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Chapter 1 Commands for MSTP

1.1 Commands for MSTP

1.1.1 abort

Command: abort

Function: Abort the current MSTP region configuration, quit MSTP region mode and return to global mode.

Command mode: MSTP Region Mode.

Usage Guide: This command is to quit MSTP region mode without saving the current configuration. The previous MSTP region configuration is valid.

Example: Quit MSTP region mode without saving the current configuration.

```
Switch(Config-Mstp-Region)#abort
```

```
Switch(config)#
```

1.1.2 exit

Command: exit

Function: Save current MSTP region configuration, quit MSTP region mode and return to global mode.

Command mode: MSTP Region Mode

Usage Guide: This command is to quit MSTP region mode with saving the current configuration.

Example: Quit MSTP region mode with saving the current configuration.

```
Switch(Config-Mstp-Region)#exit
```

```
Switch(config)#
```

1.1.3 instance vlan

Command: instance *<instance-id>* vlan *<vlan-list>*

no instance *<instance-id>* [vlan *<vlan-list>*]

Function: In MSTP region mode, create the instance and set the mappings between VLANs and instances; the command “**no instance** *<instance-id>* [vlan *<vlan-list>*]” removes the specified instance and the specified mappings between the VLANs and instances.

Parameter: Normally, *<instance-id>* sets the instance number. The valid range is from 0 to 64; in the command “**no instance <instance-id> [vlan <vlan-list>]**”, *<instance-id>* sets the instance number. The valid number is from 0 to 64. *<vlan-list>* sets consecutive or non-consecutive VLAN numbers. “-” refers to consecutive numbers, and “,” refers to non-consecutive numbers.

Command mode: MSTP Region Mode

Default: Before creating any Instances, there is only the instance 0, and VLAN 1~4094 all belong to the instance 0.

Usage Guide: This command sets the mappings between VLANs and instances. Only if all the mapping relationships and other attributes are same, the switches are considered in the same MSTP region. Before setting any instances, all the VLANs belong to the instance 0. MSTP can support maximum 64 MSTIs (except for CISTs). CIST can be treated as MSTI 0. All the other instances are considered as instance 1 to 64.

Example: Map VLAN1-10 and VLAN 100-110 to Instance 1.

```
Switch(config)#spanning-tree mst configuration
```

```
Switch(Config-Mstp-Region)#instance 1 vlan 1-10;100-110
```

1.1.4 name

Command: name *<name>*

no name

Function: In MSTP region mode, set MSTP region name; the “no name” command restores the default setting.

Parameter: *<name>* is the MSTP region name. The length of the name should be less than 32 characters.

Command mode: MSTP Region Mode

Default: Default MSTP region name is the MAC address of this bridge.

Usage Guide: This command is to set MSTP region name. The bridges with same MSTP region name and same other attributes are considered in the same MSTP region.

Example: Set MSTP region name to mstp-test.

```
Switch(config)#spanning-tree mst configuration
```

```
Switch(Config-Mstp-Region)#name mstp-test
```

1.1.5 no

Command: no *<instance-id>* | *<name>* | *<revision-level>*

Function: Cancel one command or set it as initial value.

Parameter: *<instance-id>* instance number, *<name>* MSTP region name, *<revision-level>* is account the modify value of MST configuration caption.

Command mode: MSTP Region Mode

Default: The default revision level is 0.

Usage Guide: This command deletes the specified instance and MSTP region name, restore the default of modify value is 0.

Example: Delete instance 1.

```
Switch(Config-Mstp-Region)#no instance 1
```

1.1.6 revision-level

Command: *revision-level <level>*

no revision-level

Function: In MSTP region mode, this command is to set revision level for MSTP configuration; the command “**no revision-level**” restores the default setting to 0.

Parameter: *<level>* is revision level. The valid range is from 0 to 65535.

Command mode: MSTP Region Mode

Default: The default revision level is 0.

Usage Guide: This command is to set revision level for MSTP configuration. The bridges with same MSTP revision level and same other attributes are considered in the same MSTP region.

Example: Set revision level to 2000.

```
Switch(config)#spanning-tree mst configuration  
Switch(Config-Mstp-Region)# revision-level 2000
```

1.1.7 show

Command: **show**

Function: Display the information of current running system.

Command mode: MSTP Region Mode.

Usage Guide: This command can check the detail information of system.

Example: Display the information of current running system.

```
Switch(Config-Mstp-Region)#show
```

1.1.8 spanning-tree

Command: **spanning-tree**

no spanning-tree

Function: Enable MSTP in global mode and in Port Mode; The command “**no spanning-tree**” is to disable MSTP.

Command mode: Global Mode and Port Mode

Default: MSTP is not enabled by default.

Usage Guide: If the MSTP is enabled in global mode, the MSTP is enabled in all the ports except for the ports which are set to disable the MSTP explicitly.

Example: Enable the MSTP in global mode, and disable the MSTP in the interface1/0/2.

```
Switch(config)#spanning-tree
Switch(config)#interface ethernet 1/0/2
Switch(Config-If-Ethernet1/0/2)#no spanning-tree
```

1.1.9 spanning-tree cost

Command: spanning-tree cost <cost>

no spanning-tree cost

Function: Sets path cost of the current port; the command “**no spanning-tree cost**” restores the default setting.

Parameter: <cost> sets path cost. The valid range is from 1 to 200,000,000.

Command mode: Port Mode

Default: By default, the port cost is relevant to the port bandwidth.

Port Type	Default Path Cost	Suggested Range
10Mbps	2000000	2000000~20000000
100Mbps	200000	200000~2000000
1Gbps	20000	20000~200000

For the aggregation ports, the default costs are as below:

Port Type	Allowed Number Of Aggregation Ports	Default Port Cost
10Mbps	N	2000000/N
100Mbps	N	200000/N
1Gbps	N	20000/N

Usage Guide: By setting the port cost, users can control the cost from the current port to the root bridge in order to control the elections of port and the designated port of the instance.

Example: On the port1/0/2, set the port cost is 3000000.

```
Switch(Config-If-Ethernet1/0/2)#spanning-tree cost 3000000
```

1.1.10 spanning-tree digest-snooping

Command: spanning-tree digest-snooping**no spanning-tree digest-snooping**

Function: Configure the port to use the authentication string of partner port; the command “**no spanning-tree digest-snooping**” restores to use the port generated authentication string.

Parameter: None

Command mode: Port Mode

Default: Don't use the authentication string of partner port.

Usage Guide: According to MSTP protocol, the region authentication string is generated by MD5 algorithm with public authentication key, instance ID, VLAN ID. Some manufactory don't use the public authentication key, this causes the incompatibility. After the command is executed the port can use the authentication string of partner port, realize compatibility with these manufactories equipment.

Note: Because the authentication string is related to instance ID and VLAN ID, the command may cause recognizing the equipment that with different instance and VLAN relation as in the same region. Before the command is executed, make sure that instance and VLAN relation is accord for all the equipment. If there are more than one equipment connected, all the connected ports should execute this command.

Example: Configure the authentication string of partner port.

```
Switch(config)#interface ethernet 1/0/2
```

```
Switch(Config-If-Ethernet1/0/2)#spanning-tree digest-snooping
```

```
Switch(Config-If-Ethernet1/0/2)#
```

1.1.11 spanning-tree format

Command: spanning-tree format {standard | privacy | auto}**no spanning-tree format**

Function: Configure the format of the port packet so to be interactive with products of other companies. The no command restores the default format.

Parameter: standard: The packet format provided by IEEE

privacy: Privacy packet format, which is compatible with CISCO equipments.

auto: Auto identified packet format, which is determined by checking the format of the received packets.

Command Mode: Port Mode

Default: Auto Packet Format.

Usage Guide: As the CISCO has adopted the packet format different with the one provided

by IEEE, while many companies also adopted the CISCO format to be CISCO compatible, we have to provide support to both formats. The standard format is originally the one provided by IEEE, and the privacy packet format is CISCO compatible. In case we are not sure about which the packet format is on partner, the AUTO configuration will be preferred so to identify the format by the packets they sent. The AUTO packet format is set by default in the concern of better compatibility with previous products and the leading companies. The packet format will be privacy format before receiving the partner packet when configured to AUTO.

When the format is not AUTO and the received packet format from the partner does not match the configured format, we set the state of the port which receives the unmatched packet to DISCARDING to prevent both sides consider themselves the root which leads to circuits.

When the AUTO format is set, and over one equipment which is not compatible with each other are connected on the port (e.g. a equipment running through a HUB or Transparent Transmission BPDU is connected with several equipments running MSTP), the format alter counts will be recorded and the port will be disabled at certain count threshold. The port can only be re-enabled by the administrator.

Example: Configure port message format as the message format of IEEE.

```
Switch(config)#interface ethernet 1/0/2
```

```
Switch(Config-If-Ethernet1/0/2)#spanning-tree format standard
```

```
Switch(Config-If-Ethernet1/0/2)#
```

1.1.12 spanning-tree forward-time

Command: `spanning-tree forward-time <time>`

`no spanning-tree forward-time`

Function: Set the switch forward delay time; the command “**no spanning-tree forward-time**” restores the default setting.

Parameter: `<time>` is forward delay time in seconds. The valid range is from 4 to 30.

Command mode: Global Mode

Default: The forward delay time is 15 seconds by default.

Usage Guide: When the network topology changes, the status of the port is changed from blocking to forwarding. This delay is called the forward delay. The forward delay is co working with hello time and max age. The parameters should meet the following conditions. Otherwise, the MSTP may work incorrectly.

$$2 * (\text{Bridge_Forward_Delay} - 1.0 \text{ seconds}) \geq \text{Bridge_Max_Age}$$

$\text{Bridge_Max_Age} \geq 2 * (\text{Bridge_Hello_Time} + 1.0 \text{ seconds})$

Example: In global mode, set MSTP forward delay time to 20 seconds.

```
Switch(config)#spanning-tree forward-time 20
```

1.1.13 spanning-tree hello-time

Command: `spanning-tree hello-time <time>`

`no spanning-tree hello-time`

Function: Set switch Hello time; The command “**no spanning-tree hello-time**” restores the default setting.

Parameter: `<time>` is Hello time in seconds. The valid range is from 1 to 10.

Command mode: Global Mode

Default: Hello Time is 2 seconds by default.

Usage Guide: Hello time is the interval that the switch sends BPDUs. Hello time is co working with forward delay and max age. The parameters should meet the following conditions. Otherwise, the MSTP may work incorrectly.

$2 * (\text{Bridge_Forward_Delay} - 1.0 \text{ seconds}) \geq \text{Bridge_Max_Age}$

$\text{Bridge_Max_Age} \geq 2 * (\text{Bridge_Hello_Time} + 1.0 \text{ seconds})$

Example: Set MSTP hello time to 5 seconds in global mode.

```
Switch(config)#spanning-tree hello-time 5
```

1.1.14 spanning-tree link-type p2p

Command: `spanning-tree link-type p2p {auto | force-true | force-false}`

`no spanning-tree link-type`

Function: Set the link type of the current port; the command “**no spanning-tree link-type**” restores link type to auto-negotiation.

Parameter: `auto` sets auto-negotiation, `force-true` forces the link as point-to-point type, `force-false` forces the link as non point-to-point type.

Command mode: Port Mode

Default: The link type is auto by default; The MSTP detects the link type automatically.

Usage Guide: When the port is full-duplex, MSTP sets the port link type as point-to-point; When the port is half-duplex, MSTP sets the port link type as shared.

Example: Force the port 1/0/7-8 as point-to-point type.

```
Switch(config)#interface ethernet 1/0/7-8
```

```
Switch(Config-Port-Range)#spanning-tree link-type p2p force-true
```

1.1.15 spanning-tree maxage

Command: `spanning-tree maxage <time>`

`no spanning-tree maxage`

Function: Set the max aging time for BPDU; the command “`no spanning-tree maxage`” restores the default setting.

Parameter: `<time>` is max aging time in seconds. The valid range is from 6 to 40.

Command mode: Global Mode

Default: The max age is 20 seconds by default.

Usage Guide: The lifetime of BPDU is called max age time. The max age is co working with hello time and forward delay. The parameters should meet the following conditions. Otherwise, the MSTP may work incorrectly.

$$2 * (\text{Bridge_Forward_Delay} - 1.0 \text{ seconds}) \geq \text{Bridge_Max_Age}$$
$$\text{Bridge_Max_Age} \geq 2 * (\text{Bridge_Hello_Time} + 1.0 \text{ seconds})$$

Example: In global mode, set max age time to 25 seconds.

```
Switch(config)#spanning-tree maxage 25
```

1.1.16 spanning-tree max-hop

Command: `spanning-tree max-hop <hop-count>`

`no spanning-tree max-hop`

Function: Set maximum hops of BPDU in the MSTP region; the command “`no spanning-tree max-hop`” restores the default setting.

Parameter: `<hop-count>` sets maximum hops. The valid range is from 1 to 40.

Command mode: Global Mode

Default: The max hop is 20 by default.

Usage Guide: The MSTP uses max-age to count BPDU lifetime. In addition, MSTP also uses max-hop to count BPDU lifetime. The max-hop is degressive in the network. The BPDU has the max value when it initiates from MSTI root bridge. Once the BPDU is received, the value of the max-hop is reduced by 1. When a port receives the BPDU with max-hop as 0, it drops this BPDU and sets itself as designated port to send the BPDU.

Example: Set max hop to 32.

```
Switch(config)#spanning-tree max-hop 32
```

1.1.17 spanning-tree mcheck

Command: `spanning-tree mcheck`

Function: Force the port to run in the MSTP mode.

Command mode: Port Mode

Default: The port is in the MSTP mode by default.

Usage Guide: If a network which is attached to the current port is running IEEE 802.1D STP, the port converts itself to run in STP mode. The command is used to force the port to run in the MSTP mode. But once the port receives STP messages, it changes to work in the STP mode again.

This command can only be used when the switch is running in IEEE802.1s MSTP mode. If the switch is running in IEEE802.1D STP mode, this command is invalid.

Example: Force the port 1/0/2 to run in the MSTP mode.

```
Switch(Config-If-Ethernet1/0/2)#spanning-tree mcheck
```

1.1.18 spanning-tree mode

Command: `spanning-tree mode {mstp | stp | rstp}`

`no spanning-tree mode`

Function: Set the spanning-tree mode in the switch; the command “**no spanning-tree mode**” restores the default setting.

Parameter: **mstp** sets the switch in IEEE802.1s MSTP mode; **stp** sets the switch in IEEE802.1D STP mode; **rstp** sets the switch in IEEE802.1D RSTP mode.

Command mode: Global Mode

Default: The switch is in the MSTP mode by default.

Usage Guide: When the switch is in IEEE802.1D STP mode, it only sends standard IEEE802.1D BPDU and TCN BPDU. It drops any MSTP BPDUs.

Example: Set the switch in the STP mode.

```
Switch(config)#spanning-tree mode stp
```

1.1.19 spanning-tree mst configuration

Command: `spanning-tree mst configuration`

`no spanning-tree mst configuration`

Function: Enter the MSTP mode. Under the MSTP mode, the MSTP attributes can be set. The command “**no spanning-tree mst configuration**” restores the attributes of the MSTP to their default values.

Command mode: Global Mode

Default: The default values of the attributes of the MSTP region are listed as below:

Attribute of MSTP	Default Value
Instance	There is only the instance 0. All the VLANs (1~4094) are

	mapped to the instance 0.
Name	MAC address of the bridge
Revision	0

Usage Guide: Whether the switch is in the MSTP region mode or not, users can enter the MSTP mode, configure the attributes, and save the configuration. When the switch is running in the MSTP mode, the system will generate the MST configuration identifier according to the MSTP configuration. Only if the switches with the same MST configuration identifier are considered as in the same MSTP region.

Example: Enter MSTP region mode.

Switch(config)#spanning-tree mst configuration

Switch(Config-Mstp-Region)#

1.1.20 spanning-tree mst cost

Command: spanning-tree mst *<instance-id>* cost *<cost>*

no spanning-tree mst *<instance-id>* cost

Function: Sets path cost of the current port in the specified instance; the command “no spanning-tree mst *<instance-id>* cost” restores the default setting.

Parameter: *<instance-id>* sets the instance ID. The valid range is 0-64. *<cost>* sets path cost, different cost formats have different ranges. For the default dot1t mode the valid range is 1-200,000,000, and for dot1d is 1-65535.

Command mode: Port Mode

Default: By default, the port cost is relevant to the port bandwidth.

Port Type	Default Path Cost	Suggested Range
10Mbps	2000000	2000000~20000000
100Mbps	200000	200000~2000000
1Gbps	20000	20000~200000

For the aggregation ports, the default costs are as below:

Port Type	Allowed Number Of Aggregation Ports	Default Port Cost
10Mbps	N	2000000/N
100Mbps	N	200000/N
1Gbps	N	20000/N

Port Speed	Port Type	Port Cost	
		802.1D-2008	802.1T

0		65535	200,000,000
10Mbps	Half- duplex	100	2,000,000
	Full- duplex	99	1,999,999
	aggregation link with 2 ports	95	1,000,000
	aggregation link with 3 ports	95	666,666
	aggregation link with 4 ports	95	500,000
100Mbps	Half- duplex	19	200,000
	Full- duplex	18	199,999
	aggregation link with 2 ports	15	100,000
	aggregation link with 3 ports	15	66,666
	aggregation link with 4 ports	15	50,000
1000Mbps	Full- duplex	4	20,000
	aggregation link with 2 ports	3	10,000
	aggregation link with 3 ports	3	6,666
	aggregation link with 4 ports	3	5,000

Usage Guide: By setting the port cost, users can control the cost from the current port to the root bridge in order to control the elections of root port and the designated port of the instance.

Example: On the port1/0/2, set the MSTP port cost in the instance 2 to 3000000.

```
Switch(Config-If-Ethernet1/0/2)#spanning-tree mst 2 cost 3000000
```

1.1.21 spanning-tree cost-format

Command: spanning-tree cost-format {dot1d | dot1t}

Function: In global mode, users can select path-cost format with dot1d or dot1t, the default format is dot1t.

Command Mode: Global mode.

Default: count path-cost with dot1t format.

Usage Guide: There are two formats about cost value: they are dot1d marked on IEEE802.1d-2008 and dot1t marked on IEEE802.1t, but path-cost ranges of them are different, dot1d range from 1 to 65535, and dot1t range from 1 to 200,000,000.

If users already configured the cost value of link with **spanning-tree cost** command manually, changing path-cost format with **cost-format** command is successful after the previous configuration is cleared only.

Example: Set the cost format in global mode

```
Switch(config)#spanning-tree cost-format dot1d
```

1.1.22 spanning-tree mst loopguard

Command: **spanning-tree [mst <instance-id>] loopguard**

no spanning-tree [mst <instance-id>] loopguard

Function: Enable the loopguard function for specified instance, the no command disables this function.

Parameter: *<instance-id>*: MSTP instance ID.

Command mode: Port Mode.

Default: Disable loopguard function.

Usage Guide: The command can avoid root port or alternate port to be changed as designated port due to invalid unilateralism link. When the receiving timer is time, the configured port with loopguard is set as block state.

Example: Configure port 1/0/2 as loopguard mode for instance 0.

```
Switch(Config)#interface ethernet 1/0/2
```

```
Switch(Config-Ethernet-1/0/2)#spanning-tree mst 0 loopguard
```

```
Switch(Config-Ethernet-1/0/2)#
```

1.1.23 spanning-tree mst port-priority

Command: **spanning-tree mst <instance-id> port-priority <port-priority>**

no spanning-tree mst <instance-id> port-priority

Function: Set the current port priority for the specified instance; the command “**no spanning-tree mst <instance-id> port-priority**” restores the default setting.

Parameter: *<instance-id>* sets the instance ID. The valid range is from 0 to 64; *<port-priority>* sets port priority. The valid range is from 0 to 240. The value should be the multiples of 16, such as 0, 16, 32...240.

Command mode: Port Mode

Default: The default port priority is 128.

Usage Guide: By setting the port priority, users can control the port ID of the instance in order to control the root port and designated port of the instance. The lower the value of the port priority is, the higher the priority is.

Example: Set the port priority as 32 on the port 1/0/2 for the instance 1.

```
Switch(config)#interface ethernet 1/0/2
```

```
Switch(Config-If-Ethernet1/0/2)#spanning-tree mst 1 port-priority 32
```

1.1.24 spanning-tree mst priority

Command: `spanning-tree mst <instance-id> priority <bridge-priority>`

`no spanning-tree mst <instance-id> priority`

Function: Set the bridge priority for the specified instance; the command “**no spanning-tree mst <instance-id> priority**” restores the default setting.

Parameter: `<instance-id>` sets instance ID. The valid range is from 0 to 64; `<bridge-priority>` sets the switch priority. The valid range is from 0 to 61440. The value should be the multiples of 4096, such as 0, 4096, 8192...61440.

Command mode: Global Mode

Default: The default bridge priority is 32768.

Usage Guide: By setting the bridge priority, users can change the bridge ID for the specified instance. And the bridge ID can influence the elections of root bridge and designated port for the specified instance.

Example: Set the priority for Instance 2 to 4096.

```
Switch(config)#spanning-tree mst 2 priority 4096
```

1.1.25 spanning-tree mst rootguard

Command: `spanning-tree [mst <instance-id>] rootguard`

`no spanning-tree [mst <instance-id>] rootguard`

Function: Enable the rootguard function for specified instance, the rootguard function forbid the port to be MSTP root port. “**no spanning-tree mst <instance-id> rootguard**” disable the rootguard function.

Parameter: `<instance-id>`: MSTP instance ID.

Command mode: Port Mode.

Default: Disable rootguard function.

Usage Guide: The command is used in Port Mode, if the port is configured to be a rootguard port, it is forbidden to be a MSTP root port. If superior BPDU packet is received from a rootguard port, MSTP did not recalculate spanning-tree, and just set the status of the port to be root_inconsistent (blocked).If no superior BPDU packet is received from a blocked rootguard port, the port status will restore to be forwarding. The rootguard function can maintain a relative stable spanning-tree topology when a new switch is added to the network.

Example: Enable rootguard function for port 1/0/2 in instance 0.

```
Switch(config)#interface ethernet 1/0/2
```

```
Switch(Config-If-Ethernet1/0/2)#spanning-tree mst 0 rootguard
```

```
Switch(Config-If-Ethernet1/0/2)#
```

1.1.26 spanning-tree portfast

Command: `spanning-tree portfast [bpdufilter | bpduguard] [recovery <30-3600>]`

`no spanning-tree portfast`

Function: Set the current port as boundary port, and BPDU filter、BPDU guard as specified mode or default mode; the command “**no spanning-tree portfast**” sets the current port as non-boundary port.

Parameter: **bpdufilter:** configure the border port mode as BPDU filter

bpduguard: configure the border port mode as BPDU guard

recovery: configure the border port can be recovered automatically after implement bpduguard violation operation

<30-3600>: the recovery time, do not recover it by default

Command mode: Port Mode

Default: All the ports are non-boundary ports by default when enabling MSTP.

Usage Guide: When a port is set to be a boundary port, the port converts its status from discarding to forwarding without bearing forward delay. Once the boundary port receives the BPDU, the port becomes a non-boundary port.

Example: Configure the border port mode as BPDU guard, the recovery time as 60s.

```
Switch(config)#interface ethernet 1/0/2
```

```
Switch(Config-If-Ethernet1/0/2)#spanning-tree portfast bpduguard recovery 60
```

```
Switch(Config-If-Ethernet1/0/2)#
```

1.1.27 spanning-tree port-priority

Command: `spanning-tree port-priority <port-priority>`

no spanning-tree port-priority

Function: Set the port priority; the command “**no spanning-tree port-priority**” restores the default setting.

Parameter: **<port-priority>** sets port priority. The valid range is from 0 to 240. The value should be the multiples of 16, such as 0, 16, 32, 48...240.

Command mode: Port Mode

Default: The default port priority is 32768.

Usage Guide: By setting the port priority to designated port. The lower the value of the port priority is, the higher the priority is.

Example: Set the port priority as 4096 on the port 1.

```
Switch(Config-If-Ethernet1/0/1)#spanning-tree port-priority 4096
```

1.1.28 spanning-tree priority

Command: **spanning-tree priority <bridge-priority>**

no spanning-tree priority

Function: Configure the spanning-tree priority; the “**no spanning-tree priority**” command restores the default priority.

Parameter: **<bridge-priority>** is the priority of the bridging switch. Its value should be round times of 4096 between 0 and 61440, such as 0, 4096, 8192... 61440.

Command Mode: Global Mode.

Default: Priority is 32768.

Usage Guide: The bridge ID can be altered by changing the priority of the switch. Further, the priority information can also be used for voting of the root bridge and the specified ports. The bridge priority value of the switch is smaller, however the priority is higher.

Example: Configure the priority is 4096.

```
Switch(config)#spanning-tree priority 4096
```

1.1.29 spanning-tree rootguard

Command: **spanning-tree rootguard**

no spanning-tree rootguard

Function: Set the port is root port, “**no spanning-tree rootguard**” command sets the port is non-root port.

Parameter: None.

Command mode: Port Mode.

Default: Port is non-root port.

Usage Guide: The command is used in Port Mode, if the port is configured to be a rootguard port, it is forbidden to be a MSTP root port. If superior BPDU packet is received from a rootguard port, MSTP did not recalculate spanning-tree, and just set the status of the port to be root_inconsistent (blocked). If no superior BPDU packet is received from a blocked rootguard port, the port status will restore to be forwarding. The rootguard function can maintain a relative stable spanning-tree topology when a new switch is added to the network.

Example: Set the port 1 is root port.

```
Switch(Config-If-Ethernet1/0/1)#spanning-tree rootguard
```

1.1.30 spanning-tree tcflush (Global mode)

Command: spanning-tree tcflush {enable| disable| protect}

no spanning-tree tcflush

Function: Configure the spanning-tree flush mode once the topology changes. “no spanning-tree tcflush” restores to default setting.

Parameter: enable: The spanning-tree flush once the topology changes.

disable: The spanning tree don't flush when the topology changes.

protect: the spanning-tree flush not more than one time every ten seconds.

Command mode: Global mode

Default: Enable

Usage Guide: According to MSTP, when topology changes, the port that send change message clears MAC/ARP table (FLUSH). In fact it is not needed for some network environment to do FLUSH with every topology change. At the same time, as a method to avoid network assault, we allow the network administrator to configure FLUSH mode by the command

Note: For the complicated network, especially need to switch from one spanning tree branch to another rapidly, the disable mode is not recommended.

Example: Configure the spanning-tree flush mode once the topology changes is not flush to TC.

```
Switch(config)#spanning-tree tcflush disable
```

```
Switch(config)#
```

1.1.31 spanning-tree tcflush (Port mode)

Command: spanning-tree tcflush {enable| disable| protect}

no spanning-tree tcflush

Function: Configure the spanning-tree flush mode for port once the topology changes. “no spanning-tree tflush” restores to default setting.

Parameter: enable: The spanning-tree flush once the topology changes.

disable: The spanning tree don't flush when the topology changes.

protect: the spanning-tree flush not more than one time every ten seconds.

Command mode: Port Mode

Default: Global configuration

Usage Guide: According to MSTP, when topology changes, the port that send change message clears MAC/ARP table (FLUSH). In fact it is not needed for some network environment to do FLUSH with every topology change. At the same time, as a method to avoid network assault, we allow the network administrator to configure FLUSH mode by the command

Note: For the complicated network, especially need to switch from one spanning tree branch to another rapidly, the disable mode is not recommended.

Example: Configure the spanning-tree flush mode once the topology change is not flush to TC.

```
Switch(config)#interface ethernet 1/0/2
```

```
Switch(Config-If-Ethernet1/0/2)#spanning-tree tflush disable
```

```
Switch(Config-If-Ethernet1/0/2)#
```

1.1.32 spanning-tree transmit-hold-count

Command: `spanning-tree transmit-hold-count <tx-hold-count-value>`

`no spanning-tree transmit-hold-count`

Function: Set the max transmit-hold-count of port.

Parameter: tx-hold-count-value: ranging from 1 to 20, the default value is 10.

Command mode: Global Mode

Default: 10.

Usage Guide: Set the max number for sending BPDU within the Hello Time interval to control BPDU flow. The variable is used to whole MST bridge.

Example: Set the max transmit-hold-count as 20.

```
Switch(config)#spanning-tree transmit-hold-count 20
```

1.2 Commands for Monitor and Debug

1.2.1 debug spanning-tree

Command: debug spanning-tree

no debug spanning-tree

Function: Enable the MSTP debugging information; the command “**no debug spanning-tree**” disables the MSTP debugging information.

Command mode: Admin Mode

Usage Guide: This command is the general switch for all the MSTP debugging. Users should enable the detailed debugging information, and then they can use this command to display the relevant debugging information. In general, this command is used by skilled technicians.

Example: Enable to receive the debugging information of BPDU messages on the port1/0/1.

```
Switch#debug spanning-tree
```

```
Switch#debug spanning-tree bpdu rx interface e1/0/1
```

1.2.2 show mst-pending

Command: show mst-pending

Function: In the MSTP region mode, display the configuration of the current MSTP region.

Command mode: Admin Mode

Usage Guide: In the MSTP region mode, display the configuration of the current MSTP region such as MSTP name, revision, VLAN and instance mapping.

Note: Before quitting the MSTP region mode, the displayed parameters may not be effective.

Example: Display the configuration of the current MSTP region.

```
Switch(config)#spanning-tree mst configuration
```

```
Switch(Config-Mstp-Region)#show mst-pending
```

```
Name          switch
Revision      0
Instance      Vlans Mapped
-----
00             1-29, 31-39, 41-4093
03             30
04             40
05             4094
-----
```

```
Switch(Config-Mstp-Region)#
```

1.2.3 show spanning-tree

Command: show spanning-tree [mst [<instance-id>]] [interface <interface-list>] [detail]

Function: Display the MSTP Information.

Parameter: <interface-list> sets interface list; <instance-id> sets the instance ID. The valid range is from 0 to 64; **detail** sets the detailed spanning-tree information.

Command mode: Admin and Configuration Mode

Usage Guide: This command can display the MSTP information of the instances in the current bridge.

Example: Display the bridge MSTP.

Switch#sh spanning-tree

-- MSTP Bridge Config Info --

```
Standard      : IEEE 802.1s
Bridge MAC    : 00: 03: 0f: 01: 0e: 30
Bridge Times  : Max Age 20, Hello Time 2, Forward Delay 15
Force Version: 3
```

Instance 0

```
Self Bridge Id   : 32768 - f8:f0:82:01:0e:30
Root Id         : 16384. f8:f0:82:01:0f:52
Ext.RootPathCost : 200000
Region Root Id  : this switch
Int.RootPathCost : 0
Root Port ID    : 128.1
```

Current port list in Instance 0:

Ethernet1/0/1 Ethernet1/0/2 (Total 2)

PortName	ID	ExtRPC	IntRPC	State	Role	DsgBridge	DsgPort
Ethernet1/0/1	128.001	0	0	FWD	ROOT	16384. f8f082010f52	128.007
Ethernet1/0/2	128.002	0	0	BLK	ALTR	16384. f8f082010f52	128.011

Instance 3

```
Self Bridge Id   : 0. f8:f0:82:01:0e:30
```

Region Root Id : this switch
 Int.RootPathCost : 0
 Root Port ID : 0
 Current port list in Instance 3:
 Ethernet1/0/1 Ethernet1/0/2 (Total 2)

PortName	ID	IntRPC	State Role	DsgBridge	DsgPort
Ethernet1/0/1	128.001		0 FWD MSTR	0.f8f082010e30	128.001
Ethernet1/0/2	128.002		0 BLK ALTR	0.f8f082010e30	128.002

Instance 4

Self Bridge Id : 32768.00: 03: 0f: 01: 0e: 30
 Region Root Id : this switch
 Int.RootPathCost : 0
 Root Port ID : 0
 Current port list in Instance 4:
 Ethernet1/0/1 Ethernet1/0/2 (Total 2)

PortName	ID	IntRPC	State Role	DsgBridge	DsgPort
Ethernet1/0/1	128.001		0 FWD MSTR	32768.f8f082010e30	128.001
Ethernet1/0/2	128.002		0 BLK ALTR	32768.f8f082010e30	128.002

Displayed Information	Description
Bridge Information	
Standard	STP version
Bridge MAC	Bridge MAC address
Bridge Times	Max Age, Hello Time and Forward Delay of the bridge
Force Version	Version of STP
Instance Information	
Self Bridge Id	The priority and the MAC address of the current bridge for the current instance
Root Id	The priority and the MAC address of the root bridge for the current instance

Ext.RootPathCost	Total cost from the current bridge to the root of the entire network
Int.RootPathCost	Cost from the current bridge to the region root of the current instance
Root Port ID	Root port of the current instance on the current bridge
MSTP Port List Of The Current Instance	
PortName	Port name
ID	Port priority and port index
ExtRPC	Port cost to the root of the entire network
IntRPC	Cost from the current port to the region root of the current instance
State	Port status of the current instance
Role	Port role of the current instance
DsgBridge	Upward designated bridge of the current port in the current instance
DsgPort	Upward designated port of the current port in the current instance

1.2.4 show spanning-tree mst config

Command: show spanning-tree mst config

Function: Display the configuration of the MSTP in the Admin mode.

Command mode: Admin Mode

Usage Guide: In the Admin mode, this command can show the parameters of the MSTP configuration such as MSTP name, revision, VLAN and instance mapping.

Example: Display the configuration of the MSTP on the switch.

```
Switch#show spanning-tree mst config
```

```
Name      switch
Revision  0
Instance  Vlans Mapped
-----
00        1-29, 31-39, 41-4094
03        30
04        40
-----
```

Chapter 2 Commands for ERPS

2.1 ethernet tcn-propagation erps to {erps | stp}

Command: ethernet tcn-propagation erps to {erps | stp}
no ethernet tcn-propagation erps to

Function: Configure the topology changing transmission notification method. Currently, the R-APS event notification among the ERPS rings is supported and it is used for the sub ring topology to send R-APS event packets to the interconnection ring after changing to notify the neighbor ring. The topology changing only takes effect in this ring as default but not be transmitted out of the ring. It does not affect the neighbor topology connected to it. The no command deletes this notification method.

Parameters: erps: topology changing sends the R-APS event packets to notify the connection ring of this device; stp: topology changing sends the stp packets to notify the stp topology connected to this device.

Default: ERPS ring topology changing only takes effect in this ring but does not send the notification packets.

Command Mode: Global Mode.

Usage Guide: Configure the topology changing transmission notification method supported by this device as the appointed method. The ERPS ring instance detects the changing, it will send the notification packets. If configured erps method, it will send the R-APS event packets to other ERPS rings; if configured stp method, it will send the stp packets outward.

Example:

Configure to send R-APS event notification to the interconnection ring after the topology changing.

```
Switch(config)#ethernet tcn-propagation erps to erps
```

Configure to send STP notification to the interconnection ring after the topology changing.

```
Switch(config)#ethernet tcn-propagation erps to stp
```

Delete the topology changing transmission notification method.

```
Switch(config)#no ethernet tcn-propagation erps to
```

2.2 erps-ring <ring-name>

Command: erps-ring < ring-name >
no erps-ring < ring-name >

Function: Create ERPS ring and enter into the ERPS ring configuration mode. If the ERPS ring has existed, enter into the ERPS ring configuration mode. The no command deletes the ERPS ring.

Parameters: *<ring-name>*: the ERPS ring name created. The maximum character number is 64 and it is made up with letters, numbers and the underlines. The first and last character cannot be the underline.

Command Mode: Global Mode.

Default: Do not configure any ERPS ring.

Usage Guide: If the inputted string of ring name exceeds 64 bytes, there will be the message of "Valid ERPS ring name should be no more than 64 bytes!" If the inputted string format of ring name is not lawful, there will be the message of "Invalid ERPS ring name!" If the total number of ERPS rings configured has reached the maximum value, there will be the message of "Support ERPS ring max number: 32!" If the ERPS ring existed, enter into the ERPS ring configuration mode, otherwise, create it and enter into the ERPS ring configuration mode.

Example:

Create the ERPS ring of ring1

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#
```

Delete the ERPS ring of ring1

```
Switch(config)#no erps-ring ring1
```

2.3 version {v1 | v2}

Command: version {v1 | v2}

no version

Function: Configure the supported version of the ERPS ring. Currently it achieves the newest version of v2 and it can be compatible with v1. V1 does not support the management commands of MS, FS, etc. It does not support the multi-instance either. But it supports the Revertive switch only. If the instance is not configured on ERPS ring, the version can be configured multiple times and subject to the last time. If the ERPS ring instance has configured on the ring, the version cannot be modified. The no command recovers to be the default status of v2.

Parameters: {v1 | v2}: parameters selection. V1 means to support v1 which is released in 2008-06 and the amendment (2009-04). v2 means to support v2 which is released in 2010-03 and the amendment (2010-06).

Command Mode: ERPS Ring Configuration Mode.

Default: V2.

Usage Guide:

1. If configured ERPS ring instance on this ERPS ring, there will be the message of “Can't config version on ERPS ring which has ERPS instance, please delete ERPS instance firstly!” Otherwise, enter into the next step;
2. Configure the ERPS ring to support the appointed protocol version;
3. If configured ERPS ring to support v1, this ring will not support multi-instance. ERPS ring instance does not support the management commands of MS, FS, etc. and the non-revertive switch is not effective. It only support revertive switch.
4. If configured ERPS ring to support v1, the instance of this ring will deal with the ERPS packets according to the v1 format. Package the R-APS packets and resolve the fields according to v1 format. The fields defined by v2 will not be dealt.

Example:

Configure the ERPS ring of ring1 to support v1

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#version v1
```

Configure the ERPS ring of ring1 to support v2

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#version v2
```

Delete v1 supported by the ERPS ring of ring1

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#no version
```

2.4 open-ring

Command: open-ring

no open-ring

Function: Configure the ERPS ring as the sub ring of open type. If configured ERPS ring instance on the ring, the ERPS ring type cannot be modified, the instance must be deleted first. The configuration of all the nodes in the ring must be the same; this type of ERPS can connect to other ERPS rings to be used in the interconnection topology. The no command deletes this configuration and recovers to be the default major ring of close type.

Parameters: None.

Command Mode: ERPS Ring Configuration Mode.

Default: The ERPS ring is major ring of close type as default.

Usage Guide: If the ERPS ring instance has been configured on the ring, there will be the

message of “Can't config open-ring on ERPS ring which has ERPS instance, please delete ERPS instance firstly!” Otherwise, enter into the next step. Configure this ERPS ring type as sub ring.

Example:

Configure the ERPS ring of ring1 as sub ring of open type.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#open-ring
```

Delete the configuration of the sub ring of open type.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#no open-ring
```

2.5 raps-virtual-channel {with | without}

Command: raps-virtual-channel {with | without}

Function: Configure if there is the R-APS virtual channel in ERPS ring. Configure it only on all the nodes of the sub ring and the configuration must be the same.

Parameters: {with | without}: parameter selection. If select with, the R-APS virtual channel is existed in this ERPS ring; if select without, the R-APS virtual channel is not existed in this ERPS ring.

Command Mode: ERPS Ring Configuration Mode.

Default: The R-APS virtual channel is not existed in ERPS ring.

Usage Guide:

a) If it is major ring, there will be the message of “Can't config R-APS virtual channel on ERPS major ring!”

b) Configure if there is the R-APS virtual channel in ERPS ring according to the configuration. Inputting: Success or error. If there is not R-APS virtual channel on the ERPS ring, the R-APS channel of all the instances of ERPS ring will be unblocked forever and it only blocks the data channel; otherwise, the R-APS channel and the data channel will be blocked at the same time.

Example:

Configure that there is R-APS virtual channel in the ERPS sub ring of ring1.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#raps-virtual-channel with
```

2.6 erps-ring <ring-name> port0 [port1-none]

Command: erps-ring <ring-name> port0 [port1-none]

no erps-ring <ring-name> port0

Function: Configure the port0 of the ERPS ring node. There is only one port0 on each node. If the port0 has existed, the current configuration will not be covered and there will be only the error notice. If configured port1-none, it means there is no port0 on this ring, and it is the interconnection node. The no command deletes the port0.

Parameters: <ring-name>: ERPS ring name, the maximum string is 64, and it is made up with letters, numbers and underlines; the first and last characters cannot be underlines.

[port1-none]: there is only the port0 on this ERPS ring node, no port1 and it is the interconnection node.

Command Mode: Port Mode..

Default: Do not configure port0 on ERPS ring.

Usage Guide:

If the inputted string of ring name exceeds 64 bytes, there will be the message of "Valid ERPS ring name should be no more than 64 bytes!"

If the inputted string format of ring name is not lawful, there will be the message of "Invalid ERPS ring name!"

If enabled stp mutual exclusion, there will be the message of "Port %s has enable stp or other mutex module!" %s is the port name;

If this port is the member port of aggregation port, there will be the message of "Port %s is LAG member port!" %s is the port name;

If the ERPS ring did not exist, there will be the message of "The ERPS ring doesn't exist!"

If the port0 has existed in ERPS ring, there will be the message of "Port0 exists on the ERPS ring already!"

If this port is configured as port1 of ERPS ring, there will be the message of "Port %s is already configed as port1 on the ERPS ring!" %s is the port name;

If this ERPS ring is not open-ring type, the port1-none cannot be configured, there will be the message of "Can not config port1-none on ERPS major ring!"

Configure this port as the port0 of the appointed ERPS ring;

Check if the ERPS ring configuration is integral; if it is integral, check if the ERPS instance configuration is integral; if it is integral, activate the instance as active and run the protocol.

Example:

Configure e 1/0/1 as the port0 of ERPS ring1

```
Switch(config)#interface ethernet 1/0/1
```

```
Switch(config-if-ethernet1/0/1)#erps-ring ring1 port0
Delete the e 1/0/1 as port0 of ERPS ring1
Switch(config)#interface ethernet 1/0/1
Switch(config-if-ethernet1/0/1)#no erps-ring ring1 port0
```

2.7 erps-ring <ring-name> port1

Command: erps-ring <ring-name> port1

no erps-ring <ring-name> port1

Function: Configure the port1 of the ERPS ring node. There is only one port1 on each node. If the port1 has existed, the current configuration will not be covered and there will be only the error notice. If configured port1-none, it means the configuration of port1 is not successful. The no command deletes the port1.

Parameters: <ring-name>: ERPS ring name, the maximum string is 64, and it is made up with letters, numbers and underlines; the first and last characters cannot be underlines.

Command Mode: Port Mode.

Default: Do not configure port1 on ERPS ring.

Usage Guide:

If the inputted string of ring name exceeds 64 bytes, there will be the message of "Valid ERPS ring name should be no more than 64 bytes!"

If the inputted string format of ring name is not lawful, there will be the message of "Invalid ERPS ring name!"

If enabled stp mutual exclusion, there will be the message of "Port %s has enable stp or other mutex module!" %s is the port name;

If this port is the member port of aggregation port, there will be the message of "Port %s is LAG member port!" %s is the port name;

If the ERPS ring did not exist, there will be the message of "The ERPS ring doesn't exist!"

If the port1 has existed in ERPS ring, there will be the message of "Port1 exists on the ERPS ring already!"

If this port is configured as port0 of ERPS ring, there will be the message of "Port %s is already configed as port0 on the ERPS ring!" %s is the port name;

If configured port1-none on this ERPS ring, there will be the message of "Has configed port1-none on the ERPS open ring!"

Configure this port as the port1 of the appointed ERPS ring;

Check if the ERPS ring configuration is integral; if it is integral, check if the ERPS instances configuration is integral; if it is integral, activate the instance as active and run the protocol.

Example:

```

Configure e 1/0/1 as the port1 of ERPS ring1
Switch(config)#interface ethernet 1/0/1
Switch(config-if-ethernet1/0/1)#erps-ring ring1 port1
Delete the e 1/0/1 as the port1 of ERPS ring1
Switch(config)#interface ethernet 1/0/1
Switch(config-if-ethernet1/0/1)#no erps-ring ring1 port1

```

2.8 failure-detect {cc | physical-link-or-cc} domain <domain-name> service {< ma-name > | number < ma-num > | pvlan < vlan-id >} mep <mep-id> rmep<rmep-id>

Command: {port0 | port1} failure-detect {cc | physical-link-or-cc} domain <domain-name> service {< ma-name > | number < ma-num > | pvlan < vlan-id >} mep <mep-id> rmep<rmep-id>

no {port0 | port1} failure-detect

Function: Configure the fault detection type of ERPS ring ports. If it is detected as cc type, the maintenance domain, maintenance set that cc belongs to and the monitoring link (it is conditioned with (mep-id, rmep-id)) should be appointed. The premise of this configuration is that the corresponding ring port has been joined into ERPS ring. The no command deletes the fault detection type of ERPS ring ports.

Parameters: {port0 | port1}: parameter selection. Port0 means the fault detection type of port0. Port1 means the fault detection type of port1.

{cc | physical-link-or-cc}: parameter selection. cc means that the ERPS ring port detection is cc report fault. physical-link-or-cc means that the ERPS ring port detection is cc report fault and physical link fault.

<domain-name>: the cfm domain name of ERPS ring port detection.

<ma-name>: the service name that cfm belongs to of ERPS ring port detection.

<mep-id>: the local mep id that cfm monitored of ERPS ring port detection.

<rmep-id>: the remote mep id that cfm monitored of ERPS ring port detection.

Command Mode: ERPS Ring Configuration Mode.

Default: ERPS ring port only detects the physical link fault as default.

Usage Guide:

If the inputted string of domain name exceeds 43 bytes, there will be the message of "Valid domain name should be no more than 43 bytes!"

If the inputted string format of domain name is not lawful, there will be the message of “Invalid domain name!”

If the inputted string of service name exceeds 45 bytes, there will be the message of “Valid service name should be no more than 45 bytes!”

If the inputted string format of service name is not lawful, there will be the message of “Invalid service name!”

If local mep and remote mep are the same, there will be the message of “The local mep can not be the same as the remote mep!” otherwise, enter into the next step;

Configure the fault detection type of ERPS ring ports as the appointed type. If the type is cc, save the configured md, ma, mep and rmep information to use for matching after receiving the cfm fault notification.

Example:

Configure the detection type of ERPS ring1 port0as cc.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#port0 failure-defect cc domain domain1 service service1 mep 1  
rmep 2
```

Delete this configuration.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#no port0 failure-defect
```

2.9 erps-instance <instance-id>

Command: erps-instance <instance-id>

no erps-instance <instance-id>

Function: Create the ERPS ring instance and enter into the ERPS ring instance configuration mode. If this ERPS ring instance has existed, enter into the ERPS instance configuration mode. If ERPS ring supports v2, multiple ERPS ring instances can be configured. The no command deletes the ERPS ring instance.

Parameters: <instance-id>: id of ERPS ring, the range is 1 to 48.

Command Mode: ERPS Ring Configuration Mode.

Default: Do not configure any ERPS ring instance.

Usage Guide: If the ERPS ring supports v1, there will be the message of “Doesn't support multiple ERPS instance capability on the ring running version 1!” when configured more than one ERPS instance.

If the configured instance exceeds the maximum ERPS instance number supported, there will be the message of “Support ERPS instance max number: 32 per ERPS ring!”

If the ERPS ring instance has existed on the ERPS ring, enter into the ERPS ring instance configuration mode;

Otherwise, create the corresponding ERPS ring instance and enter into the ERPS ring instance configuration mode.

Example:

Configure the ERPS ring instance 1 on ERPS ring1.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#
```

Delete the ERPS ring instance 1 on ERPS ring1.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#no erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#
```

2.10 description

Command: `description <instance-name>`

`no description <instance-name>`

Function: Configure the description string of ERPS instance.

Parameters: `<instance-name>`: ERPS instance name, the maximum string is 64, and it is made up with letters, numbers and underlines; the first and last characters cannot be underlines. The no command deletes the ERPS instance name.

Command Mode: ERPS Instance Configuration Mode.

Default: Do not configure the ERPS instance name as default.

Usage Guide: Judge the length of the string, if exceed 64, there will be the message of "Valid ERPS instance name should be no more than 64 bytes!" if the string format is not lawful, there will be the message of "Invalid ERPS instance name!" otherwise, configure the ERPS instance name as the appointed string.

Example:

Configure the ERPS instance1 name on ring1 as instance1.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)# description instance1
```

Delete this name of instance1.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)# no description
```

2.11 ring-id <ring-id>

Command: ring-id <ring-id>

no ring-id <ring-id>

Function: Configure the last byte of R-APS packets destination MAC address sent by ERPS ring node to carry ring-id. If ERPS ring supports v1, ring-id only can be configured as 1. The no command configures it not to carry the ring-id, it means that the MAC is 01-19-A7-00-00-01.

Parameters: <ring-id>: ERPS ring id and the range is 1 to 64.

Command Mode: ERPS Instance Configuration Mode.

Default: The MAC address is 01-19-A7-00-00-01 as default.

Usage Guide: If ERPS ring supports v1, ring-id only can be configured as 1. Because v1 only supports the destination MAC address of 01-19-A7-00-00-01, otherwise, there will be the message of "Can't config ringid other than 1 on the ERPS ring running version 1!"

If ERPS ring supports v2, configure the last byte of R-APS packets destination MAC address sent by ERPS ring node to carry the appointed ring-id.

Example:

Configure the last byte of R-APS packets destination MAC address sent by ERPS ring1 instance2 to carry the ring-id 2.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 2
```

```
Switch(config-erps-ring-inst-2)#ring-id 2
```

Configure the last byte of R-APS packets destination MAC address sent by ERPS ring1 instance2 not to carry the ring-id, it means the destination MAC is 01-19-A7-00-00-01.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 2
```

```
Switch(config-erps-ring-inst-2)#no ring-id
```

2.12 rpl {port0 | port1} {owner | neighbour}

Command: rpl {port0 | port1} {owner | neighbour}

no rpl {port0 | port1}

Function: Configure the member port of ERPS ring instance as RPL owner or RPL neighbour, the RPL node roles of different instances on the same ERPS ring cannot be configured on the

same member port. The no command configures the member port of ERPS ring instance as the ordinary transmission port member.

Parameters: {port0 | port1}: parameter selection. Port0 means the RPL role of port0 in ERPS ring instance; port1 means the RPL role of port1 in ERPS ring instance.

{owner | neighbour }: parameter selection. Owner means to configure the appointed member port as rpl owner; neighbour means to configure the appointed member port as rpl neighbour.

Command Mode: ERPS Instance Configuration Mode.

Default: None, it is the ordinary transmission node type.

Usage Guide: If configured port1-none, the node role of port1 cannot be configured, there will be the message of “Has configed port1-none on the ERPS open ring!”

If this instance node is already rpl owner or rpl neighbour, cannot run this command to any member port, there will be the message of “Has configed port rpl role: %s on the ERPS instance!” %s is the configured rpl role;

If other instance has configured the appointed rpl role on the ERPS ring, there will be the message of “Has configed port rpl role: %s in this or other ERPS instance on the ERPS ring!” configure the appointed member port on the ERPS ring of that instance as the appointed node role.

Example:

Configure the port0 of ERPS ring1 instance1 as RPL owner node.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)# rpl port0 owner
```

Configure the port0 of ERPS ring1 instance1 as the ordinary transmission port role.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)# no rpl port0
```

2.13 non-revertive

Command: non-revertive

no non-revertive

Function: Configure the ERPS ring instance as non-revertive. If this ERPS ring supports v1, this command is null and cannot be configured. The no command configures the ERPS ring instance as revertive. If this ERPS ring supports v1, this command is null. This command can be configured only on the RPL owner node of the sub ring.

Parameters: None.

Command Mode: ERPS Instance Configuration Mode.

Default: ERPS ring instance supports the revertive as default.

Usage Guide: If ERPS ring supports v1, there will be the message of “Can't config non-revertive on the ERPS ring running version 1!”

If the ERPS ring supports v2, configure this ERPS ring instance to support the non-revertive.

Example:

Configure the ERPS ring1 instance1 to support the non-revertive.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#non-revertive
```

Delete this configuration.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#no non-revertive
```

2.14 guard-timer <guard-times>

Command: guard-timer <guard-times>

no guard-timer

Function: Configure the Guard timer. The guard timer is used for the Ethernet node to avoid the error handling and the close loop according to the outdated R-APS packets. In the starting time of the timer, any R-APS packets received (the R-APS packets that the Request/State="1110" are except) will be dropped. The no command configures the guard timer as the default value.

Parameters: <guard-times>: the interval is 10ms and the range is 10ms to 2s.

Command Mode: ERPS Instance Configuration Mode.

Default: 500ms.

Usage Guide: If the timer is not enabled, configure the guard timer of ERPS ring instance as the appointed time; if it is enabled, configure the guard timer as the configuration value immediately. The timer will not be cleared, it will run still according to the last configuration time and this configuration will be effective next time.

Example:

Configure the guard timer of ERPS ring1 instance1 as 1s.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)guard-timer 100
Configure the guard timer of ERPS ring1 instance1 as the default value.
Switch(config)#erps-ring ring1
Switch(config-erps-ring)#erps-instance 1
Switch(config-erps-ring-inst-1) no guard-timer
```

2.15 holdoff-timer < holdoff-times>

Command: holdoff –timer <holdoff-times>

no holdoff -timer

Function: Configure the Holdoff timer. The Holdoff timer is used for the Ethernet node to block the default report time. When the new default happened or the default was more serious, this default will not be reported to the protection switching for handling immediately if the useful Holdoff timer is not 0, but enable the Holdoff timer. When the timer is time out, check if the link default in the timer starting still existed. If there is still the default, report it to handle it with protection switching, this default is not necessarily the one in the timer starting. The no command configures the Holdoff timer as the default value.

Parameters: <holdoff-times>: the interval is 1s and the range is 0 to 10s.

Command Mode: ERPS Instance Configuration Mode.

Default: 0s.

Usage Guide: If the timer is not enabled, configure the holdoff timer of ERPS ring instance as the appointed time; if it is enabled, configure the holdoff timer as the configuration value immediately. The timer will not be cleared, it will run still according to the last configuration time and this configuration will be effective next time.

Example:

```
Configure the Holdoff timer of ERPS ring1 instance1 as 5s.
Switch(config)#erps-ring ring1
Switch(config-erps-ring)#erps-instance 1
Switch(config-erps-ring-inst-1)#holdoff –timer 5
Configure the Holdoff timer of ERPS ring1 instance1 as the default value.
Switch(config)#erps-ring ring1
Switch(config-erps-ring)#erps-instance 1
Switch(config-erps-ring-inst-1)#no holdoff –timer
```

2.16 wtr-timer <wtr-times>

Command: wtr-timer <wtr-times>

no wtr-timer

Function: Configure the WTR timer. WTR timer is used to avoid the frequent protection switching of RPL owner node because of the periodic (intermittent) default. When RPL owner port received the default recovery packets, after some time, and then check if the default still existed on the other nodes and prevent blocking RPL owner port immediately to cause the chokepoint shocking. The no command configures the WTR timer as the default.

Parameters: <wtr-times>: the interval is 1min and the range is from 1 to 12min.

Command Mode: ERPS Instance Configuration Mode.

Default: 5min.

Usage Guide: If the timer is not enabled, configure the WTR timer of ERPS ring instance as the appointed time; if it is enabled, configure the WTR timer as the configuration value immediately. The timer will not be cleared, it will run still according to the last configuration time and this configuration will be effective next time.

Example:

Configure the WTR timer of ERPS ring1 instance1 as 10min.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#wtr-timer 10
```

Configure the WTR timer of ERPS ring1 instance1 as the default value.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#no wtr-timer
```

2.17 protected-instance

Command: protected-instance <instance-list>

no protected-instance <instance-list>

Function: Configure the protection instance of ERPS ring instance. ERPS ring instance can protect all the MSTP instances. The same instance cannot be quoted by multiple ERPS ring instances under the same topology. Under the same ERPS ring instance, run this command more than once to protect instance, the result will be accumulated. The no command deletes the protection instance of ERPS ring instance.

Parameters: <instance-list>: the MSTP instance list protected by ERPS ring instance, such

as i, j-k. The number of the instances in the list is not limited.

Command Mode: ERPS Instance Configuration Mode.

Default: ERPS ring instance does not protect any MSTP instance.

Usage Guide: If the inputting instance has been protected by other ERPS instance, there will be the message of “Instance: %d is protected by erps instance: %d on ring: %s!” the first %d is mstp instance id and the second is erps instance id; %s is ERPS ring name;

Configure the protection instance of ERPS ring instance as the appointed MSTP instance;

Check if the ERPS instance configuration is complete, if it is complete, activate the instance as active, and run the protocol.

Example:

Configure the protection instance of ERPS ring1 instance1 as instance 2.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#protected-instance 2
```

Delete this configuration.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#no protected-instance 2
```

2.18 raps-mel <level-value>

Command: raps-mel <level-value>

no raps-mel

Function: Configure the level of R-APS channel.

Parameters: <level-value>: the level value of APS packets, range is from 0 to 7.

Command Mode: ERPS Instance Configuration Mode.

Default: Level is 7.

Usage Guide: Configure the level of R-APS channel of ERPS ring instance as the appointed level. If configured successfully, the mel field of the R-APS packet sent by this ERPS ring instance will be added as the appointed level and only the R-APS packets with the level that is larger than or same as the appointed level can be allowed passing by, or notify the error. The no command configures the level as the default of 7. The MEL field in the protocol packets is used to detect if the current packet can pass by. If the MEL value configured in ERPS ring is letter than the value in the fault detection protocol, it means that the packet level is low and cannot pass by. The level configuration of all the nodes in the instance must be identical.

Example:

Configure the level of R-APS channel of ERPS ring1 instance1 as 5.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)raps-mel 5
```

Configure the level of R-APS channel of ERPS ring1 instance1 as 7.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)no raps-mel
```

2.19 control-vlan <vlan-id>

Command: control-vlan <vlan-id>

no control-vlan

Function: Configure the control vlan of R-APS packets of R-APS channel. In the ERPS ring instance, this vlan is only used to transmit ERPS protocol packets but not to forward the user business packets. It improves the ERPS protocol security. User makes sure the configuration uniqueness. This vlan is as the vlan tag when sending R-APS packets. The protection VLAN configuration of all the nodes in the instance must be identical. The no command deletes the control vlan.

Parameters: <vlan-id>: vlan id of R-APS packets, range is from 2 to 4094.

Command Mode: ERPS Instance Configuration Mode.

Default: Do not configure any control vlan.

Usage Guide: User configuration should meet the following situations:

The protection VLAN configuration of all the nodes in the instance must be identical;

The control vlan has uniqueness;

If the ring type with the instance is major ring, the control vlan and the protection vlan are in the same instance;

If the ring type with the instance is sub open-ring and it is the virtual channel method without R-APS, the control vlan belongs to one instance all alone;

The member port belongs to the control vlan and protection vlan.

The control vlan handling is as below:

- If the inputting VLAN does not exist, there will be the message of "Error, VLAN %d does not exist!" %d is the inputting value;
- If this ERPS ring instance has configured the control VLAN, there will be the message of "Control vlan has existed already!"
- Configure the control VLAN of the ERPS ring instance as the appointed VLAN;
- Check if the ERPS instance is integral, if it is integral, activate the instance as active and run the protocol.

Notice: The ordinary data vlan and the control vlan of the different erps instances cannot associated with the same MSTI.

Example:

Configure the control vlan of ERPS ring1 instance1 as vlan10.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)control-vlan 10
```

Delete this configuration.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)no control-vlan
```

2.20 forced-switch {port0 | port1}

Command: forced-switch {port0 | port1}

Function: Run the forced switch on the port of ERPS ring node. Two or more forced switch are allowed existing at the same time in one ERPS ring instance. But only one forced switch command can be existed on one ring node. User should avoid using multiple forced switch in ERPS ring instance to cause the ERPS ring instance splitting.

Parameters: {port0 | port1}: parameter selection, port0 means to run the forced switch configuration on port0 of the ring node; port1 means to run the forced switch configuration on port1 of the ring node.

Command Mode: ERPS Instance Configuration Mode.

Default: No forced switch in ERPS ring instance.

Usage Guide: If this ring supports version1, there will be the message of “Doesn't support the command on the ring running version 1!” otherwise, enter into the next step;

If this instance configuration is not integral, it is on the status of unactive, there will be the message of “The request is rejected because the ERP instance in unactive state!” otherwise, enter into the next step;

If the local forced switch has existed on the node of this ring instance (on same time, only one of port0 and port1 can be in the status of local FS), there will be the message of “The FS request is rejected because an local FS request is present!” otherwise, enter into the next step;

If the forced switch is on the current highest priority, block the data channel and R-APS channel of this ERPS ring instance on the appointed member port (port0 or port1), and unblock the other member port of this ring node;

When the forced switch command is the highest priority command, send the P-APS (FS) packets with FS message on the two ring ports (port0 and port1) stably and steadily;

For the node which received the R-APS (FS) packets, if there is no higher priority request in local, unblock all the blocked ring ports;

The node which received the R-APS (FS) packets should run the flush FDB configuration according the corresponding demand.

Example:

Run the forced switch configuration on the port0 of ERPS ring1 instance1.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#force-switch port0
```

2.21 manual-switch {port0 | port1}

Command: manual-switch {port0 | port1}

Function: Run the manual switch on the port of ERPS ring node. Only one manual switch is allowed existing in one ERPS ring instance, and the premise is that there is no SF fault or FS command in ERPS ring instance.

Parameters: {port0 | port1}: parameter selection, port0 means to run the manual switch configuration on port0 of the ring node; port1 means to run the manual switch configuration on port1 of the ring node.

Command Mode: ERPS Instance Configuration Mode.

Default: No manual switch in ERPS ring instance.

Usage Guide: If this ring supports version1, there will be the message of “Doesn't support the command on the ring running version 1!” otherwise, enter into the next step;

If this instance configuration is not integral, it is on the status of unactive, there will be the message of “The request is rejected because the ERP instance in unactive state!” otherwise, enter into the next step;

If the MS status has existed in ERPS ring node, there will be the message of “The MS request is rejected because an existing MS request is present!”

If the manual switch has existed on the node of this ring instance, there will be the message of “The MS request is rejected because an existing FS request is present!” otherwise, enter into the next step;

If there has been the fault in ERPS ring instance, there will be the message of “The MS request is rejected because an existing SF is present!” otherwise, enter into the next step;

If the manual switch is on the current highest priority, block the data channel and R-APS

channel of this ERPS ring instance on the appointed member port (port0 or port1), and unblock the other member port of this ring node;

When the manual switch command is the highest priority command, send the P-APS (MS) packets with MS message on the two ring ports (port0 and port1) stably and steadily;

For the node which received the R-APS (MS) packets, if there is no higher priority request in local, unblock all the blocked ring ports;

The node which received the R-APS (MS) packets should run the flush FDB configuration according the corresponding demand.

Example:

Run the manual switch configuration on the port0 of ERPS ring1 instance1.

```
Switch(config)#erps-ring ring1
```

```
Switch(config-erps-ring)#erps-instance 1
```

```
Switch(config-erps-ring-inst-1)#manual-switch port0
```

2.22 clear command

Command: clear command

Function: Run the clear command to the member port of ERPS ring node, it can clear the management command of the local activity: forced switch command and manual switch command; it can be also used to trigger the link switch under the revertive mode before WTR or WTB is time out; and trigger the link to switch from the standby link RPL back to the intrinsic link under the non-revertive mode after the fault recovery. For the last two situations, run this command on the rpl owner node universally.

Parameters: None.

Command Mode: ERPS Instance Configuration Mode.

Default: No clear command in ERPS ring instance.

Usage Guide: If this ring supports version1, there will be the message of “Doesn't support the command on the ring running version 1!” otherwise, enter into the next step;

If this instance configuration is not integral, it is on the status of unactive, there will be the message of “The request is rejected because the ERP instance in unactive state!” otherwise, enter into the next step;

If the forced or manual switch command has existed on the node of this ring instance, clear the switch command and keep the block status of the data channel and R-APS channel of the blocked member ports. And send the P-APS (NR) packets on the two member ports stably and steadily until received R-APS (NR, RB) packets and known the RPL is blocked. Or the higher level request happens on the ring (such as SF);

If the local forced or manual switch has existed on the node of this ring instance, clear the command and then receive the R-APS (NR) packets whose node ID is larger than the local node ID. Unblock all the ring ports without SF fault and stop sending the R-APS (NR) packets on the two member ports.

If the ERPS ring instance that RPL owner node is in is the revertive mode and the WTR or WTB timer is enabled, delete the timer, block the RPL port and send the R-APS (NR, RB) packets on the two ring ports; and run flush FDB configuration, trigger the link switch in advance. Otherwise, enter into the next step;

If the ERPS ring instance that RPL owner node is in is the non-revertive mode, block the RPL port and send the R-APS (NR, RB) packets on the two ring ports; and run flush FDB configuration, trigger the link to switch from the standby link RPL back to the intrinsic link.

Example:

Run clear configuration on ERPS ring1 instance1.

```
Switch(config)#erps-ring ring1
Switch(config-erps-ring)#erps-instance 1
Switch(config-erps-ring-inst-1)#clear command
```

2.23 show erps ring {<ring-name> | brief}

Command: show erps ring {<ring-name> | brief}

Function: Read the ERPS ring information.

Parameters: <ring-name>: ERPS ring name, the maximum characters number is 64 and it is made up with letters, numbers and underlines. The first and last characters cannot be underlines. If it is not appointed, show all the ERPS rings of this device.

brief: Show the ERPS ring main information.

Command Mode: Admin Mode.

Default: None.

Example: show all the ERPS rings information.

```
Switch#show erps ring brief
```

Ring-Name	Ring-topo	Port0	Port1	Version	Inst-Count
ring1	major-ring	1/0/1	1/0/2	V2	1
ring2	open-ring	1/0/5	1/0/6	V2	1

Fields	Explanation
Ring-Name	ERPS ring name, the maximum characters number

	is 64 and it is made up with letters, numbers and underlines. The first and last characters cannot be underlines.
Ring-topo	ERPS ring topology mode: major-ring, open-bring
Port0	Port0 information of ERPS ring
Port1	Port1 information of ERPS ring
Version	Version that ERPS ring supports: V1, V2
Inst-Count	Instances number range of ERPS ring: 1 to 64

Show the ERPS ring1 information:

Switch#show erps ring ring1

R: RPL Owner

N: RPL Neighbour

C: Common Node

R-APS ring topology: open-ring

R-APS Virtual-Channel: with

Port0: Ethernet1/0/1 Failure-detect type: physical-link-or-cc

Port1: Ethernet1/0/2 Failure-detect type: physical-link

Instance Contral Protected WTR_Timer Guard_Timer Holdoff_Timer Port0
Port1

ID	Vlan	Instance	(min)	(csec)	(second)		
1	10	3	6	100	0	R	C
2	20	4	5	500	0	C	C

Fields	Explanation
Instance ID	Id number of ERPS ring instance, range is from 1 to 64.
Contral Vlan	R-APS channel vlan, package R-APS packet of tag
Protected Instance	MSTP instance protected by ERPS ring instance
WTR_Timer	Wait to Restore timer, range is from 1 to 12min.
Guard_Timer	Guard timer, range is from 10ms to 2s
Holdoff_Timer	Holdoff timer, range is from 0 to 10s
Port0	Port0 information of ERPS ring

Port1	Port1 information of ERPS ring
R-APS ring topology	ERPS ring topology mode: major-ring, open-bring
R-APS Virtual-Channel	If it is ERPS sub ring, whether there is the R-APS virtual channel: with, without

2.24 show erps instance [ring <ring-name> [instance <instance-id>]]

Command: show erps instance [ring <ring-name> [instance <instance-id>]]

Function: Show the ERPS ring instance information.

Parameters: <ring-name>: ERPS ring name, the maximum characters number is 64 and it is made up with letters, numbers and underlines. The first and last characters cannot be underlines. If it is not appointed, show all the ERPS ring instances of this device.

<instance-id>: ID of ERPS ring instance, range is from 1 to 48. If it is not appointed, show all the ERPS ring instances information.

Command Mode: Admin Mode.

Default: None.

Example:

Show all the ERPS ring instances information.

```
Switch#show erps instance
ERPS Ring ring1
  Instance 1
  Description: instance1
  Protected Instance: 1
  Revertive mode: non-revertive
  R-APS MEL: 7
  R-APS Virtual-Channel: with
  Control Vlan: 10
  Ring ID:
  Guard Timer (csec): 100
  Holdoff Timer (seconds): 0
  WTR Timer (min): 6
-----
Port      Role      Port-Status
-----
port0    RPL Owner  Blocked
```

port1 Common Forwarding

Fields	Explanation
Description	ERPS ring instance name
Protected Instance	MSTP instance protected by ERPS ring instance
Revertive mode	ERPS ring link mode: revertive, non-revertive
R-APS MEL	Level of R-APS channel, package R-APS packets
R-APS Virtual-Channel	If the ERPS ring is the sub ring, the R-APS virtual channel of the inherited ring: with, without
Ring ID	The ring-id number carried by the packets sent by ERPS ring instance, range is from 1 to 64.
Contral Vlan	R-APS channel vlan, package R-APS packet of tag
WTR_Timer	Wait to Restore timer, range is from 1 to 12min
Guard_Timer	Guard timer, range is from 10ms to 2s
Holdoff_Timer	Holdoff timer, range is from 0 to 10s
Port	ERPS ring port information: port0, port1
Role	ERPS ring node roles: RPL Owner, RPL neighbor, Common
Port Status	Blocked: port is in block status forwarding: port is in forwarding status

2.25 show erps status [ring <ring-name> [instance <instance-id>]]

Command: show erps status [ring <ring-name> [instance <instance-id>]]

Function: Show the status information of ERPS ring instance.

Parameters: <ring-name>: ERPS ring name, the maximum characters number is 64 and it is made up with letters, numbers and underlines. The first and last characters cannot be underlines. If it is not appointed, show all the ERPS rings of this device.

<instance-id>: ID of ERPS ring instance, range is from 1 to 48. If it is not appointed, show all the ERPS ring instances status information.

Command Mode: Admin Mode.

Default: None.

Example:

Show all the ERPS ring instances status information.

```
Switch#show erps status
ERPS ring ring1 instance 1 status:
Active: 1
Node State: Idle
Time last topology change : Jan 01 00:17:25 2012
```

```
-----
Port    Interface  Port-Status  Signal-Status  R-RAPS-NodeId  BPR
-----
Port0   1/0/1      blocked      Non-failed     00-00-00-00-00-00  0
Port1   1/0/2      forwarding   Non-failed     00-00-00-00-00-00  0
```

Active	Current active status of ERPS ring instance: 1, 0
Node State	Current status of ERPS ring instance: Idle, Protection, Forced-switch, Manual-switch, Pending
Port Status	Blocked: the port is in block status Forwarding: the port is in forwarding status
Signal Status	ERPS ring port fault status: Non-failed: no fault Failed: fault happened
Remote R-APS NodeId	NodeId information carried by the receiving last R-APS saved by ERPS ring port, it is mac information.
BPR	The block link information carried by the receiving last R-APS saved by ERPS ring port, it is port0 or port1 which was blocked.
Time last topology change	Topology switching last time

2.26 show erps statistics [ring <ring-name> [instance <instance-id>]]

Command: show erps statistics [ring <ring-name> [instance <instance-id>]]

Function: Show the statistic information of ERPS ring instance.

Parameters: <ring-name>: ERPS ring name, the maximum characters number is 64 and it is made up with letters, numbers and underlines. The first and last characters cannot be underlines. If it is not appointed, show the statistic information of all the ERPS rings of this

device.

<instance-id>: ID of ERPS ring instance, range is from 1 to 48. If it is not appointed, show the statistic information of all the ERPS ring instances of this device.

Command Mode: Admin Mode.

Default: None.

Example:

Show the statistic information of ERPS ring instance.

```
Switch#show erps statistics ring 1 instance 1
```

```
Statistics for ERPS ring ring1 instance 1:
```

R-APS	Port0(Tx/Rx)	Port1(Tx/Rx)
NR	3/0	3/0
NR,RB	0/0	0/0
SF	19129/0	19129/0
MS	0/0	0/0
FS	0/0	0/0
EVENT	0/0	0/0
TOTOL	19132/0	19132/0

2.27 clear erps statistics [ring <ring-name> [instance <instance-id>]]

Command: clear erps statistics [ring <ring-name> [instance <instance-id>]]

Function: Clear the statistic information of ERPS.

Parameters: **<ring-name>**: ERPS ring name, the maximum characters number is 64 and it is made up with letters, numbers and underlines. The first and last characters cannot be underlines. If it is not appointed, clear the statistic information of all the ERPS rings of this device.

<instance-id>: ID of ERPS ring instance, range is from 1 to 48. If it is not appointed, clear the statistic information of all the ERPS ring instances of this device.

Command Mode: Admin Mode.

Default: None.

Example: Clear the statistic information of ERPS ring1 instance1.

```
Switch#clear erps statistics ring 1 instance 1
```

2.28 debug erps

Command: debug erps packet [detail] {send | receive} {[ring <ring-name> [instance <instance-id>]] | [port]}

debug erps fsm [ring <ring-name> [instance <instance-id>]]

debug erps timer [ring <ring-name> [instance <instance-id>]]

no debug erps

Function: Enable the debug information of ERPS. The no command disables this information.

Parameters: **packet:** Enable the packets debug information.

detail: Enable the detail debug information of packets.

send: Enable the sending packets debug information.

received: Enable the receiving packets debug information.

fsm: Enable the status device debug information.

timer: Enable the timer debug information.

<ring-name>: ERPS ring name, the maximum characters number is 64 and it is made up with letters, numbers and underlines. The first and last characters cannot be underlines.

<instance-id>: ID of ERPS ring instance, range is from 1 to 48.

Command Mode: Admin Mode.

Default: Do not show.

2.29 debug erps error

Command: debug erps error

no debug erps error

Function: Show the default information of ERPS. The no command disables this information.

Parameters: None.

Command Mode: Admin Mode.

Default: Do not show.

2.30 debug erps event

Command: debug erps event

no debug erps event

Function: Show the event information of ERPS. The no command disables this information.

Parameters: None.

Command Mode: Admin Mode.

Default: Do not show.

2.31 no debug all

Command: no debug all

Function: Disable all the debug information of this device.

Parameters: None.

Command Mode: Admin Mode.

Default: None.

Usage Guide: When using no debug all command to disable all the debug information of the switch, this command is effective to the debug information of ERPS, the debug information of ERPS will be disabled too.

2.32 show debugging

Command: show debugging

Function: Enable all the debug information of this module.

Parameters: None.

Command Mode: Admin Mode.

Default: None.

Usage Guide: When using **show debugging erps** command to show the debug information, this module supports this command.