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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 interface1/2.

```
Switch(config)#spanning-tree
Switch(config)#interface ethernet 1/2
Switch(Config-If-Ethernet1/2)#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
10Gbps	2000	2000~20000

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
10Gbps	N	2000/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 port1/2, set the port cost is 3000000.

```
Switch(Config-If-Ethernet1/2)#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 1/2
```

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

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

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 1/2
```

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

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

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 1/7-8 as point-to-point type.

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

```
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 1/2 to run in the MSTP mode.

```
Switch(Config-If-Ethernet1/2)#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
10Gbps	2000	2000~20000

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
10Gbps	N	2000/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
10Gbps	Full- duplex	2	2,000
	aggregation link with 2 ports	1	1,000
	aggregation link with 3 ports	1	666
	aggregation link with 4 ports	1	500

	4 ports		
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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 port1/2, set the MSTP port cost in the instance 2 to 3000000.

```
Switch(Config-If-Ethernet1/2)#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 1/2 as loopguard mode for instance 0.

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

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

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 1/2 for the instance 1.

```
Switch(config)#interface ethernet 1/2
Switch(Config-If-Ethernet1/2)#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 1/2 in instance 0.

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

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

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

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 1/2
```

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

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

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-Ethernet1/1)#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-Ethernet1/1)#spanning-tree rootguard
```

1.1.30 spanning-tree tflush (Global mode)

Command: `spanning-tree tflush {enable| disable| protect}`

`no spanning-tree tflush`

Function: Configure the spanning-tree flush mode 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: 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 tflush disable
Switch(config)#
```

1.1.31 spanning-tree tflush (Port mode)

Command: `spanning-tree tflush {enable| disable| protect}`
`no spanning-tree tflush`

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 1/2
Switch(Config-If-Ethernet1/2)#spanning-tree tflush disable
Switch(Config-If-Ethernet1/2)#
```

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 port1/1.

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

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

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 - 00: 03: 0f: 01: 0e: 30
Root Id        : 16384.00: 03: 0f: 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:

Ethernet1/1 Ethernet1/2 (Total 2)

PortName	ID	ExtRPC	IntRPC	State	Role	DsgBridge	DsgPort
Ethernet1/1	128.001	0	0	FWD	ROOT	16384.00030f010f52	128.007
Ethernet1/2	128.002	0	0	BLK	ALTR	16384.00030f010f52	128.011

Instance 3

Self Bridge Id : 0.00: 03: 0f: 01: 0e: 30

Region Root Id : this switch

Int.RootPathCost : 0

Root Port ID : 0

Current port list in Instance 3:

Ethernet1/1 Ethernet1/2 (Total 2)

PortName	ID	IntRPC	State	Role	DsgBridge	DsgPort
Ethernet1/1	128.001	0	FWD	MSTR	0.00030f010e30	128.001
Ethernet1/2	128.002	0	BLK	ALTR	0.00030f010e30	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:

Ethernet1/1 Ethernet1/2 (Total 2)

PortName	ID	IntRPC	State	Role	DsgBridge	DsgPort
Ethernet1/1	128.001	0	FWD	MSTR	32768.00030f010e30	128.001
Ethernet1/2	128.002	0	BLK	ALTR	32768.00030f010e30	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
-----
```