip.

Default: Sent and received data packet is version 2 by default.

Command Mode: Router mode and address-family mode

Usage Guide: 1 refers to that each interface of the layer 3 switch only sends/receives the RIP-I data packets. 2 refers to that each interface of the layer 3 switch only sends/receives the RIP-II data packets. The RIP-II data packet is the default version.

Example: Configure the version of all RIP data packets sent/received by router interfaces to version 2.

```
Switch(config-router)#version 2
```

Related Command: **ip rip receive version**

ip rip send version

Chapter 4 Commands for RIPng

4.1 clear ipv6 route

Command: `clear ipv6 rip route {<ipv6-address >| kernel |static | connected |rip |ospf |isis | bgp |all }`

Function: Clear specific route from the RIPng route table.

Parameter: Clears the route exactly match with the destination address from the RIP route table.

<ipv6-address > is the destination address shown in hex notation with prefix length.

kernel delete kernel route from the RIPng route table

static delete static route from the RIPng route table

connected delete direct route from the RIPng route table

rip delete RIPng route from the RIPng route table only

ospf delete IPv6 OSPF route from the RIPng route table only

bgp delete IPv6 BGP route from the RIPng route table only

ISIS delete ipv6 isis route from the RIPng route table only

all delete all routes from the RIPng route table

Default: No default configuration

Command Mode: Admin mode

Usage Guide: All routes in the RIPng route table will be deleted by using this command with all parameters.

Example: `Switch#clear ipv6 rip route 2001:1:1::/64`

`Switch#clear ipv6 rip route ospf`

4.2 default-information originate

Command: `default-information originate`

`no default-information originate`

Function: Permit redistributing the network 0:: into RIPng. The “**no default-information originate**” disables this function.

Parameter: None

Default: Disabled

Command Mode: Router mode

Example: `Switch#config terminal`

`Switch(config)#router ipv6 rip`

```
Switch(config-router)#default-information originate
```

4.3 default-metric

Command: `default-metric <value>`

`no default-metric`

Function: Set the default metric route value of the introduced route; the “**no default-metric**” restores the default value.

Parameter: `<value>` is the route metric value to be set, ranging between 1~16.

Default: Default route metric value is 1.

Command Mode: Router mode

Usage Guide: **default-metric** command is used for setting the default route metric value of the routes from other routing protocols when distributed into the RIPng routes. When using the **redistribute** commands for introducing routes from other protocols, the default route metric value specified by **default-metric** will be adopted if no specific route metric value is set.

Example: Set the default route metric value of the routes from other routing protocols when distributed into the RIPng routes as 3.

```
Switch(config-router)#default-metric 3
```

Related Command: **redistribute**

4.4 distance

Command: `distance <number> [<ipv6-address>] [<access-list-name / access-list-number>]`

`no distance [<ipv6-address>]`

Function: Set the managing distance with this command. The “**no distance [<A.B.C.D/M>]**” command restores the default value to 120.

Parameter: `<number>` specifies the distance value, ranging between 1-255. `<ipv6-address>` is the local link address or its prefix. `<access-list-name/access-list-number>` specifies the access-list number or name applied.

Default: The default managing distance of RIP is 120.

Command Mode: Router mode and address-family mode.

Usage Guide: In case there are routes from two different routing protocols to the same destination, the managing distance is then used for selecting routes. The less the managing distance of the route protocol is, the more reliable will be the route acquired

from the protocol.

Example:

```
Switch#config terminal
```

```
Switch(config)#router rip
```

```
Switch(config-router)#distance 8 fe80:1111::4200:21ff:fe00:11 mylist
```

4.5 distribute-list

Command: `distribute-list {access-list-name} |prefix<prefix-list-name> {in|out} [<ifname>|vlan <vlan-id>]`

`no distribute-list {access-list-name} |prefix<prefix-list-name> {in|out} [<ifname>|vlan <vlan-id>]`

Function: This command uses access-list or prefix-list to filter the route renews messages sent and received. The “`no distribute-list {access-list-name} |prefix<prefix-list-name> {in|out} [<ifname>|vlan <vlan-id>]`” command cancels this filter function.

Parameter: `<access-list-name>` is the name or access-list number to be applied. `<prefix-list-name>` is the name of the prefix-list to be applied. `<ifname>` specifies the name of interface to be applied with route filtering.

Default: Function disabled by RIPng by default.

Command Mode: Router mode

Usage Guide: The filter will be applied to all interfaces if no specific interface is set.

Example: Switch#config terminal

```
Switch(config)#router ipv6 rip
```

```
Switch(config-router)#distribute-list prefix myfilter in Vlan1
```

4.6 debug ipv6 rip

Command: `debug ipv6 rip [events| nsm| packet [recv|send]][detail]| all]`

`no debug ipv6 rip [events| nsm| packet [recv|send]][detail]| all]`

Function: For opening various debugging switches of RIPng, showing various debugging messages. The “`no debug ipv6 rip [events| nsm| packet [recv|send]][detail]| all]`” command closes the corresponding debugging switch.

Parameter: `events` shows the debugging message of RIPng events

`nsm` shows the communication messages between RIPng and NSM.

`packet` shows the debugging messages of RIPng data packets

`recv` shows the messages of the received data packets

send shows the messages of the sent data packets

detail shows the messages of the data packets received or sent.

Default: Not enabled

Command Mode: Admin mode

Example: Switch#debug ipv6 rip packet

```
Switch#1970/01/01 21:15:08 IMI: SEND[Ethernet1/0/4]: Send to [ff02::9]:521
1970/01/01 21:15:08 IMI: SEND[Ethernet1/0/2]: Send to [ff02::9]:521
1970/01/01 21:15:09 IMI: RECV[Ethernet1/0/4]: Receive from
[fe80::20b:46ff:fe57:8e60]:521
1970/01/01 21:15:09 IMI: RECV[Ethernet1/0/4]: 3000:1:1::/64 is filtered by access-list
dclist
1970/01/01 21:15:09 IMI: RECV[Ethernet1/0/4]: 3ffe:1:1::/64 is filtered by access-list dclist
1970/01/01 21:15:15 IMI: RECV[Ethernet1/0/2]: Receive from
[fe80::203:fff:fe01:257c]:521
```

4.7 debug ipv6 rip redistribute message send

Command: debug ipv6 rip redistribute message send

no debug ipv6 rip redistribute message send

Function: To enable the debugging of sending messages for routing redistribution messages from OSPFv3 or other external process for RIPng. The no form of this command will disable the debugging messages.

Parameter: None.

Default: Close the debug by default.

Command Mode: Admin Mode.

Usage Guide: None.

Example:

```
Switch# debug ipv6 rip redistribute message send
Switch# no debug ipv6 rip redistribute message send
```

4.8 debug ipv6 rip redistribute route receive

Command: debug ipv6 rip redistribute route receive

no debug ipv6 rip redistribute route receive

Function: To enable the debugging switch received from NSM for redistribution of routing information for RIPng. The no form of this command will disable the debugging switch.

Parameter: None.

Default: Close the debug by default.

Command Mode: Admin Mode.

Usage Guide: None.

Example:

```
Switch#debug ipv6 rip redistribute route receive
Switch# no debug ipv6 rip redistribute route receive
```

4.9 ipv6 rip aggregate-address

Command: `ipv6 rip aggregate-address X:X::X:X/M`
`no ipv6 rip aggregate-address X:X::X:X/M`

Function: To configure IPv6 aggregation route. The **no** form of this command deletes the IPv6 aggregation route.

Parameter: `X:X::X:X/M`: IPv6 address and prefix length.

Command Mode: Router Mode or Interface Configuration Mode.

Default: No aggregation route configured.

Usage Guide: If to configure aggregation route under router mode, RIPng protocol must be enabled. If configured under interface configuration mode, RIPng protocol may not be enabled, but the aggregation route can operation after the RIPng protocol be enabled on interface.

Example: To configure aggregation route as 2001:3f:ed8::99/64 globally.

```
Switch(config)#router rip
Switch(config-router) #ipv6 rip agg 2001:3f:ed8::99/64
```

4.10 ipv6 rip split-horizon

Command: `ipv6 rip split-horizon [poisoned]`
`no ipv6 rip split-horizon`

Function: Permit the split horizon. The “**no ipv6 rip split-horizon**” disables the split horizon.

Parameter: `[poisoned]` configures split horizon with poison reverse.

Default: Split horizon with poison reverse.

Command Mode: Interface Configuration Mode.

Usage Guide: The split horizon is for preventing the routing loops, namely preventing the layer 3 switch from broadcasting a route at the interface from which the very route is learnt. The command can configure on IPv6 tunnel interface, but it is successful configuration to only configure tunnel carefully.

Example: Switch#config terminal
Switch(config)#interface Vlan1
Switch(config-if-Vlan1)#ipv6 rip split-horizon poisoned

4.11 ipv6 router rip

Command: `ipv6 router rip`
`no ipv6 router rip`

Function: Enable RIPng on the interface. The “**no ipv6 router rip**” command disables RIPng on the interface.

Default: Not configured

Command Mode: Interface Configuration Mode.

Usage Guide: The command can configure on IPv6 tunnel interface, but it is successful configuration to only configure tunnel carefully.

Example: Switch#config terminal
Switch(config)#interface Vlan1
Switch(Config-if-Vlan1)#ipv6 router rip

4.12 neighbor

Command: `neighbor <ipv6-address> {<ifname> vlan <vlan-id>}`
`no neighbor <ipv6-address> {<ifname> vlan <vlan-id>}`

Function: Specify the destination address for fixed sending. The “**no neighbor <ipv6-address> <ifname> vlan <vlan-id>**” cancels the specified address defined and restores all trusted gateways.

Parameter: `<ipv6-address>` is the IPv6 Link-local address specified for sending and shown in colon hex notation without the prefix length. `<ifname>` is the name of interface.

Default: Not sending to any fixed destination address.

Command Mode: Router mode

Usage Guide: When used associating passive-interface command it would be able to send routing messages to specified neighbor only.

Example: Switch#config terminal
Switch(config)#router ipv6 rip
Switch(config-router)#neighbor FE80:506::2 Vlan1

Related Command: `passive-interface`

4.13 offset-list

Command: `offset-list <access-list-number|access-list-name> {in|out} <number> [<ifname>|vlan <vlan-id>]`

`no offset-list <access-list-number|access-list-name> {in|out} <number> [<ifname>|vlan <vlan-id>]`

Function: Add an offset value on the routing metric value learnt by RIPng. The “`no offset-list <access-list-number|access-list-name> {in|out} <number> [<ifname>|vlan <vlan-id>]`” command disables this function.

Parameter: `<access-list-number |access-list-name>` is the access-list or name to be applied. `<number>` is the additional offset value, ranging between 0-16; `<ifname>` is the name of specific interface.

Default: The default offset value is the metric value of the interface defined by the system.

Command Mode: Router mode

Example: Switch#config terminal

```
Switch(config)#router ipv6 rip
```

```
Switch(config-router)#offset-list 1 in 5 Vlan1
```

Related Command: `access-list`

4.14 passive-interface

Command: `passive-interface<ifname>|vlan <vlan-id>`

`no passive-interface<ifname>|vlan <vlan-id>`

Function: Set the RIPng layers 3 switches to block RIPng broadcast on the specified interfaces, and only send the RIPng data packet to the layer 3 switch which is configured with neighbor.

Parameter: `<ifname>` is the specific interface name.

Default: Not configured

Command Mode: Router mode

Example: Switch#config terminal

```
Switch(config)#router ipv6 rip
```

```
Switch(config-router)#passive-interface Vlan1
```

Related Command: `show ipv6 rip`

4.15 redistribute

Command: `redistribute {kernel |connected| static| ospf| isis| bgp} [metric<value>]`

[route-map<word>]

no redistribute {kernel |connected| static| ospf| isis| bgp}

[metric<value>] [route-map<word>]

Function: Introduce the routes learnt from other routing protocols into RIPng.

Parameter: **kernel** introduce from kernel routes

connected introduce from direct routes

static introduce from static routes

ospf introduce from IPv6 OSPF routes

isis introduce from IPv6 ISIS routes

bgp introduce from IPv6 BGP routes

<value> is the metric value assigned to the introduced route, ranging between 0-16

<word> is the probe pointing to the route map for introducing routes

Command Mode: Router mode

Example: Switch#config terminal

Switch(config)#router ipv6 rip

Switch(config-router)#redistribute kernel route-map ip

4.16 redistribute ospf

Command: redistribute ospf [<process-tag>] [metric<value>] [route-map<word>]

no redistribute ospf [<process-tag>]

Function: To redistribute routing information from external OSPFv3 processes to RIPng process. The **no** form of this command will remove the introduced OSPFv3 routing entries.

Parameters: **process-tag** is the string tag for OSPFv3 process with maximum length limited within 15 characters. If not specified, the default process will be used.

metric<value> is the metric for the introduced routing entries, limited between 0 and 16.

route-map<word> is the pointer to the introduced routing map.

Default: Not redistributed by default.

Command Mode: RIPng Configuration Mode.

Usage Guide: None.

Example: To redistribute OSPFv3 ABC routing to RIPng.

Switch(config)#router ipv6 rip

Switch (config-router)#redistribute ospf abc

4.17 route

Command: `route <ipv6-address>`

`no route <ipv6-address>`

Function: This command configures a static RIPng route. The “**no route <ipv6-address>**” command deletes this route.

Parameter: Specifies this destination IPv6 address prefix and its length show in colon hex notation.

Usage Guide: The command adds a static RIPng route, and is mainly used for debugging. Routes configured by this command will not appear in kernel route table but in the RIPng route database, however it could be located by using the `show ipv6 rip` command.

Command Mode: Router mode

Example: Switch#config terminal

```
Switch(config)#router ipv6 rip
```

```
Switch(config-router)#route 3ffe:1234:5678::1/64
```

4.18 router ipv6 rip

Command: `router ipv6 rip`

`no router ipv6 rip`

Function: Enable RIPng routing process and entering RIPng mode; the “**no router ipv6 rip**” of this command disables the RIPng routing protocol.

Default: RIPng routing not running.

Command Mode: Global mode

Usage Guide: This command is for enabling the RIPng routing protocol, this command should be enabled before performing other global configuration of the RIPng protocol.

Example: Enable the RIPng protocol mode.

```
Switch(config)#router ipv6 rip
```

4.19 show debugging ipv6 rip

Command: `show debugging ipv6 rip`

Function: Show RIPng debugging status for following debugging options: nsm debugging, RIPng event debugging, RIPng packet debugging and RIPng nsm debugging.

Command Mode: Admin mode

Example:

```
Switch#show debugging ipv6 rip
```

RIPng debugging status:

- RIPng event debugging is on
- RIPng packet detail debugging is on
- RIPng NSM debugging is on

4.20 show ipv6 rip interface

Command: show ipv6 rip interface

Function: Make sure the interface and line protocols is up.

Command Mode: Admin mode

Example: Switch(config)#show ipv6 rip interface

```

Loopback is up, line protocol is up
RIPng is not enabled on this interface
Vlan1 is up, line protocol is up
Routing Protocol: RIPng
Passive interface: Disabled
Split horizon: Enabled with Poisoned Reversed
IPv6 interface address:
3000:1:1::1/64
fe80::203:fff:fe0c:cda/64
    
```

Displayed information	Explanations
Vlan1 is up, line protocol is up	Interface is Up
Routing Protocol: RIP	The routing protocol running on the interface is RIPng
Passive interface: Disabled	Passive-interface disabled
Split horizon: Enabled with Poisoned Reversed	The split horizon is enabled with poisoned reversed on the interface.
IP interface address: 3000:1:1::1/64 fe80::203:fff:fe01:429e/64	IPv6 address of the interface

4.21 show ipv6 rip redistribute

Command: show ipv6 rip redistribute

Function: Show the configuration information of redistributed other out routing to RIPng.

Parameter: None.

Default: Not shown by default.

Command Mode: Admin Mode and Configuration Mode.

Usage Guide: None.

Example:

Switch#show ipv6 rip redistribute

4.22 show ipv6 protocols rip

Command: show ipv6 protocols rip

Function: Show the RIPng process parameters and statistic messages.

Command Mode: Admin mode

Example: Switch(config)#show ipv6 protocols rip

```

Routing Protocol is "RIPng"
Sending updates every 30 seconds with +/-50%, next due in 1 second
Timeout after 180 seconds, garbage collect after 120 seconds
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Ethernet1/0/4 filtered by dclist
Default redistribute metric is 1
Redistributing: static
Interface
Vlan10
Vlan2
Routing for Networks:
    
```

Displayed information	Explanations
Sending updates every 30 seconds with +/-50%, next due in 1 seconds	Sending updates every 30 seconds
Timeout after 180 seconds, garbage collect after 120 seconds	The route timeout time is 180 seconds, the garbage collect time is 120 seconds
Outgoing update filter list for all interface is not set	Outgoing update filter list for all interface is not set
Incoming update filter list for all interface is not set	Incoming update filter list for all interface is not set
Default redistribution metric is 1	Default redistribution metric is 1
Redistributing: static	Redistricting the static route into the RIP routes

Interface Vlan10 Vlan2	The interfaces running RIP is Vlan 10 and Vlan 2
------------------------------	---

4.23 show ipv6 rip

Command: show ipv6 rip

Function: Show RIPng Routing.

Command Mode: Admin mode

Example: Switch#show ipv6 rip

Codes: R - RIP, K - Kernel, C - Connected, S - Static, O - OSPF, I - IS-IS,
B - BGP, a - aggregate, s - suppressed

	Network	Next Hop	If	Met	Tag	Time
R	2000:1:1::/64	::	Vlan2	1	0	
R	2001:1:1::/64	fe80::203:fff:fe01:257c	Vlan2	2	0	02:40
R	3000:1:1::/64	::	Vlan10	1	0	
R	3010:1:1::/64	::	--	1	0	

Amongst R stands for RIP route, namely a RIP route with the destination network address 2001:1:1::/64, next-hop address at fe80::203:fff:fe01:257c. It is learnt from the Ethernet port VLAN2 with a metric value of 2, and still has 2 minutes 40 seconds before time out.

Equal Command: show ipv6 rip database

4.24 show ipv6 rip database

Command: show ipv6 rip database

Function: Show messages related to RIPng database.

Command Mode: Admin mode

Example: Switch#show ipv6 rip database

Equal Command: show ipv6 rip

4.25 show ipv6 rip aggregate

Command: show ipv6 rip aggregate

Function: To display the information of IPv6 aggregation route.

Parameter: None.

Command Mode: Admin and Configuration Mode.

Default: None.

Usage Guide: This command is used to display which interface the aggregation route be configured, Metric, Count, Suppress and so on, if configured under global mode, then the interface display “----”. **“Metric”** is metric. **“Count”** is the number of learned aggregation routes. **“Suppress”** is the times of aggregation.

Example: To display the information of IPv6 aggregation route.

Switch(config-router)#show ipv rip agg

Aggregate information of ripng

Network	Aggregated Ifname	Metric	Count	Suppress
2001::/16	Vlan1	1	2	0
2001:1::/32	----	1	2	0
2001:1:2::/60	Vlan1	1	1	1
	----	1	1	1

Displayed information	Explanation
Network	Route prefix and prefix length.
Aggregated Ifname	To configure the interface name of the aggregation route. If the route aggregated globally, then display “----”.
Metric	Metric of aggregation route.
Count	The number of learned aggregation routes.
Suppress	The times of aggregated for aggregation route.

4.26 show ipv6 rip redistribute

Command: show ipv6 rip redistribute

Function: Show the configuration information of redistributed other out routing to RIPng.

Parameter: None.

Default: Not shown by default.

Command Mode: Admin Mode and Configuration Mode.

Usage Guide: None.

Example:

Switch#show ipv6 rip redistribute

4.27 timers basic

Command: `timers basic <update> <invalid> <garbage>`

no timers basic

Function: Adjust the RIP timer update, timeout, and garbage collecting time. The “**no timers basic**” command restores each parameter to their default values.

Parameter: `<update>` time interval of sending update packet, shown in seconds and ranging between 5-2147483647; `<invalid>` time period after which the RIP route is advertised dead, shown in seconds and ranging between 5-2147483647; `<garbage>` is the hold time in which the a route remains in the routing table after advertised dead, shown in seconds and ranging between 5-2147483647.

Default: `<update>` defaulted at 30; `<invalid>` defaulted at 180; `<garbage>` defaulted at 120

Command Mode: Router mode

Usage Guide: The system is defaulted broadcasting RIPng update packets every 30 seconds; and the route is considered invalid after 180 seconds but still exists for another 120 seconds before it is deleted from the routing table.

Example: Set the RIP update time to 20 seconds and the timeout period to 80 seconds, the garbage collecting time to 60 seconds.

```
Switch(Config-Router)#timers basic 20 80 60
```

Chapter 5 Commands for OSPF

5.1 area authentication

Command: `area <id> authentication [message-digest]`

`no area <id> authentication`

Function: Configure the authentication mode of the OSPF area; the “`no area <id> authentication`” command restores the default value.

Parameter: `<id>` is the area number which could be shown in digit, ranging from 0 to 4294967295, or in IP address. `message-digest` is proved by MD5 authentication, or be proved by simple plaintext authentication if not choose this parameter.

Default: No authentication.

Command Mode: OSPF protocol mode

Usage Guide: Set the authentication mode to plaintext authentication or MD5 authentication. The authentication mode is also configurable under interface mode of which the priority is higher than those in the area. It is required to use `ip ospf authentication-key` to set the password while no authentication mode configured at the interface and the area is plaintext authentication, and use `ip ospf message-digest key` command to configure MD5 key if is MD5 authentication. The area authentication mode could not affect the authentication mode of the interface in this area.

Example: Set the authentication mode in area 0 to MD5.

```
Switch(config-router)#area 0 authentication message-digest
```

5.2 area default-cost

Command: `area <id> default-cost <cost>`

`no area <id> default-cost`

Function: Configure the cost of sending to the default summary route in stub or NSSA area; the “`no area <id> default-cost`” command restores the default value.

Parameter: `<id>` is the area number which could be shown as digits 0~4294967295, or as an IP address; `<cost>` ranges between `<0-16777215>`.

Default: Default OSPF cost is 1.

Command Mode: OSPF protocol mode

Usage Guide: The command is only adaptive to the ABR router connected to the stub area or NSSA area.

Example: Set the default-cost of area 1 to 10.

```
Switch(config-router)#area 1 default-cost 10
```

5.3 area filter-list

Command: `area <id> filter-list {access|prefix} {in|out}`

`no area <id> filter-list {access|prefix} {in|out}`

Function: Configure the filter broadcasting summary routing on the ABR; the “`no area <id> filter-list {access|prefix} {in|out}`” command restores the default value.

Parameter: `<id>` is the area number which could be shown in digits ranging between 0~4294967295, or as an IP address; `access-list` is appointed for use in access, so is `prefix-list` for prefix; `<name>` is the name of the filter, the length of which is between 1-256; `in` means from other areas to this area, `out` means from this area to other areas.

Default: No filter configured.

Command Mode: OSPF protocol mode

Usage Guide: This command is used for restraining routes from specific area from spreading between this area and other areas.

Example: Set a filter on the area 1.

```
Switch(config)#access-list 1 deny 172.22.0.0 0.0.0.255
```

```
Switch(config)#access-list 1 permit any
```

```
Switch(config)#router ospf 100
```

```
Switch(config-router)#area 1 filter-list access 1 in
```

5.4 area nssa

Command: `area <id> nssa [TRANSLATOR| no-redistribution |DEFAULT-ORIGINATE | no-summary]`

`no area <id> nssa [TRANSLATOR| no-redistribution | DEFAULT-ORIGINATE | no-summary]`

Function: Set the area to Not-So-Stubby-Area (NSSA) area.

Parameter: `<id>` is the area number which could be digits ranging between 0~4294967295, and also as an IP address.

TRANSLATOR = translator-role {candidate|never|always}, specifies the LSA translation mode for routes: **candidate** means if the router is elected translator, Type 7 LSA can be translated to Type-5 LSA, the default is **candidate**.

never means the router will never translate Type 7 LSA to Type 5 LSA.

always means the route always translate Type 7 LSA to Type 5 LSA.

no-redistribution means never distribute external-LSA to NSSA.

DEFAULT-ORIGINATE=default-information-originate [metric <0-16777214>]

[metric-type <1-2>], generate the Type-7 LSA.

metric <0-16777214> specifies the metric value.

metric-type <1-2> specifies the metric value type of external-LSA , default value is 2.

no-summary shows not injecting area route to the NSSA.

Default: No NSSA area defined by default.

Command Mode: OSPF protocol mode

Usage Guide: The same area can not be both NSSA and stub at the same time.

Example: Set area 3 to NSSA.

```
Switch#config terminal
```

```
Switch(config)#router ospf 100
```

```
Switch(config-router)#area 0.0.0.51 nssa
```

```
Switch(config-router)#area 3 nssa default-information-originate metric 34 metric-type 2
translator-role candidate no-redistribution
```

5.5 area range

Command: area <id> range <address> [advertise| not-advertise| substitute]

no area <id> range <address>

Function: Aggregate OSPF route on the area border. The “no area <id> range <address>” cancels this function.

Parameter: <id> is the area number which could be digits ranging between 0 ~ 4294967295, and also as an IP address.

<address>=<A.B.C.D/M> specifies the area network prefix and its length.

advertise: Advertise this area, which is the default.

not-advertise : Not advertise this area.

substitute= substitute <A.B.C.D/M>: advertise this area as another prefix.

<A.B.C.D/M>: Replace the network prefix to be advertised in this area.

Default: Not set.

Command Mode: OSPF protocol mode

Usage Guide: Use this command to aggregate routes inside an area. If the network IDs in this area are not configured continuously, a summary route can be advertised by configuring this command on ABR. This route consists of all single networks belong to specific range.

Example:

```
Switch#config terminal
```

```
Switch(config)# router ospf 100
```

```
Switch(config-router)# area 1 range 192.16.0.0/24
```

5.6 area stub

Command: `area <id> stub [no-summary]`

`no area <id> stub [no-summary]`

Function: Define an area to a stub area. The “`no area <id> stub [no-summary]`” command cancels this function.

Parameter: `<id>` is the area number which could be digits ranging between 0 ~ 4294967295, and also as an IP address.

no-summary: The area border routes stop sending link summary announcement to the stub area.

Default: Not defined.

Command Mode: OSPF protocol mode

Usage Guide: Configure area stub on all routes in the stub area. There are two configuration commands for the routers in the stub area: stub and default-cost. All routers connected to the stub area should be configured with area stub command. As for area border routers connected to the stub area, their introducing cost is defined with area default-cost command.

Example:

```
Switch # config terminal
```

```
Switch (config)# router ospf 100
```

```
Switch (config-router)# area 1 stub
```

Related Command: `area default-cost`

5.7 area virtual-link

Command: `area <id> virtual-link A.B.C.D {AUTHENTICATION | AUTH_KEY | INTERVAL}`

`no area <id> virtual-link A.B.C.D [AUTHENTICATION | AUTH_KEY | INTERVAL]`

Function: Configure a logical link between two backbone areas physically divided by non-backbone area. The “`no area <id> virtual-link A.B.C.D [AUTHENTICATION | AUTH_KEY | INTERVAL]`” command removes this virtual-link.

Parameter: `<id>` is the area number which could be digits ranging between 0 ~ 4294967295, and also as an IP address.

AUTHENTICATION = authentication [message-digest[message-digest-key <1-255> md5 <LINE>] |null|AUTH_KEY].

authentication : Enable authentication on this virtual link.

message-digest: Authentication with MD-5.

null : Overwrite password or packet summary with null authentication.

AUTH_KEY= authentication-key <key>.

<key>: A password consists of less than 8 characters.

INTERVAL= [dead-interval | hello-interval | message-digest-key<1-255>md5<LINE> | retransmit-interval | transmit-delay] <value>.

<value>:: The delay or interval seconds, ranging between 1~65535.

<dead-interval>: A neighbor is considered offline for certain dead interval without its group messages which the default is 40 seconds.

<hello-interval>: The time interval before the router sends a hello group message, default is 10 seconds.

<message-digest-key>: Authentication key with MD-5.

<retransmit-interval>: The time interval before a router retransmitting a group message, default is 5 seconds.

<transmit-delay>: The time delay before a router sending a group messages, default is 1 second.

Default: None.

Command Mode: OSPF protocol mode

Usage Guide: In the OSPF all non-backbone areas will be connected to a backbone area. If the connection to the backbone area is lost, virtual link will repair this connection. You can configure virtual link between any two backbone area routers connected with the public non-backbone area. The protocol treat routers connected by virtual links as a point-to-point network.

Example:

```
Switch#config terminal
```

```
Switch(config) #router ospf 100
```

```
Switch(config-router) #area 1 virtual-link 10.10.11.50 hello 5 dead 20
```

Relevant Commands: area authentication, show ip ospf, show ip ospf virtual-links

5.8 auto-cost reference-bandwidth

Command: auto-cost reference-bandwidth <bandwidth>

no auto-cost reference-bandwidth

Function: This command sets the way in which OSPF calculate the default metric value. The “no auto-cost reference-bandwidth” command only configures the cost to the interface by types.

Parameter: <bandwidth> reference bandwidth in Mbps, ranging between 1~4294967.

Default: Default bandwidth is 100Mbps.

Command Mode: OSPF protocol mode

Usage Guide: The interface metric value is acquired by divide the interface bandwidth with reference bandwidth. This command is mainly for differentiate high bandwidth links. If several high bandwidth links exist, their cost can be assorted by configuring a larger reference bandwidth value.

Example:

```
Switch#config terminal
Switch(config)#router ospf 100
Switch(config-router)#auto-cost reference-bandwidth 50
```

Relative Command: ip ospf cost

5.9 compatible rfc1583

Command: compatible rfc1583

no compatible rfc1583

Function: This command configures to rfc1583 compatible. The “no compatible rfc1583” command close the compatibility.

Default: Rfc 2328 compatible by default.

Command Mode: OSPF protocol mode

Example:

```
Switch#config terminal
Switch(config)#router ospf 100
Switch(config-router)#compatible rfc1583
```

5.10 clear ip ospf process

Command: clear ip ospf [*<process-id>*] process

Function: Use this command to clear and restart OSPF routing processes. One certain OSPF process will be cleared by specifying the process ID, or else all OSPF processes will be cleared.

Default: No default configuration.

Command Mode: Admin mode

Example:

```
Switch#clear ip ospf process
```

5.11 debug ospf events

Command: debug ospf events [abr|asbr|lsa|nssa|os|router|vlink]

no debug ospf events [abr|asbr|lsa|nssa|os|router|vlink]

Function: Open debugging switches showing various OSPF events messages; the “**no debug ospf events [abr|asbr|lsa|nssa|os|router|vlink]**” command closes the debugging switch.

Default: Closed

Command Mode: Admin and global mode

Example:

```
Switch#debug ospf events router
```

5.12 debug ospf ifsm

Command: debug ospf ifsm [status|events|timers]

no debug ospf ifsm [status|events|timers]

Function: Open debugging switches showing the OSPF interface states; the “**no debug ospf ifsm [status|events|timers]**” command closes this debugging switches.

Default: Closed

Command Mode: Admin mode and global mode

Example:

```
Switch#debug ospf ifsm events
```

5.13 debug ospf lsa

Command: debug ospf lsa [generate|flooding|install|maxage|refresh]

no debug ospf lsa [generate|flooding|install|maxage|refresh]

Function: Open debugging switches showing showing link state announcements; the “**no debug ospf lsa [generate|flooding|install|maxage|refresh]**” closes the debugging switches.

Default: Closed

Command Mode: Admin mode and global mode

Example:

```
Switch#debug ospf lsa generate
```

5.14 debug ospf nfsm

Command: debug ospf nfsm [status|events|timers]

no debug ospf nfsm [status|events|timers]

Function: Open debugging switches showing OSPF neighbor state machine; the “no debug ospf nfsm [status|events|timers]” command closes this debugging switch.

Default: Closed

Command Mode: Admin mode and global mode

Example:

```
Switch#debug ospf nfsm events
```

5.15 debug ospf nsm

Command: debug ospf nsm [interface|redistribute]

no debug ospf nsm [interface|redistribute]

Function: Open debugging switches showing OSPF NSM, the “no debug ospf nsm [interface|redistribute]” command closes this debugging switch.

Default: Closed

Command Mode: Admin mode and global mode

Example:

```
Switch#debug ospf nsm interface
```

5.16 debug ospf packet

Command: debug ospf packet [dd | detail | hello | ls-ack | ls-request | ls-update | rcv | detail]

no debug ospf packet [dd | detail | hello | ls-ack | ls-request | ls-update | rcv | detail]

Function: Open debugging switches showing OSPF packet messages; the “no debug ospf packet [dd | detail | hello | ls-ack | ls-request | ls-update | rcv | detail]” command closes this debugging switch.

Default: Closed

Command Mode: Admin mode and global mode

Example:

```
Switch#debug ospf packet hello
```

5.17 debug ospf route

Command: debug ospf route [ase|ia|install|spf]

no debug ospf route [ase|ia|install|spf]

Function: Open debugging switches showing OSPF related routes; the “no debug ospf route [ase|ia|install|spf]” command closes this debugging switch.

Default: Closed

Command Mode: Admin mode and global mode

Example:

```
Switch#debug ospf route spf
```

5.18 debug ospf redistribute message send

Command: debug ospf redistribute message send

no debug ospf redistribute message send

Function: To enable debugging of sending command from OSPF process redistributed to other OSPF process routing. The no form of command disables debugging of sending command from OSPF process redistributed to other OSPF process routing.

Parameter: None.

Default: Disabled.

Command Mode: Admin Mode.

Usage Guide: None.

Example: To enable debugging of sending command from OSPF process redistributed to other OSPF process routing.

```
Switch#debug ospf redistribute message send
```

5.19 debug ospf redistribute route receive

Command: debug ospf redistribute route receive

no debug ospf redistribute route receive

Function: To enable/disable debugging switch of received routing message from NSM for OSPF process.

Parameter: None.

Default: Disabled.

Command Mode: Admin Mode.

Usage Guide: None.

Example: To enable debugging switch of received routing message from NSM for OSPF

process.

Switch# debug ospf redistribute route receive

5.20 default-information originate

Command: `default-information originate [always | METRIC | METRICTYPE | ROUTEMAP]`

`no default-information originate`

Function: This command create a default external route to OSPF route area; the “**no default-information originate**” closes this feature.

Parameter: always: Whether default route exist in the software or not, the default route is always advertised.

METRIC = metric <value>: Set the metric value for creating default route, <value> ranges between 0~16777214, default metric value is 0.

METRICTYPE = metric-type {1|2} set the OSPF external link type of default route.

1 Set the OSPF external type 1 metric value.

2 Set the OSPF external type 2 metric value.

ROUTEMAP = route-map <WORD>.

<WORD> specifies the route map name to be applied.

Default: Default metric value is 10; default OSPF external link type is 2.

Command Mode: OSPF protocol mode

Usage Guide: When introducing route into OSPF route area with this command, the system will behaves like an ASBR.

Example:

```
Switch#config terminal
```

```
Switch(config)#router ospf 100
```

```
Switch(config-router)#default-information originate always metric 23 metric-type 2  
route-map myinfo
```

Relevant Commands: `route-map`

5.21 default-metric

Command: `default-metric <value>`

`no default-metric`

Function: The command set the default metric value of OSPF routing protocol; the “**no default-metric**” returns to the default state.

Parameter: *<value>*, metric value, ranging between 0~16777214.

Default: Built-in, metric value auto translating.

Command Mode: OSPF protocol mode

Usage Guide: When the default metric value makes the metric value not compatible, the route introducing still goes through. If the metric value can not be translated, the default value provides alternative option to carry the route introducing on. This command will result in that all introduced route will use the same metric value. This command should be used associating redistribute.

Example:

```
Switch#config terminal
Switch(config)#router ospf 100
Switch(config-router)#default-metric 100
```

5.22 distance

Command: `distance {<value>|ROUTEPARAMETER}`

`no distance ospf`

Function: Configure OSPF manage distance base on route type. The “no distance ospf” command restores the default value.

Parameter: *<value>*, OSPF routing manage distance, ranging between 1~235

ROUTEPARAMETER= ospf {ROUTE1|ROUTE2|ROUTE3}.

ROUTE1= external <external-distance>, Configure the distance learnt from other routing area.

<external-distance> distance value, ranging between 1~255.

ROUTE2= inter-area <inter-distance>, configure the distance value from one area to another area.

<inter-distance> manage distance value, ranging between 1~255.

ROUTE3= intra-area <intra-distance> Configure all distance values in one area.

<intra-distance> Manage distance value, ranging between 1~255.

Default: Default distance value is 110.

Command Mode: OSPF protocol mode

Usage Guide: Manage distance shows the reliability of the routing message source. The distance value may range between 1~255. The larger the manage distance value is, the lower is its reliability.

Example:

```
Switch#config terminal
Switch(config)#router ospf 100
Switch(config-router)#distance ospf inter-area 20 intra-area 10 external 40
```

5.23 distribute-list

Command: `distribute-list <access-list-name> out {kernel |connected| static| rip| isis| bgp}`

no distribute-list out {kernel |connected| static| rip| isis| bgp}

Function: Filter network in the routing update. The “**no distribute-list out {kernel |connected| static| rip| isis| bgp}**” command disables this function.

Parameter: `< access-list-name>` is the access-list name to be applied.

out: Filter the sent route update.

kernel Kernel route.

connected Direct route.

static Static route.

rip RIP route.

isis ISIS route.

bgp BGP route.

Command Mode: OSPF protocol mode

Usage Guide: When distributing route from other routing protocols into the OSPF routing table, we can use this command.

Example: Example below is the advertisement based on the access-list list 1 of the BGP route.

```
Switch#config terminal
```

```
Switch(config)#access-list 11 permit 172.10.0.0 0.0.255.255
```

```
Switch(config)#router ospf 100
```

```
Switch(config-router)#redistribute bgp
```

```
Switch(config-router)#distribute-list 1 out bgp
```

5.24 filter-policy

Command: `filter-policy <access-list-name>`

no filter-policy

Function: Use access list to filter the route obtained by OSPF, the **no** command cancels the route filtering.

Parameter: `<access-list-name>`: Access list name will be applied, it can use numeric standard IP access list and naming standard IP access list to configure.

Default: There is **no** default configuration.

Command Mode: OSPF protocol mode

Usage Guide: This command is used to filter the route obtained by OSPF. Do not filter any routes when the specified access list is not exist, for the routes which do not match permit rule of access list, they will be filtered. One access list can be set for this command, only the last configuration takes effect when configuring many times.

Example: Use access list 1 to filter the routes which do not belong to 172.10.0.0/16 segment.

```
Switch#config terminal
Switch(config)#access-list 1 permit 172.10.0.0 0.0.255.255
Switch(config)#router ospf
Switch(config-router)#filter-policy 1
```

5.25 host area

Command: `host <host-address> area <area-id> [cost <cost>]`

`no host <host-address> area <area-id> [cost <cost>]`

Function: Use this command to set a stub host entire belongs to certain area. The “[no] `host <host-address> area <area-id> [cost <cost>]`” command cancels this configuration.

Parameter: `<host-address>` is host IP address show in dotted decimal notation.

`<area-id>` area ID shown in dotted decimal notation or integer ranging between 0~4294967295.

`<cost>` specifies the entire cost, which is a integer ranging between 0~65535 and defaulted at 0.

Default: No entire set.

Command Mode: OSPF protocol mode

Usage Guide: With this command you can advertise certain specific host route out as stub link. Since the stub host belongs to special router in which setting host is not important.

Example:

```
Switch#config terminal
Switch(config)#router ospf 100
Switch(config-router)#host 172.16.10.100 area 1
Switch(config-router)#host 172.16.10.101 area 2 cost 10
```

5.26 ip ospf authentication

Command: `ip ospf [<ip-address>] authentication [message-digest[null]]`

no ip ospf [*<ip-address>*] authentication

Function: Specify the authentication mode required in sending and receiving OSPF packets on the interfaces; the “**no ip ospf [*<ip-address>*] authentication**” command cancels the authentication.

Parameter: *<ip-address>* is the interface IP address, shown in dotted decimal notation.

message-digest: Use MD5 authentication.

null: no authentication applied, which resets the password or MD5 authentication applied on the interface.

Default: Authentication not required in receiving OSPF packets on the interface.

Command Mode: Interface Configuration Mode.

Example:

```
Switch#config terminal
```

```
Switch(config)#interface vlan 1
```

```
Switch(Config-if-Vlan1)#ip ospf authentication message-digest
```

5.27 ip ospf authentication-key

Command: **ip ospf [*<ip-address>*] authentication-key <0 LINE / 7 WORD / LINE>**

no ip ospf [*<ip-address>*] authentication

Function: Specify the authentication key required in sending and receiving OSPF packet on the interface; the no command cancels the authentication key.

Parameter: *<ip-address>* is the interface IP address shown in dotted decimal notation; *<LINE>* specifies authentication key. If key option is 0, specify plaintext key. If key option is 7, specify encrypted string. If no option, specify plaintext key by default.

Default: Authentication not required in receiving OSPF packets on the interface.

Command Mode: Interface Configuration Mode.

Example:

```
Switch#config terminal
```

```
Switch(config)#interface vlan 1
```

```
Switch(Config-if-Vlan1)#ip ospf authentication-key 0 password
```

5.28 ip ospf cost

Command: **ip ospf [*<ip-address>*] cost <cost>**

no ip ospf [*<ip-address>*] cost

Function: Specify the cost required in running OSPF protocol on the interface; the “**no ip ospf [*<ip-address>*] cost**” command restores the default value.

Parameter: *<ip-address>* is the interface IP address shown in dotted decimal notation.

<cost > is the cost of OSPF protocol ranging between 1~65535.

Default: Default OSPF cost on the interface is auto-figure out based bandwidth.

Command Mode: Interface Configuration Mode.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf cost 3
```

5.29 ip ospf database-filter

Command: `ip ospf [<ip-address>] database-filter all out`

`no ip ospf [<ip-address>] database-filter`

Function: The command opens LSA database filter switch on specific interface; the “`no ip ospf [<ip-address>] database-filter`” command closes the filter switch.

Parameter: *<ip-address>* is the interface IP address shown in dotted decimal notation;

all: All LSAs.

out: Sent LSAs.

Default: Filter switch Closed.

Command Mode: Interface Configuration Mode.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf database-filter all out
```

5.30 ip ospf dead-interval

Command: `ip ospf [<ip-address>] dead-interval <time >`

`no ip ospf [<ip-address>] dead-interval`

Function: Specify the dead interval for neighboring layer 3 switch; the “`no ip ospf [<ip-address>] dead-interval`” command restores the default value.

Parameter: *<ip-address>* is the interface IP address shown in dotted decimal notation;

<time > is the dead interval length of the neighboring layer 3 switches, shown in seconds and ranging between 1~65535.

Default: The default dead interval is 40 seconds (normally 4 times of the hello-interval).

Command Mode: Interface Configuration Mode.

Usage Guide: If no Hello data packet received after the **dead-interval** period then this

layer 3 switch is considered inaccessible and invalid. This command modifies the dead interval value of neighboring layer 3 switch according to the actual link state. The set **dead-interval** value is written into the Hello packet and transmitted. To ensure the normal operation of the OSPF protocol, the dead-interval between adjacent layer 3 switches should be in accordance or at least 4 times of the **hello-interval** value.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf dead-interval 80
```

5.31 ip ospf disable all

Command: ip ospf disable all

no ip ospf disable all

Function: Stop OSPF group process on the interface.

Command Mode: Interface Configuration Mode.

Usage Guide: This command resets the network area command and stops group process on specific interface.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf disable all
```

5.32 ip ospf hello-interval

Command: ip ospf [*<ip-address>*] hello-interval *<time>*

no ip ospf [*<ip-address>*] hello-interval

Function: Specify the hello-interval on the interface; the “no ip ospf [*<ip-address>*] hello-interval” restores the default value.

Parameter: *<ip-address>* is the interface IP address shown in dotted decimal notation;
<time> is the interval sending HELLO packet, shown in seconds and ranging between 1~65535.

Default: The hello-interval on the interface is 10 seconds.

Command Mode: Interface Configuration Mode.

Usage Guide: HELLO data packet is the most common packet which is periodically sent to adjacent layer 3 switch to discover and maintain adjacent relationship, elect DR and BDR. The user set **hello-interval** value will be written into the HELLO packet and

transmitted. The less the **hello-interval** value is, the sooner the network topological structure is discovered as well larger the cost. To ensure the normal operation of OSPF protocol the **hello-interval** parameter between the layer 3 switches adjacent to the interface must be in accordance.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf hello-interval 20
```

Relevant Commands: ip ospf dead-interval

5.33 ip ospf message-digest-key

Command: ip ospf [*<ip-address>*] message-digest-key *<key_id>* MD5 *<0 LINE | 7 WORD | LINE>*

no ip ospf [*<ip-address>*] message-digest-key *<key_id>*

Function: Specify the key id and value of MD5 authentication on the interface; the **no** command restores the default value.

Parameter: *<ip-address>* is the interface IP address shown in dotted decimal notation;

<key_id> ranges between 1-255;

<LINE> is OSPF key. If key option is 0, specify plaintext key. If key option is 7, specify encrypted string. If no option, specify plaintext key by default.

Default: MD5 key is not configured.

Command Mode: Interface Configuration Mode.

Usage Guide: MD5 key encrypted authentication is used to ensure the safety between the OSPF routers on the network. Same key id and key should be configured between neighbors when using this command, or else no adjacent relationship will not be created.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf message-digest-key 2 MD5 0 yourpassword
```

5.34 ip ospf mtu

Command: ip ospf mtu *<mtu>*

no ip ospf mtu

Function: Specify the mtu value of the interface as the OSPF group structure according; the “**no ip ospf mtu**” command restores the default value.

Parameter: *<mtu>* is the interface mtu value ranging between 576~65535.

Default: Use the interface mtu acquired from the kernel.

Command Mode: Interface Configuration Mode.

Usage Guide: The interface value configured by this command is only used by OSPF protocol other than updated into kernel.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf mtu 1480
```

5.35 ip ospf mtu-ignore

Command: `ip ospf <ip-address> mtu-ignore`
`no ip ospf <ip-address> mtu-ignore`

Function: Use this command so that the mtu size is not checked when switching DD; the “no ip ospf <ip-address> mtu-ignore” will ensure the mtu size check when performing DD switch.

Parameter: *<ip-address>* is the interface IP address show in dotted decimal notation.

Default: Check mtu size in DD switch.

Command Mode: Interface Configuration Mode.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf mtu-ignore
```

5.36 ip ospf network

Command: `ip ospf network {broadcast | non-broadcast | point-to-point | point-to-multipoint}`
`no ip ospf network`

Function: This command configures the OSPF network type of the interface; the “no ip ospf network” command restores the default value.

Parameter: **broadcast:** Set the OSPF network type to broadcast.

non-broadcast: Set the OSPF network type to NBMA.

point-to-point: Set the OSPF network type to point-to-point.

point-to-multipoint: Set the OSPF network type to point-to-multipoint.

Default: The default OSPF network type is broadcast.

Command Mode: Interface Configuration Mode.

Example: The configuration below set the OSPF network type of the interface vlan 1 to point-to-point.

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf network point-to-point
```

5.37 ip ospf priority

Command: `ip ospf [<ip-address>] priority <priority>`

`no ip ospf [<ip-address>] priority`

Function: Configure the priority when electing “Defined layer 3 switch” at the interface. The “`no ip ospf [<ip-address>] priority`” command restores the default value.

Parameter: `<ip-address>` is the interface IP address show in dotted decimal notation.

`<priority>` is the priority of which the valid value ranges between 0~255.

Default: The default priority when electing DR is 1.

Command Mode: Interface Configuration Mode.

Usage Guide: When two layer 3 switches connected to the same segments both want to be the “Defined layer 3 switch”, the priority will decide which one should be chosen. Normally the one with higher priority will be elected, or the one with larger router-id number if the priorities are the same. A layer 3 switch with a priority equal to 0 will not be elected as “Defined layer 3 switch” or “Backup Defined layer 3 switch”.

Example: Configure the priority of DR electing. Configure the interface vlan 1 to no election right, namely set the priority to 0.

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf priority 0
```

5.38 ip ospf retransmit-interval

Command: `ip ospf [<ip-address>] retransmit-interval <time>`

`no ip ospf [<ip-address>] retransmit-interval`

Function: Specify the retransmit interval of link state announcements between the interface and adjacent layer 3 switches. The “`no ip ospf [<ip-address>] retransmit-interval`” command restores the default value.

Parameter: `<ip-address>` is the interface IP address show in dotted decimal notation.

`<time>` is the retransmit interveral of link state announcements between the

interface and adjacent layer 3 switches, shown in seconds ranging between 1~65535.

Default: Default retransmit interval is 5 seconds.

Command Mode: Interface Configuration Mode.

Usage Guide: When a layer 3 switch transmits LSA to its neighbor, it will maintain the link state announcements till confirm from the object side is received. If the confirm packet is not received within the interval, the LSA will be retransmitted. The retransmit interval must be larger than the time it takes to make a round between two layer 3 switches.

Example: Configure the LSA retransmit interval of interface vlan 1 to 10 seconds.

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf retransmit-interval 10
```

5.39 ip ospf transmit-delay

Command: `ip ospf [<ip-address>] transmit-delay <time>`

`no ip ospf [<ip-address>] transmit-delay`

Function: Set the transmit delay value of LSA transmitting; the “`no ip ospf [<ip-address>] transmit-delay`” restores the default value.

Parameter: *<ip-address>* is the interface IP address show in dotted decimal notation.

<time> is the transmit delay value of link state announcements between the interface and adjacent layer 3 switches, shown in seconds ranging between 1~65535.

Default: Default transmit delay value of link state announcements is 1 second.

Command Mode: Interface Configuration Mode.

Usage Guide: The LSA ages with time in the layer 3 switches, but not in the network transmitting process. By adding the **transmit-delay** prior to sending the LSA, the LSA will be sent before aged.

Example: Set the LSA transmit delay of interface vlan1 to 3 seconds.

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ip ospf transmit-delay 3
```

5.40 key

Command: `key <keyid>`

`no key <keyid>`

Function: This command is for managing and adding keys in the key chain. The “`no key <keyid>`” command deletes one key.

Parameter: *<keyid>* is key ID, ranging between 0-2147483647.

Command Mode: keychain Mode and keychain-key Mode

Usage Guide: The command permits entering the keychain-key mode and set the passwords corresponding to the keys.

Example: Switch#config terminal
Switch(config)#key chain mychain
Switch(config-keychain)#key 1
Switch(config-keychain-key)#

Relevant Commands: **key chain**, **key-string**, **accept-lifetime**, **send-lifetime**

5.41 key chain

Command: **key chain** *<name-of-chain>*

no key chain *< name-of-chain >*

Function: This command is for entering a keychain manage mode and configure a keychain. The “**no key chain** *< name-of-chain >*” command deletes one keychain.

Parameter: *<name-of-chain>* is the name string of the keychain the length of which is not specifically limited.

Command Mode: Global Mode and Keychain Mode.

Example: Switch#config terminal
Switch(config)#key chain mychain
Switch(config-keychain)#

5.42 log-adjacency-changes detail

Command: **log-adjacency-changes detail**

no log-adjacency-changes detail

Function: Configure to keep a log for OSPF adjacency changes or not.

Parameter: None.

Default: Don't I keep a log for OSPF adjacency changes by default.

Command Mode: OSPF Protocol Configuration Mode

Usage Guide: When this command is configured, the OSPF adjacency changes information will be recorded into a log.

Example:

Switch#config terminal
Switch(config)#router ospf 100

```
Switch(config-router)#log-adjacency-changes detail
```

5.43 max-concurrent-dd

Command: max-concurrent-dd <value>

no max-concurrent-dd

Function: This command set the maximum concurrent number of dd in the OSPF process; the “no max-concurrent-dd” command restores the default.

Parameter: <value> ranges between <1-65535>, which is the capacity of processing the concurrent dd data packet.

Default: Not set, no concurrent dd limit.

Command Mode: OSPF protocol mode

Usage Guide: Specify the max concurrent number of dd in the OSPF process.

Example: Set the max concurrent dd to 20.

```
Switch#config terminal
```

```
Switch(config)#router ospf 100
```

```
Switch(config-router)#max-concurrent-dd 20
```

5.44 neighbor

Command: neighbor A.B.C.D [<cost>| priority <value> | poll-interval <value>]

no neighbor A.B.C.D [<cost>| priority <value> | poll-interval <value>]

Function: This command configures the OSPF router connecting NBMA network. The “no neighbor A.B.C.D [<cost>| priority <value> | poll-interval <value>]” command removes this configuration.

Parameter: <cost>, OSPF neighbor cost value ranging between 1-65535;

priority <value>, neighbor priority defaulted at 0 and ranges between 0-255;

poll-interval <value>, 120s by default, which the polling time before neighbor relationship come into shape , ranging between 1-65535.

Default: No default configuration.

Command Mode: OSPF protocol mode

Usage Guide: Use this command on NBMA network to configure neighbor manually. Every known non-broadcasting neighbor router should be configured with a neighbor entry. The configured neighbor address should be the main address of the interface. The poll-interval should be much larger than the hello-interval.

Example:

```
Switch#config terminal
```

```
Switch(config)#router ospf 100
Switch(config-router)#neighbor 1.2.3.4 priority 1 poll-interval 90
Switch(config-router)#neighbor 1.2.3.4 cost 15
```

5.45 network area

Command: `network NETWORKADDRESS area <area-id>`

no network NETWORKADDRESS area <area-id>

Function: This command enables OSPF routing function on the interface with IP address matched with the network address. The “**no network NETWORKADDRESS area <area-id>**” command removes the configuration and stops OSPF on corresponding interface.

Parameter: `NETWORKADDRESS = A.B.C.D/M | A.B.C.D X.Y.Z.W`, Shown with the network address prefix or the mask. Wildcard mask if shown in mask;

`<area-id>` is the IP address or area number shown in point-to-point decimal system, if shown in decimal integer, it ranges between 0~4294967295.

Default: No default.

Command Mode: OSPF protocol mode

Usage Guide: When a certain segment belongs to a certain area, the interface segment belongs to will be in this area, starting hello and database interaction with the connected neighbor.

Example:

```
Switch#config terminal
Switch(config)#router ospf 100
Switch(config-router)#network 10.1.1.0/24 area 1
```

5.46 ospf abr-type

Command: `ospf abr-type {cisco|ibm|shortcut|standard}`

no ospf abr-type

Function: Use this command to configure an OSPF ABR type. The “**no ospf abr-type**” command restores the default value.

Parameter: `cisco`, Realize through Cisco ABR;

`ibm`, Realize through IBM ABR;

`shortcut`, Specify a shortcut-ABR;

`standard`, Realize with standard(RFC2328)ABR.

Default: Cisco by default.

Command Mode: OSPF protocol mode

Usage Guide: For Specifying the realizing type of abr. This command is good for interactive operation among different OSPF realizing method and is especially useful in the multiple host environment.

Example: Configure abr as standard.

```
Switch#config terminal
```

```
Switch(config)#router ospf 100
```

```
Switch(config-router)#ospf abr-type standard
```

5.47 ospf router-id

Command: `ospf router-id <address>`

no ospf router-id

Function: Specify a router ID for the OSPF process. The “**no ospf router-id**” command cancels the ID number.

Parameter: `<address>`, IPv4 address format of router-id.

Default: No default configuration.

Command Mode: OSPF protocol mode

Usage Guide: The new router-id takes effect immediately.

Example: Configure router-id of ospf 100 to 2.3.4.5.

```
Switch#config terminal
```

```
Switch(config)#router ospf 100
```

```
Switch(config-router)#ospf router-id 2.3.4.5
```

5.48 overflow database

Command: `overflow database <maxdbsize > [{hard|soft}]`

no overflow database

Function: This command is for configuring the max LSA number. The “**no overflow database**” command cancels the limit.

Default: Not configured.

Parameter: `< maxdbsize >`Max LSA numbers, ranging between 0~4294967294.

soft: Soft limit, warns when border exceeded.

hard: Hard limit, directly close ospf instance when border exceeded.

If there is not soft or hard configured, the configuration is taken as hard limit.

Command Mode: OSPF Protocol Mode.

Example:

```
Switch#config terminal
Switch(config)#router ospf
Switch(config-router)#overflow database 10000 soft
```

5.49 overflow database external

Command: `overflow database external [<maxdbsize> <maxtime>]`

no overflow database external [<maxdbsize> <maxtime>]

Function: The command is for configuring the size of external link database and the waiting time before the route exits overflow state. The “**no overflow database external [<maxdbsize> <maxtime>]**” restores the default value.

Parameter: `< maxdbsize >` size of external link database, ranging between 0~4294967294, defaulted at 4294967294.

`< maxtime >` the seconds the router has to wait before exiting the database overflow, ranging between 0~65535.

Command Mode: OSPF protocol mode

Example:

```
Switch#config terminal
Switch(config)#router ospf
Switch(config-router)#overflow database external 5 3
```

5.50 passive-interface

Command: `passive-interface <ifname> [<ip-address>]`

no passive-interface <ifname>[<ip-address>]

Function: Configure that the hello group not sent on specific interfaces. The “**no passive-interface <ifname> [<ip-address>]**” command cancels this function.

Parameter: `<ifname>` is the specific name of interface.

`<ip-address>` IP address of the interface in dotted decimal format.

Default: Not configured.

Command Mode: OSPF protocol mode

Example:

```
Switch#config terminal
Switch(config)#router ospf
Switch(config-router)#passive-interface vlan1
```

5.51 redistribute

Command: redistribute {kernel |connected| static| rip| isis| bgp} [metric<value>]
[metric-type {1|2}][route-map<word>][tag<tag-value>]

no redistribute {kernel |connected| static| rip| isis| bgp} [metric<value>]
[metric-type {1|2}][route-map<word>][tag<tag-value>]

Function: Introduce route learnt from other routing protocols into OSPF.

Parameter: **kernel** introduce from kernel route.

connected introduce from direct route.

static introduce from static route.

rip introduce from the RIP route.

isis introduce from ISIS route.

bgp introduce from BGP route.

metric <value> is the introduced metric value, ranging between 0-16777214.

metric-type {1|2} is the metric value type of the introduced external route, which can be 1 or 2, and it is 2 by default.

route-map <word> point to the probe of the route map for introducing route.

tag<tag-value> external identification number of the external route, ranging between 0~4294967295, defaulted at 0.

Command Mode: OSPF Protocol Mode.

Usage Guide: Learn and introduce other routing protocol into OSPF area to generate AS-external_LSAs.

Example:

```
Switch#config terminal
```

```
Switch(config)#router ospf
```

```
Switch(config-router)#redistribute bgp metric 12
```

5.52 redistribute ospf

Command: redistribute ospf [<process-id>] [metric<value>] [metric-type {1|2}][route-map<word>]

no redistribute ospf [<process-id>] [metric<value>] [metric-type {1|2}][route-map<word>]

Function: To redistribute of process ID routing to this process. The no form of command deletes the redistribution of process ID routing to this process. When input the optional parameters of metric, metric type and routemap, then restores default configuration.

Parameter: **process-id** is OSPF process ID, 0 by default.

metric <value> is the metric for redistributed routing, range between 0 to 16777214.

metric-type {1|2} is the metric type for redistributed routing, only can be 1 or 2, and 2 by default.

route-map <word> is the pointer to the introduced routing map.

Default: Not redistributed any OSPF routing by default.

Command Mode: OSPF Protocol Mode.

Usage Guide: When process-id is not input, that means OSPF routing will be redistributed by default (Process-id is 0).

Example:

```
Switch(config-router)#redistribute ospf
```

5.53 router ospf

Command: `router ospf <process_id>`

`no router ospf <process_id>`

Function: This command is for relating the OSPF process. The no command deletes the config.

Parameter: `<process_id>` specifies the ID of the OSPF process to be created, the ranging from 1 to 65535.

Command Mode: Global mode

Example:

```
Switch# config terminal
Switch(config)# router ospf 100
Switch(config-router)#network 10.1.1.0/24 area 0
```

5.54 show ip ospf

Command: `show ip ospf [<process-id>]`

Function: Display OSPF main messages.

Parameter: `<process-id>` is the process ID, ranging between 0~65535.

Default: Not displayed

Command Mode: Admin and configuration mode

Example:

```
Switch#show ip ospf
Routing Process "ospf 0" with ID 192.168.1.1
  Process uptime is 2 days 0 hour 30 minutes
```

Conforms to RFC2328, and RFC1583Compatibility flag is disabled
Supports only single TOS(TOS0) routes
Supports opaque LSA
SPF schedule delay 5 secs, Hold time between two SPF's 10 secs
Refresh timer 10 secs
Number of external LSA 0. Checksum Sum 0x000000
Number of opaque AS LSA 0. Checksum Sum 0x000000
Number of non-default external LSA 0
External LSA database is unlimited.
Number of LSA originated 0
Number of LSA received 0
Number of areas attached to this router: 1
Area 0 (BACKBONE) (Inactive)
Number of interfaces in this area is 0(0)
Number of fully adjacent neighbors in this area is 0
Area has message digest authentication
SPF algorithm executed 0 times
Number of LSA 0. Checksum Sum 0x000000

Routing Process "ospf 10" with ID 0.0.0.0
Process uptime is 4 days 23 hours 51 minutes
Conforms to RFC2328, and RFC1583Compatibility flag is disabled
Supports only single TOS(TOS0) routes
Supports opaque LSA
SPF schedule delay 5 secs, Hold time between two SPF's 10 secs
Refresh timer 10 secs
Number of external LSA 0. Checksum Sum 0x000000
Number of opaque AS LSA 0. Checksum Sum 0x000000
Number of non-default external LSA 0
External LSA database is unlimited.
Number of LSA originated 0
Number of LSA received 0
Number of areas attached to this router: 1
Area 0 (BACKBONE) (Inactive)
Number of interfaces in this area is 0(0)
Number of fully adjacent neighbors in this area is 0
Area has no authentication
SPF algorithm executed 0 times

Number of LSA 0. Checksum Sum 0x000000

5.55 show ip ospf border-routers

Command: show ip ospf [*<process-id>*] border-routers

Function: Display the intra-domain route entries for the switch to reach ABR and ASBR of all instances.

Parameter: *<process-id>* is the process ID, ranging between 0~65535.

Default: Not displayed

Command Mode: Admin and configuration mode

Example:

```
Switch#show ip ospf border-routers
```

```
OSPF process 0 internal Routing Table
```

```
Codes: i - Intra-area route, I - Inter-area route
```

```
i 10.15.0.1 [10] via 10.10.0.1, Vlan1, ASBR, Area 0.0.0.0
```

```
i 172.16.10.1 [10] via 10.10.11.50, Vlan2, ABR, ASBR, Area 0.0.0.0
```

5.56 show ip ospf database

Command: show ip ospf [*<process-id>*] database[{

```
  adv-router [{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  | asbr-summary[{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  | external [{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  | network [{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  | nssa-external [{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  | opaque-area [{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  | opaque-as [{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  | opaque-link [{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  | router [{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  | summary [{<linkstate_id>| self-originate |adv-router <advertiser_router>}]
  |self-originate | max-age }
```

Function: Display the OSPF link state data base messages.

Parameter: *<process-id>* is the process ID, ranging between 0~65535

<linkstate_id> Link state ID, shown in point divided demical system

<advertiser_router> is the ID of Advertising router, shown in point divided demical IP address format

Default: Not displayed

Command Mode: Admin and configuration mode

Usage Guide: According to the output messages of this command, we can view the OSPF link state database messages.

Example:

Switch#show ip ospf database

Router Link States (Area 0.0.0.2)

Link ID	ADV Router	Age	Seq#	CkSum	Link count
192.168.1.2	192.168.1.2	254	0x80000031	0xec21	1
192.168.1.3	192.168.1.3	236	0x80000033	0x0521	2

Net Link States (Area 0.0.0.2)

Link ID	ADV Router	Age	Seq#	CkSum
20.1.1.2	192.168.1.2	254	0x8000002b	0xece4

Summary Link States (Area 0.0.0.2)

Link ID	ADV Router	Age	Seq#	CkSum	Route
6.1.0.0	192.168.1.2	68	0x8000002b	0x5757	6.1.0.0/22
6.1.1.0	192.168.1.2	879	0x8000002a	0xf8bc	6.1.1.0/24
22.1.1.0	192.168.1.2	308	0x8000000c	0xc8f0	22.1.1.0/24

ASBR-Summary Link States (Area 0.0.0.2)

Link ID	ADV Router	Age	Seq#	CkSum
192.168.1.1	192.168.1.2	1702	0x8000002a	0x89c7

AS External Link States

Link ID	ADV Router	Age	Seq#	CkSum	Route
2.2.2.0	192.168.1.1	1499	0x80000056	0x3a63	E2 2.2.2.0/24 [0x0]
2.2.3.0	192.168.1.1	1103	0x8000002b	0x0ec3	E2 2.2.3.0/24 [0x0]

5.57 show ip ospf interface

Command: show ip ospf interface <interface>

Function: Display the OSPF interface messages.

Parameter: *<interface>* is the name of interface

Default: Not displayed

Command Mode: Admin and configuration mode

Example:

```
Switch#show ip ospf interface
```

```
Loopback is up, line protocol is up
```

```
    OSPF not enabled on this interface
```

```
Vlan1 is up, line protocol is up
```

```
    Internet Address 10.10.10.50/24, Area 0.0.0.0
```

```
        Process ID 0, Router ID 10.10.11.50, Network Type BROADCAST, Cost: 10
```

```
        Transmit Delay is 5 sec, State Waiting, Priority 1
```

```
        No designated router on this network
```

```
        No backup designated router on this network
```

```
        Timer intervals configured, Hello 35, Dead 35, Wait 35, Retransmit 5
```

```
        Hello due in 00:00:16
```

```
Neighbor Count is 0, Adjacent neighbor count is 0
```

5.58 show ip ospf neighbor

Command: `show ip ospf [<process-id>] neighbor [{<neighbor_id> |all |detail [all] |interface <ifaddress>}]`

Function: Display the OSPF adjacent point messages.

Parameter: *<process-id>* is the process ID ranging between 0~65535

<neighbor_id> is the dotted decimal notation neighbor ID

all: Display messages of all neighbors

detail: Display detailed messages of all neighbors

<ifaddress> Interface IP address

Default: Not displayed

Command Mode: Admin and configuration mode

Usage Guide: OSPF neighbor state can be checked by viewing the output of this command.

Example:

```
Switch#show ip ospf neighbor
```

```
OSPF process 0:
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.1.1	1	Full/Backup	00:00:32	6.1.1.1	Vlan1
192.168.1.3	1	Full/DR	00:00:36	20.1.1.3	Vlan2
192.168.1.3	1	Full/ -	00:00:30	20.1.1.3	VLINK2

Displayed information	Explanation
Neighbor ID	ID Neighbor ID
Priority	Priority
State	Neighbor relation state
Dead time	Neighbor dead time
Address	Interface Address
Interface	Interface name

5.59 show ip ospf redistribute

Command: `show ip ospf [<process-id>] redistribute`

Function: To display the routing message redistributed from external process of OSPF.

Parameter: `<process-id>` is the process ID ranging between 0~65535.

Default: None.

Command Mode: Admin Mode and Configuration Mode.

Usage Guide: None.

Example:

```
Switch#show ip ospf redistribute
      ospf process 1 redistribute information:
        ospf process 2
        ospf process 3
        bgp
      ospf process 2 redistribute information:
        ospf process 1
        bgp
      ospf process 3 redistribute information:
        ospf process 1
        bgp
```

```
Switch#show ip ospf 2 redistribute
      ospf process 2 redistribute information:
        ospf process 1
        bgp
```

5.60 show ip ospf route

Command: show ip ospf [*<process-id>*] route

Function: Display the OSPF routing table messages.

Parameter: *<process-id>* is the process ID ranging between 0~65535

Default: Not displayed

Command Mode: Admin and configuration mode

Example:

```
Switch#show ip ospf route
```

```
O 10.1.1.0/24 [10] is directly connected, Vlan1, Area 0.0.0.0
O 10.1.1.4/32 [10] via 10.1.1.4, Vlan1, Area 0.0.0.0
IA 11.1.1.0/24 [20] via 10.1.1.1, Vlan1, Area 0.0.0.0
IA 11.1.1.2/32 [20] via 10.1.1.1, Vlan1, Area 0.0.0.0
IA 12.1.1.0/24 [20] via 10.1.1.2, Vlan1, Area 0.0.0.0
IA 12.1.1.2/32 [20] via 10.1.1.2, Vlan1, Area 0.0.0.0
O 13.1.1.0/24 [10] is directly connected, Vlan4, Area 0.0.0.3
O 14.1.1.0/24 [10] is directly connected, Vlan5, Area 0.0.0.4
IA 15.1.1.0/24 [20] via 13.1.1.2, Vlan4, Area 0.0.0.3
IA 15.1.1.2/32 [20] via 13.1.1.2, Vlan4, Area 0.0.0.3
E1 100.1.0.0/16 [21] via 10.1.1.1, Vlan1
E1 100.2.0.0/16 [21] via 10.1.1.1, Vlan1
```

5.61 show ip ospf virtual-links

Command: show ip ospf [*<process-id>*] virtual-links

Function: Display the OSPF virtual link message.

Parameter: *<process-id>* is the process ID ranging between 0~65535.

Default: Not displayed

Command Mode: Admin and configuration mode

Example:

```
Switch#show ip ospf virtual-links
```

```
Virtual Link VLINK0 to router 10.10.0.9 is up
```

```
Transit area 0.0.0.1 via interface Vlan1
```

```
Transmit Delay is 1 sec, State Point-To-Point,
```

```
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
```

```
Hello due in 00:00:02
```

```

Adjacency state Full
Virtual Link VLINK1 to router 10.10.0.123 is down
Transit area 0.0.0.1 via interface Vlan1
Transmit Delay is 1 sec, State Down,
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in inactive
Adjacency state Down

```

5.62 show ip route process-detail

Command: show ip route [database] process-detail

Function: Display the IP routing table with specific process ID or Tag.

Parameters: The parameter of database means displaying all the routers, no parameter means only displaying effective routers.

Default: Not importing any router of OSPF process by default.

Command Mode: Admin mode and configure mode.

Usage Guide: None.

Example:

```
Switch#show ip route database process-detail
```

Codes: K - kernel, C - connected, S - static, R - RIP, B - BGP

O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

> - selected route, * - FIB route, p - stale info

```

C      *> 127.0.0.0/8 is directly connected, Loopback
O      192.168.2.0/24 [110/10] is directly connected, Vlan2, 00:06:13, process 12
C      *> 192.168.2.0/24 is directly connected, Vlan2

```

5.63 show ip route vrf process-detail

This command is not supported by the switch.

5.64 show ip protocols

Command: show ip protocols

Function: Display the running routing protocol messages.

Default: None

Command Mode: Admin and configuration mode

Example:

```
Switch#show ip protocols
```

Use "show ip protocols" command will show the messages of the routing protocol running on current layer 3 switch

For example, the displayed messages are:

```
Routing Protocol is "ospf 0"
```

```
  Invalid after 0 seconds, hold down 0, flushed after 0
```

```
  Outgoing update filter list for all interfaces is
```

```
  Incoming update filter list for all interfaces is
```

```
  Redistributing:
```

```
  Routing for Networks:
```

```
    10.1.1.0/24
```

```
    12.1.1.0/24
```

```
  Routing Information Sources:
```

```
    Gateway          Distance      Last Update
```

```
  Distance: (default is 110)
```

```
    Address          Mask          Distance List
```

```
Routing Protocol is "bgp 0"
```

```
  Outgoing update filter list for all interfaces is
```

```
  Incoming update filter list for all interfaces is
```

```
  IGP synchronization is disabled
```

```
  Automatic route summarization is disabled
```

```
  Neighbor(s):
```

```
    Address          Filtn Filtn Distln DistOut Weight RouteMap
```

```
Incoming Route Filter:
```

5.65 summary-address

Command: `summary-address <A.B.C.D/M> [{not-advertise|tag<tag-value>}]`

Function: Summarize or restrain external route with specific address scope.

Parameter: `<A.B.C.D/M>` address scope, shown in dotted decimal notation IPv4 address plus mask length.

not-advertised restrain the external routes.

tag<tag-value> is the identification label of the external routes, which ranges

between 0~4294967295, and is defaulted at 0.

Command Mode: OSPF protocol mode.

Usage Guide: When routes are introduced into OSPF from other routing protocols, it is required to advertise every route in a external LSA. This command is for advertise one summary route for those introduced routes contained in specific network address and masks, which could greatly reduces the size of the link state database.

Example:

```
Switch#config terminal
```

```
Switch(config)#router ospf
```

```
Switch(config-router)#summary-address 172.16.0.0/16 tag 3
```

5.66 timers spf

Command: `timers spf <spf-delay> <spf-holdtime>`

no timers spf

Function: Adjust the value of the route calculating timer. The “**no timers spf**” command restores relevant values to default.

Parameter: `<spf-delay>` 5 seconds by default.

`<spf-holdtime>` 10 seconds by default.

Command Mode: OSPF protocol mode.

Usage Guide: This command configures the delay time between receiving topology change and SPF calculation, further configured the hold item between two discontinuous SPF calculation.

Example:

```
Switch#config terminal
```

```
Switch(config)#router ospf
```

```
Switch(config-router)#timers spf 5 10
```

Chapter 6 Commands for OSPFv3

6.1 area default cost

Command: `area <id> default-cost <cost>`

`no area <id> default-cost`

Function: Configure the cost of sending to the default summary route in stub or NSSA area; the “`no area <id> default-cost`” command restores the default value.

Parameter: `<id>` is the area number which could be shown as digits 0~4294967295, or as an IP address; `<cost>` ranges between `<0-16777215>`

Default: Default OSPFv3 cost is 1.

Command Mode: OSPFv3 protocol mode

Usage Guide: The command is only adaptive to the ABR router connected to the stub area.

Example: Set the default-cost of area 1 to 10

```
Switch(config-router)#area 1 default-cost 10
```

6.2 area range

Command: `area <id> range <ipv6address> [advertise| not-advertise]`

`no area <id> range <ipv6address>`

Function: Aggregate OSPF route on the area border. The “`no area <id> range <address>`” cancels this function.

Parameter: `<id>` is the area number which could be digits ranging between 0~4294967295, and also as an IP address.

`<ipv6address>=<X:X::X:X/M>`, Specifies the area ipv6 network prefix and its length

advertise: Advertise this area

not-advertise : Not advertise this area

If both are not set, this area is defaulted for advertising

Default: Function not configured.

Command Mode: OSPFv3 protocol mode

Usage Guide: Use this command to aggregate routes inside an area. If the network IDs in this area are not configured continuously, a summary route can be advertised by configuring this command on ABR. This route consists of all single networks belong to specific range.

Example:

```
Switch # config terminal
Switch (config)# router ipv6 ospf
Switch (config-router)# area 1 range 2000::/3
```

6.3 area stub

Command: area <id> stub [no-summary]

no area <id> stub [no-summary]

Function: Define an area to a stub area. The “no area <id> stub [no-summary]” command cancels this function.

Parameter: <id> is the area number which could be digits ranging between 0 ~ 4294967295, and also as an IPv4 address.

no-summary: The area border routes stop sending link summary announcement to the stub area

Default: Not defined

Command Mode: OSPFv3 protocol mode

Usage Guide: Configure area stub on all routes in the stub area. There are two configuration commands for the routers in the stub area: stub and default-cost. All routers connected to the stub area should be configured with area stub command. As for area border routers connected to the stub area, their introducing cost is defined with area default-cost command.

Example:

```
Switch # config terminal
Switch (config)# router ipv6 ospf
Switch (config-router)# area 1 stub
```

Relevant Commands: area default-cost

6.4 area virtual-link

Command: area <id> virtual-link A.B.C.D [instance-id <instance-id> | INTERVAL <value>]

no area <id> virtual-link A.B.C.D [instance-id <instance-id> | INTERVAL]

Function: Configure a logical link between two backbone areas physically divided by non-backbone area. The “no area <id> virtual-link A.B.C.D [instance-id <instance-id> | INTERVAL]” command removes this virtual-link.

Parameter: <id> is the area number which could be digits ranging between 0 ~

4294967295, and also as an IP address.

<**instance-id**> is the interface instance ID ranging between 0~255 and defaulted at 0

INTERVAL= [*dead-interval*[/*hello-interval*[/*retransmit-interval*[/*transmit-delay*]

<**value**>: The delay or interval seconds, ranging between 1~65535

<**dead-interval**>: A neighbor is considered offline for certain dead interval without its group messages which the default is 40 seconds.

<**hello-interval**>: The time interval before the router sends a hello group message, default is 10 seconds

<**retransmit-interval**>: The time interval before a router retransmitting a group message, default is 5 seconds

<**transmit-delay**>: The time delay before a router sending a group messages, 1 second by default

Default: No default configuration.

Command Mode: OSPFv3 protocol mode

Usage Guide: In the OSPF all non-backbone areas will be connected to a backbone area. If the connection to the backbone area is lost, virtual link will repair this connection. You can configure virtual link between any two backbone areas routers connected with the public non-backbone area. The protocol treat routers connected by virtual links as a point-to-point network.

Example:

```
Switch#config terminal
```

```
Switch(config) #router ipv6 ospf
```

```
Switch(config-router) #area 1 virtual-link 10.10.11.50 hello 5 dead 20
```

```
Switch(config-router) #area 1 virtual-link 10.10.11.50 instance-id 1
```

6.5 abr-type

Command: **abr-type** {*cisco*|*ibm*| *standard*}

no abr-type [*cisco*|*ibm*| *standard*]

Function: Configure an OSPF ABR type with this command. The “**no abr-type** [*cisco*|*ibm*| *standard*]” command restores the default.

Parameter: **cisco**, realize by cisco ABR; **ibm**, realize by ibm ABR; **shortcut**, specify a shortcut-ABR; **standard**, realize with standard (RFC2328) ABR.

Default: Cisco configured by default

Command Mode: OSPFv3 protocol mode

Usage Guide: For Specifying the realizing type of abr. This command is good for interactive operation among different OSPF realizing method and is especially useful in the multiple host environment.

Example: Configure ABR as standard.

```
Switch#config terminal
Switch(config)#router ipv6 ospf
Switch(config-router)#abr-type standard
```

6.6 default-metric

Command: `default-metric <value>`

no default-metric

Function: The command set the default metric value of OSPF routing protocol; the “**no default-metric**” returns to the default state.

Parameter: `<value>`, metric value, ranging between 1~16777214.

Default: Built-in, metric value auto translating.

Command Mode: OSPF protocol mode

Usage Guide: When the default metric value makes the metric value not compatible, the route introducing still goes through. If the metric value can not be translated, the default value provides alternative option to carry the route introducing on. This command will result in that all introduced route will use the same metric value. This command should be used associating redistribute.

Example:

```
Switch#config terminal
Switch(config)#router ipv6 ospf
Switch(config-router)#default-metric 100
```

6.7 debug ipv6 ospf events

Command: `[no] debug ipv6 ospf events [abr|asbr|os|router|vlink]`

Function: Open debugging switches showing OSPF events. The “**no debug ipv6 ospf events [abr|asbr|os|router|vlink]**” command closes this debugging switch.

Default: Closed.

Command Mode: Admin mode

Example:

```
Switch#debug ipv6 ospf events
1970/01/01 01:10:35 IMI: ROUTER[Process:(null)]: GC timer expire
```

6.8 debug ipv6 ospf ifsm

Command: [no] debug ipv6 ospf ifsm [status|events|timers]

Function: Open debugging switches showing the OSPF interface states; the “[no] debug ospf ifsm [status|events|timers]” command closes this debugging switches.

Default: Closed.

Command Mode: Admin mode

Example:

```
Switch#debug ipv6 ospf ifsm
1970/01/01 01:11:44 IMI: IFSM[Vlan1]: Hello timer expire
1970/01/01 01:11:44 IMI: IFSM[Vlan2]: Hello timer expire
```

6.9 debug ipv6 ospf lsa

Command: [no]debug ipv6 ospf lsa [generate|flooding|install|maxage|refresh]

Function: Open debugging switches showing showing link state announcements; the “no debug ospf lsa [generate|flooding|install|maxage|refresh]” closes the debugging switches.

Default: Closed.

Command Mode: Admin mode

6.10 debug ipv6 ospf nfsm

Command: [no] debug ipv6 ospf nfsm [status|events|timers]

Function: Open debugging switches showing showing OSPF neighbor state machine; the “no debug ipv6 ospf nfsm [status|events|timers]” command closes this debugging switch.

Default: Closed.

Command Mode: Admin mode

```
Switch#debug ipv6 ospf nfsm
1970/01/01 01:14:07 IMI: NFSM[192.168.2.3-000007d4]: LS update timer expire
1970/01/01 01:14:07 IMI: NFSM[192.168.2.1-000007d3]: LS update timer expire
1970/01/01 01:14:08 IMI: NFSM[192.168.2.1-000007d3]: Full (HelloReceived)
1970/01/01 01:14:08 IMI: NFSM[192.168.2.1-000007d3]: nfsm_ignore called
1970/01/01 01:14:08 IMI: NFSM[192.168.2.1-000007d3]: Full (2-WayReceived)
```

6.11 debug ipv6 ospf nsm

Command: [no] debug ipv6 ospf nsm [interface|redistribute]

Function: Open debugging switches showing showing OSPF NSM, the “no debug ipv6 ospf nsm [interface|redistribute]” command closes this debugging switch.

Default: Closed.

Command Mode: Admin mode

6.12 debug ipv6 ospf packet

Command: [no] debug ipv6 ospf packet [dd | detail | hello | ls-ack | ls-request | ls-update | rcv | send]

Function: Open debugging switches showing OSPF packet messages; the “no debug ipv6 ospf packet [dd | detail | hello | ls-ack | ls-request | ls-update | rcv | send]” command closes this debugging switch.

Default: Closed.

Command Mode: Admin Mode.

6.13 debug ipv6 ospf redistribute message send

Command: debug ipv6 ospf redistribute message send

no debug ipv6 ospf redistribute message send

Function: To enable/disable debugging of sending command from IPv6 OSPF process redistributed to other IPv6 OSPF process routing.

Parameter: None.

Default: Disabled.

Command Mode: Admin Mode.

Usage Guide: None.

Example:

```
Switch#debug ipv6 ospf redistribute message send
```

6.14 debug ipv6 ospf redistribute route receive

Command: debug ipv6 ospf redistribute route receive

no debug ipv6 ospf redistribute route receive

Function: To enable/disable debugging of received routing message from NSM for IPv6 OSPF process.

Parameter: None.

Default: Disabled.

Command Mode: Admin Mode.

Usage Guide: None.

Example:

```
Switch# debug ipv6 ospf redistribute route receive
```

6.15 debug ipv6 ospf route

Command: [no] debug ipv6 ospf route [ase|ia|install|spf]

Function: Open debugging switches showing OSPF related routes; the “[no]debug ipv6 ospf route [ase|ia|install|spf]” command closes this debugging switch.

Default: Closed.

Command Mode: Admin mode

6.16 ipv6 ospf cost

Command: ipv6 ospf cost <cost> [instance-id <id>]

no ipv6 ospf <cost> [instance-id <id>]

Function: Specify the cost required in running OSPF protocol on the interface; the “no ipv6 ospf cost [instance-id <id>]” command restores the default value.

Parameter: <id> is the interface instance ID, ranging between 0~255, defaulted at 0

<cost > is the cost of OSPF protocol ranging between 1~65535.

Default: Default OSPF cost on the interface is 10.

Command Mode: Interface Configuration Mode.

Usage Guide: The command can configure on IPv6 tunnel interface, but it is successful configuration to only configure tunnel carefully.

Example:

```
Switch#config terminal
```

```
Switch(config)#interface vlan 1
```

```
Switch(Config-if-Vlan1)#ipv6 ospf cost 3
```

6.17 ipv6 ospf dead-interval

Command: ipv6 ospf dead-interval <time > [instance-id <id>]

no ipv6 ospf dead-interval [instance-id <id>]

Function: Specify the dead interval for neighboring layer 3 switch; the “no ipv6 ospf

dead-interval [instance-id <id>]” command restores the default value.

Parameter: **<id>** is the interface instance ID, ranging between 0~255, defaulted at 0

<time > is the length of the adjacent layer 3 switch, in seconds, ranging between 1~65535

Default: The default dead interval is 40 seconds (normally 4 times of the hello-interval).

Command Mode: Interface Configuration Mode.

Usage Guide: If no HELLO data packet received after the **dead-interval** period then this layer 3 switch is considered inaccessible and invalid. This command modifies the dead interval value of neighboring layer 3 switch according to the actual link state. The set **dead-interval** value is written into the Hello packet and transmitted. To ensure the normal operation of the OSPF protocol, the dead-interval between adjacent layer 3 switches should be in accordance or at least 4 times of the **hello-interval** value. The command can configure on IPv6 tunnel interface, but it is successful configuration to only configure tunnel carefully.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ipv6 ospf dead-interval 80
```

6.18 ipv6 ospf display route single-line

Command: **[no] ipv6 ospf display route single-line**

Function: **show ipv6 ospf route** change the display results of show ipv6 ospf route command. The “**no ipv6 ospf display route single-line**” restores to default display mode.

Default: Not configured

Command Mode: Global Mode

Usage Guide: The show ipv6 ospf route command displays the same route in several lines. This command will strict that one route will be displayed in one line.

Example:

```
Switch#config terminal
Switch(config)#ipv6 ospf display route single-line
```

6.19 ipv6 ospf hello-interval

Command: **ipv6 ospf hello-interval <time> [instance-id <id>]**

no ipv6 ospf hello-interval [instance-id <id>]

Function: Specify the hello-interval on the interface; the “**no ipv6 ospf hello-interval [instance-id <id>]**” restores the default value.

Parameter: **<id>** is the interface instance ID, ranging between 0~255, defaulted at 0
<time > is the length of the adjacent layer 3 switch, in seconds, ranging between 1~65535

Default: Default HELLO packet sending interval is 10 seconds.

Command Mode: Interface Configuration Mode.

Usage Guide: HELLO data packet is the most common packet which is periodically sent to adjacent layer 3 switch to discover and maintain adjacent relationship, elect DR and BDR. The user set **hello-interval** value will be written into the HELLO packet and transmitted. The less the **hello-interval** value is, the sooner the network topological structure is discovered as well larger the cost. To ensure the normal operation of OSPF protocol the **hello-interval** parameter between the layer 3 switches adjacent to the interface must be in accordance. The command can configure on IPv6 tunnel interface, but it is successful configuration to only configure tunnel carefully.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ipv6 ospf hello-interval 20
```

Relevant Commands: **ipv6 ospf dead-interval**

6.20 ipv6 ospf priority

Command: **ipv6 ospf priority <priority> [instance-id <id>]**

no ipv6 ospf priority[instance-id <id>]

Function: Configure the priority when electing “Defined layer 3 switch” at the interface. The “**no ipv6 ospf [<ip-address>] priority**” command restores the default value.

Parameter: **<id>** is the interface instance ID, ranging between 0~255, and defaulted at 0
<priority> is the priority of which the valid value ranges between 0~255.

Default: The default priority when electing DR is 1.

Command Mode: Interface Configuration Mode.

Usage Guide: When two layer 3 switches connected to the same segments both want to be the “Defined layer 3 switch”, the priority will decide which one should be chosen. Normally the one with higher priority will be elected, or the one with larger router-id number if the priorities are the same. A layer 3 switch with a priority equal to 0 will not be elected as “Defined layer 3 switch” or “Backup Defined layer 3 switch”. The command can configure on IPv6 tunnel interface, but it is successful configuration to only configure tunnel carefully.

Example: Configure the priority of DR electing. Configure the interface vlan 1 to no election right, namely set the priority to 0.

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ipv6 ospf priority 0
```

6.21 ipv6 ospf retransmit-interval

Command: `ipv6 ospf retransmit-interval <time> [instance-id <id>]`

no ipv6 ospf retransmit-interval [instance-id <id>]

Function: Specify the retransmit interval of link state announcements between the interface and adjacent layer 3 switches. The “**no ipv6 ospf retransmit-interval [instance-id <id>]**” command restores the default value.

Parameter: **<id>** is the interface instance ID, ranging between 0~255, defaulted at 0
<time> is the retransmit interval of link state announcements between the interface and adjacent layer 3 switches, shown in seconds and ranging between 1~65535.

Default: Default retransmit interval is 5 seconds.

Command Mode: Interface Configuration Mode.

Usage Guide: When a layer 3 switch transmits LSA to its neighbor, it will maintain the link state announcements till confirm from the object side is received. If the confirm packet is not received within the interval, the LSA will be retransmitted. The retransmit interval must be larger than the time it takes to make a round between two layer 3 switches. The command can configure on IPv6 tunnel interface, but it is successful configuration to only configure tunnel carefully.

Example: Configure the LSA retransmit interval of interface vlan 1 to 10 seconds.

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ipv6 ospf retransmit-interval 10
```

6.22 ipv6 ospf transmit-delay

Command: `ipv6 ospf transmit-delay <time> [instance-id <id>]`

no ipv6 ospf transmit-delay [instance-id <id>]

Function: Configure the LSA sending delay time on the interface. The “**no ipv6 ospf transmit-delay [instance-id <id>]**” command restores to the default.

Parameter: **<id>** is the instance ID ranging between 0~255 and defaulted at 0

<time> is the delay time of sending LSA on the interface, which is shown in

seconds and ranged between 1~65535.

Default: The default delay time of send LSA on the interface is 1 second by default.

Command Mode: Interface Configuration Mode.

Usage Guide: The LSA ages by time in the layer 3 switches but not in the transmission process. So by increasing the **transmit-delay** before sending LSA so that it will be sent out. The command can configure on IPv6 tunnel interface, but it is successful configuration to only configure tunnel carefully.

Example: Set the interface vlan 1 LSA sending delay to 3 seconds.

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ipv6 ospf transmit-delay 3
```

6.23 ipv6 router ospf

Command: [no] ipv6 router ospf {area <area-id> [instance-id <instance-id>]} tag <tag>[instance-id <instance-id>]} tag <tag> area <area-id> [instance-id <instance-id>]}

Function: Enable ospf route on the interface; the “no ipv6 router ospf {area <area-id> [instance-id <instance-id>]} tag <tag>[instance-id <instance-id>]} tag <tag> area <area-id> [instance-id <instance-id>]}” command cancels this configuration.

Parameter: <area-id> is an area ID which could be shown in digits ranging between 0~4294967295, or an IPv4 address

<instance-id> is the interface instance ID ranging between 0~255 and defaulted at 0.

<tag> ospfv3 process identifier

Default: Not configured

Command Mode: Interface Configuration Mode.

Usage Guide: To enable this command on the interface, the area id must be configured. The instance ID and instance tag are optional. The ospfv3 process allows one routing instance for each instance ID. The route can be enabled on a interface with a instance ID. If the instance IDs are different, several OSPF process can be run on one interface. However different OSPF process should not use the same instance ID The command can configure on IPv6 tunnel interface, but it is successful configuration to only configure tunnel carefully.

Example:

```
Switch#config terminal
Switch(config)#interface vlan 1
Switch(Config-if-Vlan1)#ipv6 router ospf area 1 tag IPI instance-id 1
```

6.24 max-concurrent-dd

Command: max-concurrent-dd <value>

no max-concurrent-dd

Function: Configure with this command the current dd max concurrent number in the OSPF processing. The “no max-concurrent-dd” command restores the default.

Parameter: <value> ranges between <1-65535>, the capacity of concurrent dd data packet processing.

Default: No default configuration. No dd concurrent limit.

Command Mode: OSPFv3 protocol mode

Usage Guide: Specify the current dd max concurrent number in the OSPF processing.

Example: Set the max concurrent dd to 20.

```
Switch#config terminal
```

```
Switch(config)#router ipv6 ospf
```

```
Switch(config-router)#max-concurrent-dd 20
```

6.25 passive-interface

Command: [no] passive-interface {<ifname>/vlan <vlan-id>}

Function: Configure that the hello group not sent on specific interfaces. The “no passive-interface{<ifname>/vlan <vlan-id>}” command cancels this function.

Parameter: <ifname> is the specific name of interface.

Default: Not configured

Command Mode: OSPFv3 protocol mode

Example: Switch#config terminal

```
Switch(config)#router ipv6 ospf
```

```
Switch(config-router)#passive-interface vlan1
```

6.26 redistribute

Command: [no] redistribute {kernel |connected| static| rip| isis| bgp} [metric<value>] [metric-type {1|2}][route-map<word>]

Function: Introduce route learnt from other routing protocols into OSPFv3.

Parameter: **kernel** Introduce from kernel route

connected Introduce from direct route

static Introduce from static route

rip Introduce from the RIP route

isis Introduce from ISIS route

bgp Introduce from BGP route

metric <value> is the introduced metric value, ranging between 0-16777214

metric-type {1|2} is the metric value type of the introduced external route, which can be 1 or 2, and it is 2 by default

route-map <word> targets to the probe of the route map for introducing route

Command Mode: OSPFv3 protocol mode

Usage Guide: Learn and introduce other routing protocol into OSPFv3 area to generate AS-external_LSAs.

Example: Switch#config terminal

```
Switch(config)#router ipv6 ospf
```

```
Switch(config-router)#redistribute bgp metric 12 metric-type 1
```

6.27 redistribute ospf

Command: `redistribute ospf [<process-tag>] [metric<value>] [metric-type {1|2}] [route-map<word>]`

`no redistribute ospf [<process-tag>] [metric<value>] [metric-type {1|2}][route-map<word>]`

Function: To redistribute routing information form process-tag to this command. The no form of command cancels the redistribution of process-tag routing to this process. When input the optional parameters of metric, metric type and routemap, then restores default configuration.

Parameter: **process-tag** is the process ID of IPv6 OSPF process, NULL by default.

metric <value> is the metric for redistributed routing, range between 0 to 16777214.

metric-type {1|2} is the metric type for redistributed routing, only can be 1 or 2, and 2 by default.

route-map <word> is the pointer to the introduced routing map.

Default: Not redistributed any OSPFv3 routing by default.

Command Mode: Router IPv6 OSPF Configuration Mode.

Usage Guide: When process-id is not input, that means OSPFv3 routing will be redistributed by default (Process-tag is NULL). The no form of command input the optional parameters of metric, metric-type and routemap, then restores default configuration. When not input any optional parameters that mean to delete the router of redistributed process.

Example:

```
Switch(config)#router ipv6 ospf
```

```
Switch(config-router)#redistribute ospf
```

6.28 router-id

Command: `router-id <router-id>`

`no router-id`

Function: Configure router ID for ospfv3 process. The “**no router-id**” restores ID to 0.0.0.0.

Parameter: `<router-id>` is the router ID shown in IPv4 format.

Default: 0.0.0.0 by default.

Usage Guide: If the router-id is 0.0.0.0, the ospfv3 process can not be normally enabled. It is required to configure a router-id for ospfv3.

Command Mode: OSPFv3 protocol mode

Example: Switch#config terminal

```
Switch(config)#router ipv6 ospf
```

```
Switch(config-router)#router-id 192.168.2.1
```

6.29 router ipv6 ospf

Command: `[no] router ipv6 ospf [<tag>]`

Function: This command initializes the ospfv3 routing process and enters ospfv3 mode for configuring the ospfv3 routing process. The “**no router ipv6 ospf [<tag>]**” command stops relevant process.

Parameter: `<tag>` ospfv3 is the process mark which could be random strings made up of characters and digits

Command Mode: Global mode

Usage Guide: To let the ospfv3 routing process work properly, this command must be configured and ospfv3 must at least be enabled on one interface. When the tag configured by the `ipv6 router ospf area` command under interface mode matches with the tag of ospf process, the ospfv3 process is enabled on this interface.

Example: Switch#config terminal

```
Switch(config)#router ipv6 ospf IPI
```

6.30 show ipv6 ospf

Command: `show ipv6 ospf [<tag>]`

Function: Display OSPF global and area messages.

Parameter: *<tag>* is the process tag which is a character string.

Default: Not displayed.

Command Mode: All modes

Example:

```
Switch#show ipv6 ospf
Routing Process "OSPFv3 (*null*)" with ID 192.168.2.2
SPF schedule delay 5 secs, Hold time between SPFs 10 secs
Minimum LSA interval 5 secs, Minimum LSA arrival 1 secs
Number of external LSA 0. Checksum Sum 0x0000
Number of AS-Scoped Unknown LSA 0
Number of LSA originated 6
Number of LSA received 14
Number of areas in this router is 1
Area BACKBONE(0)
Number of interfaces in this area is 2
SPF algorithm executed 6 times
Number of LSA 8. Checksum Sum 0x43D52
Number of Unknown LSA 0
```

6.31 show ipv6 ospf database

Command: show ipv6 ospf [*<tag>*] database

```
[ router [adv-router <advertiser_router>]
| network [adv-router <advertiser_router>]
| intra-prefix [adv-router <advertiser_router>]
| link [adv-router <advertiser_router>]
| external [adv-router <advertiser_router>]
| inter-prefix [adv-router <advertiser_router>]
| inter-router [adv-router <advertiser_router>]]
```

Function: Display the OSPF link state data base message.

Parameter: *<tag>* is the process tag which is a character string.

<advertiser_router> is the ID of Advertising router, shown in IPv4 address format

Default: Not displayed

Command Mode: All modes

Usage Guide: According to the output messages of this command, we can view the OSPF link state database messages.

Example:

Use show ipv6 ospf database command will be able to show LSA messages of the OSPF routing protocol

For Example, the displayed messages are:

```

OSPFv3 Router with ID (192.168.2.2) (Process *null*)
  Link-LSA (Interface Vlan1)
Link State ID  ADV Router    Age  Seq#      CkSum  Prefix
0.0.7.211     192.168.2.2  1409 0x80000001 0x6dda   1
0.0.7.212     192.168.2.3  1357 0x80000001 0x248e   1
  Link-LSA (Interface Vlan2)
Link State ID  ADV Router    Age  Seq#      CkSum  Prefix
0.0.7.211     192.168.2.1  1450 0x80000001 0xa565   1
0.0.7.212     192.168.2.2  1399 0x80000001 0x4305   1
  Router-LSA (Area 0.0.0.0)
Link State ID  ADV Router    Age  Seq#      CkSum  Link
0.0.0.0       192.168.2.1  1390 0x80000006 0x9fe2   1
0.0.0.0       192.168.2.2  1354 0x80000007 0x4af5   2
0.0.0.0       192.168.2.3  1308 0x80000004 0xbbc4   1
  Network-LSA (Area 0.0.0.0)
Link State ID  ADV Router    Age  Seq#      CkSum
0.0.7.211     192.168.2.1  1390 0x80000001 0x897e
0.0.7.211     192.168.2.2  1354 0x80000001 0x9b69
  Intra-Area-Prefix-LSA (Area 0.0.0.0)
Link State ID  ADV Router    Age  Seq#      CkSum  Prefix  Reference
0.0.0.1       192.168.2.1  1389 0x80000005 0x7e2e   1  Router-LSA
0.0.0.2       192.168.2.1  1389 0x80000001 0x22cb   1  Network-LSA
0.0.0.1       192.168.2.3  1306 0x80000002 0xd0d7   1  Router-LSA

```

Displayed information's	Explanations
Link-LSA (Interface Vlan1)	Link LSA messages of interface Vlan1
Router-LSA (Area 0.0.0.0)	Router LSA messages in Area 0
Network-LSA (Area 0.0.0.0)	Network LSA in Area 0
Intra-Area-Prefix-LSA (Area 0.0.0.0)	Intra-domain Prefix LSA in Area 0

6.32 show ipv6 ospf interface

Command: show ipv6 ospf interface <ifname>[vlan <vlan-id>

Function: Display the OSPF interface messages.

Parameter: <ifname> is the name of the interface.

Default: Not displayed

Command Mode: All modes

Example:

```
Switch#show ipv6 ospf interface
Loopback is up, line protocol is up
OSPFv3 not enabled on this interface
Vlan1 is up, line protocol is up
Interface ID 2003
IPv6 Prefixes
fe80::203:fff:fe01:257c/64 (Link-Local Address)
2001:1:1::1/64
OSPFv3 Process (*null*), Area 0.0.0.0, Instance ID 0
Router ID 192.168.2.2, Network Type BROADCAST, Cost: 10
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 192.168.2.2
Interface Address fe80::203:fff:fe01:257c
Backup Designated Router (ID) 192.168.2.3
Interface Address fe80::203:fff:fe01:d28
Timer interval configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:10
Neighbor Count is 1, Adjacent neighbor count is 1
Vlan2 is up, line protocol is up
Interface ID 2004
IPv6 Prefixes
fe80::203:fff:fe01:257c/64 (Link-Local Address)
2000:1:1::1/64
OSPFv3 Process (*null*), Area 0.0.0.0, Instance ID 0
Router ID 192.168.2.2, Network Type BROADCAST, Cost: 10
Transmit Delay is 1 sec, State Backup, Priority 1
Designated Router (ID) 192.168.2.1
Interface Address fe80::203:fff:fe01:429e
Backup Designated Router (ID) 192.168.2.2
Interface Address fe80::203:fff:fe01:257c
Timer interval configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:10
Neighbor Count is 1, Adjacent neighbor count is 1
```

Displayed information	Explanations
Vlan1 is up, line protocol is up	Let the interface up both logically and

	physically
IPv6 Prefixes fe80::203:fff:fe01:257c/64 (Link-Local Address) 2001:1:1::1/64	IPv6 address of the interface and the length of the prefix
OSPFv3 Process (*null*)	OspfV3 process the interface belongs
Area 0.0.0.1	Area the interface belongs
Instance ID 0	Instance ID is 0
Router ID 192.168.2.2, Network Type BROADCAST, Cost: 10	Process ID; Router ID; Network Type; Cost
Transmit Delay is 1 sec, State DR, Priority 1	LAS transmission delay on the interface; state; electing the priority of the layer 3 switch.
Designated Router (ID) 192.168.2.2 Interface Address fe80::203:fff:fe01:257c	Specifying layer 3 switch
Backup Designated Router (ID) 192.168.2.3 Interface Address fe80::203:fff:fe01:d28	Back up designated layer 3 switch
Timer interval configured, Hello 10, Dead 40, Wait 40, Retransmit 5 Hello due in 00:00:10	OSPF protocol timer; including hello packet, poll interval packets, router dead, router retransmission.
Neighbor Count is 1, Adjacent neighbor count is 1	Numbers of the adjacent layer 3 switch; number of the layer 3 switches established with neighbor relation

6.33 show ipv6 ospf neighbor

Command: show ipv6 ospf [*<tag>*] neighbor [*<neighbor_id>* | *<ifname>* detail | detail]

Function: Show OSPF adjacent point messages.

Parameter: *<tag>* is process tag, which is a character string

<neighbor_id> is the neighbor ID shown in IPv4 address format

detail: Show neighbor details

<ifname> name of the interface

Default: Not displayed

Command Mode: All modes

Usage Guide: OSPF neighbor state can be checked by viewing the output of this command.

Example:

Switch#show ipv6 ospf neighbor

OSPFv3 Process (*null*)

Neighbor ID	Pri	State	Dead Time	Interface	Instance ID
192.168.2.3	1	Full/Backup	00:00:29	Vlan1	0
192.168.2.1	1	Full/DR	00:00:38	Vlan2	0

Displayed information	Explanation
Neighbor ID	Neighbor ID
Instance ID	Instance ID
Address	IP address of neighboring layer 3 switch
Interface	Interface the neighbor belongs
State	Neighbor relationship state
Pri	Priority

6.34 show ipv6 ospf route

Command: show ipv6 ospf [<tag>] route

Function: Show the OSPF route table messages.

Parameter: <tag> is the processes tag, which is a character string.

Default: Not displayed

Command Mode: All modes

Example:

Switch#show ipv6 ospf route

Codes: C - connected, D - Discard, O - OSPF, IA - OSPF inter area

E1 - OSPF external type 1, E2 - OSPF external type 2

Destination	Metric
Next-hop	
O 2000:1:1::/64	10
directly connected, Vlan2	
O 2001:1:1::/64	10
directly connected, Vlan1	
O 3000:1:1::/64	20
via fe80::203:fff:fe01:429e, Vlan2	
O 3003:1:1::/64	20
via fe80::203:fff:fe01:d28, Vlan1	

6.35 show ipv6 ospf redistribute

Command: show ip ospf v6 [*<process-tag>*] redistribute

Function: To display the routing message redistributed from external process of OSPF.

Parameter: IPv6 OSPF is the tag ID, to display all routing messages redistributed from external process of IPv6 OSPF if there is **no** parameter.

Default: None.

Command Mode: Admin Mode and Configuration Mode.

Usage Guide: None.

Example:

```
Switch#show ipv6 ospf redistribute
      ospf process abc redistribute information:
        ospf process def
        bgp
      ospf process def redistribute information:
        ospf process abc
```

```
Switch#show ipv6 ospf abc redistribute
      ospf process abc redistribute information:
        ospf process def
        bgp
```

6.36 show ipv6 ospf topology

Command: show ipv6 ospf [*<tag>*] topology [area *<area-id>*]

Function: Show messages of OSPF topology.

Parameter: *<tag>* is the processes tag, which is a character string.

<area-id> is an area ID which could be shown in digits ranging between 0~4294967295, or an IPv4 address.

Default: Not displayed.

Command Mode: All modes

Example:

```
Switch#show ipv6 ospf topology
OSPFv3 Process (*null*)
OSPFv3 paths to Area (0.0.0.0) routers
Router ID      Bits  Metric  Next-Hop      Interface
192.168.2.1    10    192.168.2.1  Vlan2
```

192.168.2.2	--		
192.168.2.3	10	192.168.2.3	Vlan1

6.37 show ipv6 ospf virtual-links

Command: show ipv6 ospf [<tag>] virtual-links

Function: Show OSPF virtual link messages.

Parameter: <tag> is the processes tag, which is a character string.

Default: Not displayed.

Command Mode: All modes

Example:

```
Switch#show ipv6 ospf virtual-links
Virtual Link VLINK1 to router 5.6.7.8 is up
Transit area 0.0.0.1 via interface Vlan1, instance ID 0
Local address 3ffe:1234:1::1/128
Remote address 3ffe:5678:3::1/128
Transmit Delay is 1 sec, State Point-To-Point,
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:01
Adjacency state Up
```

6.38 show ipv6 route process-detail

Command: show ipv6 route [database] process-detail

Function: Display the IP routing table with specific process ID or Tag.

Parameters: The parameter of database means displaying all the routers, no parameter means only displaying effective routers.

Command Mode: Admin mode and configure mode.

Usage Guide: None.

Example:

```
Switch#show ipv6 route database process-detail
IPv6 Routing Table
Codes: K - kernel route, C - connected, S - static, R - RIP, O - OSPF,
       I - IS-IS, B - BGP
       > - selected route, * - FIB route, p - stale info
Timers: Uptime
```

```
C*> ::1/128 via ::, Loopback, 00:29:53
O 2001::/64 [110/10] via ::, Vlan1, 00:01:07 ,process aaa
C*> 2001::/64 via ::, Vlan1, 00:02:54
O*> 2006::/64 [110/10] via ::, Vlan1, 00:01:07, process aaa
O*> 2008::/64 [110/20] via fe80::203:fff:fe01:2542, Vlan1, 00:00:54, process bbb
```

6.39 timers spf

Command: `timers spf <spf-delay> <spf-holdtime>`

no timers spf

Function: Adjust route calculation timer value. The “**no timers spf**” restores the relevant value to default.

Parameter: `<spf-delay>` 5 seconds by default

`<spf-holdtime>` 10 seconds by default

Command Mode: OSPFv3 protocol mode

Usage Guide: In this command the delay time between receiving topology change and SPF calculation, and further configured the hold time between two discontinuous SPF calculations.

Example: Switch#config terminal

```
Switch(config)#router ipv6 ospf
```

```
Switch(config-router)#timers spf 5 10
```

Chapter 7 Commands for Black Hole Routing

7.1 ip route null0

Command: ip route {<ip-prefix> <mask>|<ip-prefix>|<prefix-length>} null0 [<distance>]

no ip route {<ip-prefix> <mask>|<ip-prefix>|<prefix-length>} null0

Function: To configure routing destined to the specified network to the interface of null0.

Parameters: <ip-prefix> and <mask> are the IP address and network address mask of the destination, in dotted decimal format: <ip-prefix> and <prefix-length> are the IP address of the destination and the length of the prefix respectively; null0 is the output interface for the black hole routing; <distance> is the management distance of the routing entry with limitation between 1 and 255.

Default: None.

Command Mode: Global Configuration Mode.

Usage Guide: Null0 should be used as the output interface for IPv4 Black Hole Routing.

Example: To configure the routing to 192.168.188.0/24 as a Black Hole Routing.

```
Switch (config)# ip route 192.168.188.0/24 null0 20
```

7.2 ipv6 route null0

Command: ipv6 route <ipv6-prefix|prefix-length> null0 [<precedence>]

no ipv6 route <ipv6-prefix|prefix-length> null0

Function: To configure routing destined to the specified network to the interface of null0.

Parameters: <ipv6-prefix> is the IPv6 network static route address of the destination, in dotted decimal format. <prefix-length> is the IPv6 address of the destination and the length of the prefix. null0 is the output interface for the black hole routing. <precedence> is the route weight, ranging between 1 to 255 and 1 by default.

Default: None.

Command Mode: Global Configuration Mode.

Usage Guide: When configuring IPv6 Black Hole Routing, it is much like configuring normal static routing, but using null0 as the output interface.

Example: To configure a route to 2001:2:3:4::/64 as a Black Hole Routing.

```
Switch(config)#ipv6 route 2001:2:3:4::/64 null0
```

Chapter 8 Commands for ECMP

8.1 load-balance

This command is not supported by switch.

8.2 maximum-paths

Command: maximum-paths <1-32>

no maximum-paths

Function: This command is used to configure the maximum-paths which support the equivalence multi-paths. The no command restores the default configuration.

Parameter: <1-32>: At present, users can configure the multi-paths number from 1 to 32. When configure 1, it is equal to disable ECMP function. In addition, the actual configuration number is the power of 2 that approaches and is bigger than the user input value.

Command mode: Global Mode.

Default: The default number is 4.

Usage Guide: None.

Example: Configure the maximum-paths of the equivalence multi-paths as 8.

```
Switch(config)# maximum-paths 8
```