Sun Ethernet Fabric Operating System CLI Reference Manual, Vol. 2

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Contents

Using This Documentation

- **Overview** – Provides information on Oracle's SEFOS CLI commands
- **Audience** – Users and system administrators who configure SEFOS through the CLI
- **Required knowledge** – Basic knowledge of UNIX CLI command syntax

Product Documentation Library

Documentation and resources for this product and related products are available at http://www.oracle.com/goto/es2-72_es2-64/docs.

Acronyms

Refer to the *Sun Ethernet Fabric Operating System CLI Reference Manual, Vol. 1* for acronyms and abbreviations.

CLI Command Modes

Refer to the *Sun Ethernet Fabric Operating System CLI Reference Manual, Vol. 1* for CLI command modes.

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CHAPTER 14

STP

STP (Spanning-Tree Protocol) is a link management protocol that provides path redundancy while preventing undesirable loops in the network that are created by multiple active paths between stations. To establish path redundancy, STP creates a tree that spans all of the switches in an extended network, forcing redundant paths into a standby or blocked state.

For an Ethernet network to function properly, only one active path should exist between two stations. Multiple active paths between stations in a bridged network can cause loops in which Ethernet frames can endlessly circulate. STP logically breaks such loops and prevents looping traffic from clogging the network. The dynamic control of the topology provides continued network operation in the presence of redundant or unintended looping paths.

The list of CLI commands for the configuration of STP is common to both SI and MI except for a difference in the prompt that appears for the switch with MI support. The prompt for the switch configuration mode is,

```
SEFOS(config-switch)# spanning-tree Mode rst
```

The STP functionality is realized in the network using one of the three following STPs:

- RSTP
- MSTP
- PVRST+

14.1 STP Commands Common for RSTP, MSTP and PVRST+

This section describes all Spanning-Tree Protocol related commands that are common for all kinds of STPs.

RSTP

Oracle RSTP is a portable implementation of the IEEE 802.1D standard. It provides rapid recovery of connectivity following the failure of a bridge/bridge port or a LAN. It reduces the time to reconfigure the active topology of the network when physical topology or topology configuration parameters change. It provides increased availability of MAC service when there is a reconfiguration or failure of components in a bridged LAN. It can interoperate with legacy STP bridges without any change in the configuration.

14.1.1 shutdown spanning-tree

Command Objective	This command shuts down spanning tree functionality in the switch. The switch does not execute any STP to form a loop-free topology in the Ethernet network and operates with the existing topology structure.
Syntax	**shutdown spanning-tree**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Spanning tree MSTP is started and enabled in the switch.
Example	**SEFOS(config)# shutdown spanning-tree**
Related Command(s)	• **base bridge-Mode** - Configures the base mode (either 802.1d transparent bridge mode or 802.1q VLAN-aware bridge mode) in which the VLAN feature should operate on the switch. • **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports. • **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology. • **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch. • **clear spanning-tree counters** - Deletes all bridge and port-level spanning tree statistics. • **spanning-tree pathcost dynamic** – Enables the dynamic path cost calculation feature in the switch. • **spanning-tree priority** - Configures the priority value that is assigned to the switch. • **spanning-tree auto-edge** - Enables automatic detection of Edge port parameter of an interface.

- **spanning-tree – Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates a port in STP when Automatic Port Create feature is disabled.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.
- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP.
- **show spanning-tree – Summary, Blockedports, Pathcost, Redundancy** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree interface** - Displays the port-related spanning tree information for the specified interface.
- **show spanning-tree root** - Displays the spanning tree root information.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree – layer 2 gateway port** - Displays spanning tree information for all L2GPs enabled in the switch.
- **spanning-tree mst max-hops** - Configures the maximum number of hops permitted in the MST.
- **spanning-tree mst configuration** - Enters into MST configuration

mode, where instance-specific and MST region configuration can be done.

- **spanning-tree mst max-instance** - Configures the maximum number of active MSTIs that can be created.
- **spanning-tree mst - Properties of an interface for MSTP** - Configures the port-related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello-time for an interface that is enabled.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst configuration** - Displays multiple spanning tree instance-related information.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port-specific information for the specified port.
- **spanning-tree vlan** - Configures spanning tree-related information on a per VLAN basis.
- **spanning-tree bpduguard** - Configures the status of BPDU guard feature in an interface.
- **spanning-tree guard** - Configures the various guard features such as root guard, and loop guard in a port.
- **spanning-tree encap** - Configures the encapsulation type to be used in an interface.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN.
- **show spanning-tree vlan - bridge** - Displays the PVRT-related information of the bridge for the specified VLAN ID.
- **show spanning-tree vlan - root** - Displays the PVRT-related information of the root for the specified VLAN ID.
- **show spanning-tree vlan - interface** - Displays interface-specific

PVRST information for the specified VLAN.

- **`errordisable recovery-interval`** - Sets the error disable recovery timer in an interface.
- **`show spanning-tree interface - inconsistency`** - Displays the port-related spanning tree inconsistent state information for the specified interface.
- **`show customer spanning-tree`** – Displays the detailed customer spanning information.
- **`set performance-data status`** - Enables or disables the collection of performance data for the STP protocol.

14.1.2 spanning-tree

Command Objective	This command enables the spanning tree operation in the switch for the selected spanning tree mode. Spanning tree operation provides path redundancy while preventing undesirable loops in the network that are created by multiple active paths between stations. It logically breaks such loops and prevents looping traffic from clogging the network. The no form of this command disables the spanning tree operation in the switch. The spanning tree operation is automatically enabled in the switch, once the spanning tree mode is changed.
Syntax	**`spanning-tree`** **`no spanning-tree`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Spanning tree MSTP is started and enabled in the switch.
Note:	The spanning tree operation can be enabled in the switch only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	**`SEFOS(config)#spanning-tree`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. • **`show spanning-tree - Summary, Blockedports, Pathcost, Redundancy`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.

- **show spanning-tree interface** - Displays the port-related spanning tree information for the specified interface.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port-specific information for the specified port.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN.
- **show spanning-tree vlan - interface** - Displays interface-specific PVRST information for the specified VLAN.
- **show spanning-tree interface - inconsistency** - Displays the port-related spanning tree inconsistent state information for the specified interface.
- **show customer spanning-tree** – Displays the detailed customer spanning information
- **Set performance-data-status** - Enables or disables the collection of performance data for the RSTP protocol

14.1.3 spanning-tree provider

Command Objective	This command enables the spanning tree provider mode of operation in the switch, thereby the SVLAN component of the switch is created. The no form of the command disables the spanning tree provider operation in the switch.
Syntax	**spanning-tree provider** **no spanning-tree provider**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Spanning tree-enabled is MSTP
Note:	This command is applicable for provider-edge or provider-core bridges only and not for provider or customer bridges. This command is applicable only in RSTP & MSTP modes.
Example	**SEFOS(config)# spanning-tree provider**
Related Command(s)	• **base bridge-Mode** - Configures the base mode (either 802.1d transparent bridge mode or 802.1q VLAN-aware bridge mode) in which the VLAN feature should operate on the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. • **show spanning-tree detail** - Displays detailed spanning tree information. • **show spanning-tree active** - Displays spanning tree information of active ports.

14.1.4 spanning-tree Mode

Command Objective	This command sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. The current selected type of spanning tree is enabled and the existing spanning tree type is disabled in the switch.
Syntax	**If switch PVRST_WANTED is set as "yes" during compilation of exe:** **`spanning-tree Mode {mst|rst|pvrst|pvst|rapid-pvst}`** **`no spanning-tree Mode`** **If switch PVRST_WANTED is set as "no" during compilation of exe:** **`spanning-tree Mode {mst|rst}`**
Parameter Description	• **`mst`** - Configures the switch to execute MSTP to prevent undesirable loops. MSTP configures spanning tree on per VLAN basis or multiple VLANs per spanning tree. The mode cannot be set as `mst`, if the base bridge mode is configured as transparent bridging. • **`rst`** - Configures the switch to execute RSTP to prevent undesirable loops. RSTP provides rapid recovery of connectivity following the failure of a bridge/bridge port or a LAN. • **`pvrst`** - Configures the switch to execute PVRST+ to prevent undesirable loops. PVRST+ is an enhancement of RSTP which works in combination with VLAN to provide better control over traffic in the network. The mode cannot be set as `pvrst` if the base bridge mode is configured as transparent bridging. The `pvrst` can be set as the spanning tree mode, only if the GVRP feature is disabled. • **`pvst`** - Configures the switch to execute PVST to prevent undesirable loops. PVST maintains a separate spanning tree instance for each VLAN in the network and forwards a VLAN trunk for only some VLANs. The mode cannot be set as `pvst` if the base bridge mode is configured as transparent bridging. This feature is currently not supported. • **`rapid-pvst`** - Configures the switch to execute rapid PVST to prevent undesirable loops. Rapid PVST combines the functionalities of RSTP and PVST, and creates a tree for each VLAN. The mode cannot be set as `rapid-pvst`, if the base bridge mode is configured as transparent bridging. This feature is currently not supported.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E

Default	`mst`
Example	**`SEFOS(config)#spanning-tree Mode rst`**
Related Command(s)	• **`base bridge-Mode`** - Configures the base mode (either 802.1d transparent bridge mode or 802.1q VLAN-aware bridge mode) in which the VLAN feature should operate on the switch. • **`set gvrp disable`** – Globally disables GVRP feature on all ports of a switch. • **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree`** - Enables the spanning tree operation in the switch for the selected spanning tree mode. • **`spanning-tree compatibility`** - Sets the STP compatibility version in the switch for all ports. • **`spanning-tree timers`** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology. • **`spanning-tree transmit hold-count`** - Sets the transmit hold-count value for the switch. • **`clear spanning-tree counters`** - Deletes all bridge and port-level spanning tree statistics information. • **`spanning-tree pathcost dynamic`** - Enables dynamic path cost calculation feature in the switch. • **`spanning-tree priority`** - Configures the priority value that is assigned to the switch. • **`spanning-tree auto-edge`** - Enables automatic detection of Edge port parameter of an interface. • **`spanning-tree - Properties of an interface`** - Configures the port-related spanning tree information for all kinds of STPs and creates a port in STP when Automatic Port Create feature is disabled. • **`spanning-tree restricted-role`** - Enables the restricted role feature for a port. • **`spanning-tree restricted-tcn`** - Enables the topology change guard / restricted TCN feature on a port. • **`spanning-tree layer2-gateway-port`** - Configures a port to operate as a L2GP.

- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP.
- **show spanning-tree – Summary, Blockedports, Pathcost, Redundancy** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree interface** - Displays the port-related spanning tree information for the specified interface.
- **show spanning-tree root** - Displays the spanning tree root information.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree – layer 2 gateway port** - Displays spanning tree information for all L2GPs enabled in the switch.
- **spanning-tree mst max-hops** - Configures the maximum number of hops permitted in the MST.
- **spanning-tree mst max-instance** - Configures the maximum number of active MSTIs that can be created.
- **spanning-tree mst configuration** - Enters into MST configuration mode, where instance-specific and MST region configuration can be done.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port-related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello-time for an interface that is enabled.
- **show spanning-tree mst - CIST or specified mst Instance**

- Displays multiple spanning tree information for all MSTIs in the switch.

- **show spanning-tree mst configuration** - Displays multiple spanning tree instance-related information.

- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port-specific information for the specified port.

- **spanning-tree vlan** - Configures spanning tree-related information on a per VLAN basis.

- **spanning-tree bpduguard** - Configures the status of BPDU guard feature in an interface.

- **spanning-tree guard** - Configures the various PVRST guard features, such as root guard, in a port.

- **spanning-tree encap** - Configures the encapsulation type to be used in an interface.

- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.

- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.

- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.

- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN.

- **show spanning-tree vlan - bridge** - Displays the PVRT-related information of the bridge for the specified VLAN ID.

- **show spanning-tree vlan - root** - Displays the PVRT-related information of the root, for the specified VLAN ID.

- **show spanning-tree vlan - interface** - Displays interface-specific PVRST information for the specified VLAN.

- **spanning-tree flush-interval** - Configures the flush interval timer value

- **spanning-tree flush-indication-threshold -**Configures the flush indication threshold value for a specific instance.

- **spanning-tree forwarddelay optimization alternate-role** - ~~enabels~~ Enables and disables the optimization for spanning tree-related protocol in alternate port role transition.

- **`show customer spanning-tree`** – Displays the detailed customer spanning information
- **`Set performance-data-status`** - Enables or disables the collection of performance data for the RSTP protocol

14.1.5 spanning-tree compatibility

Command Objective	This command sets the STP compatibility version in the switch for all ports. The no form of this command sets the STP compatibility version to its default value. The STP compatibility version is changed to its default value even if the spanning tree mode is changed. The compatibility version allows the switch to temporarily operate (that is, till this configuration is reset manually in a different STP version despite the spanning tree mode set to some other version. This configuration is useful during cases where spanning tree mode is not required to be changed.
Syntax	**spanning-tree compatibility {stp|rst|mst}** **no spanning-tree compatibility**
Parameter Description	• **stp** - Configures the switch to execute spanning tree operation as specified in IEEE 802.1D. • **rst** - Configures the switch to execute spanning tree operation as specified in IEEE 802.1w. • **mst** - Configures the switch to execute spanning tree operation as specified in IEEE 802.1s. The STP compatibility version cannot be set as `mst`, if the spanning tree mode is set as `rst`.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	If STP mode is set as `mst`, then spanning tree compatibility is set as `mst`. If STP mode is set as `rst`, then spanning tree compatibility is set as `rst`.
Note:	The STP compatibility version can be configured in the switch, only if the spanning tree functionality is not shut down in the switch. The spanning tree mode should be set, if the functionality is already shut down. The STP compatibility version does not change the operation of the switch whose spanning tree mode is set as PVRST.
Example	**SEFOS(config)#spanning-tree compatibility stp**
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.

- **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **`show spanning-tree - Summary, Blockedports, Pathcost, Redundancy`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.
- **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **`show spanning-tree vlan - Summary, Blockedports, Pathcost`** - Displays PVRST-related information for the specified VLAN.

14.1.6 spanning-tree timers

Command Objective	This command sets the spanning tree timers such as hello-time used for controlling the transmission of BPDUs during the computation of loop-free topology. The no form of this command resets the spanning tree timers to its default values. The spanning tree timers are reset to its default value, even if the spanning tree mode is changed.
Syntax	**`spanning-tree {forward-time <seconds(4-30)> | hello-time <seconds(1-2)> | max-age <seconds(6-40)>}`** **`no spanning-tree { forward-time | hello-time | max-age }`**
Parameter Description	• **`forward-time`** - Configures the number of seconds a port waits before changing from the blocking state to the forwarding state. This value ranges from 4 to 30 seconds. In MSTP, this time configuration is applied for IST root (that is, MSTI 0). • **`hello-time`** - Configures the time interval (in seconds) between two successive configuration BPDUs generated by the root switch. This value should be either 1 or 2 seconds. This value is configured on per-port basis for MSTP and is configured globally for RSTP. • **`max-age`** - Configures the maximum expected arrival time (in seconds) of hello BPDUs. STP information learned from the network on any port is discarded once the configured arrival time expires. The spanning tree topology is re-computed after this time interval. This value ranges from 6 to 40 seconds. In MSTP, this time configuration is applied for IST root (that is, MSTI 0). Note: Spanning-tree timers can be configured in centiseconds through SNMP
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	• forward-time - 15 seconds • hello-time - 2 seconds • max-age - 20 seconds
Note:	The values configured for the spanning tree timers should satisfy the following conditions: `2 * (forward-time - 1) >= max-age`, and

	`max-age >= 2 * (hello-time +1)` The STP timers can be configured in the switch, only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. This spanning tree timer's configuration is not supported in PVRST mode.
Example	**`SEFOS(config)# spanning-tree max-age 6`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. • **`show spanning-tree - Summary, Blockedports, Pathcost, Redundancy`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree interface detail`** - Displays detailed spanning tree-related information for the specified port. • **`show spanning-tree root`** - Displays the spanning tree root information. • **`show spanning-tree bridge`** - Displays the spanning tree bridge information. • **`show spanning-tree mst - CIST or specified mst Instance`** - Displays multiple spanning tree information for all MSTIs in the switch. • **`show spanning-tree mst - Port Specific Configuration`** - Displays multiple spanning tree port specific-information for the specified port. • **`show customer spanning-tree`** – Displays the detailed customer spanning information

14.1.7 spanning-tree transmit hold-count

Command Objective	This command sets the transmit hold-count value for the switch. The transmit hold-count value is a counter that is used to limit the maximum transmission rate of the switch and to avoid flooding. This value specifies the maximum number of packets that can be sent in a given hello-time interval. This value ranges from 1 to 10. The no form of this command sets the transmit hold-count to its default value. The transmit hold-count is changed to its default value even if the spanning tree mode is changed.
Syntax	**spanning-tree transmit hold-count <value (1-10)>** **no spanning-tree transmit hold-count**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	6, if the spanning tree mode is set as `mst`. 3, if the spanning tree mode is set as `rst` or `pvrst`.
Note:	The transmit hold-count value can be configured in the switch, only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. This transmit hold-count value configuration is not supported in PVRST mode.
Example	**SEFOS(config)# spanning-tree transmit hold-count 5**
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. • **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **show spanning-tree active detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN.

- **`show customer spanning-tree`** – Displays the detailed customer spanning information.

14.1.8 clear spanning-tree counters

Command Objective

This command deletes all bridge and port-level spanning tree statistics information.

For RSTP, the information contains number of:

- Transitions to forwarding state
- RSTP BPDU count received or transmitted
- Config BPDU count received or transmitted
- TCN BPDU count received or transmitted
- Invalid BPDU count transmitted
- Port protocol migration count

For MSTP, the information contains number of:

- Port forward transitions
- Port received BPDUs
- Port transmitted BPDUs
- Port invalid BPDUs received
- Port protocol migration count
- BPDUs sent or received for each MSTI

For PVRST, the information contains number of:

- Transitions to forwarding state
- PVRST BPDU count received or transmitted
- Config BPDU count received or transmitted
- TCN BPDU count received or transmitted
- Port protocol migration count

Syntax	**clear spanning-tree [mst <instance-id>] counters[interface <interface-type> <interface-id>]**
Syntax **Description**	• **mst <instance-id>]** - Clears the statistical counters specific to the MSTP instance already created in the switch. This value ranges from 1 to 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs. This option is applicable only if the spanning tree mode is set as `mst`. • **interface** - Clears all port-level spanning tree statistics information for the given port. ▪ **<interface-type> –** Clears all port-level spanning tree statistics information for the specified type of interface. The interface can be: • **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. Note: As of release 2.0.0.3, all interfaces are referred to as extreme-ethernet. • **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. • **internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. • **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. ▪ **<interface-id> –** Clears all port-level spanning tree statistics information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	The statistics information can be deleted only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	**SEFOS(config)# clear spanning-tree counters interface extreme-ethernet 0/1**

Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **instance** - Creates an MST instance and maps it to VLANs. • **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **show spanning-tree active detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **show spanning-tree interface** - Displays the port-related spanning tree information for the specified interface. • **show spanning-tree mst – CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch. • **show spanning-tree mst – Port Specific Configuration** - Displays multiple spanning tree port-specific information for the specified port. • **show spanning-tree vlan – Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN. • **show spanning-tree vlan – interface** - Displays interface-specific PVRST information for the specified VLAN.

14.1.9 spanning-tree pathcost dynamic

Command Objective	This command enables dynamic path cost calculation feature in the switch. The no form of this command disables dynamic path cost calculation feature in the switch. The dynamic path cost calculation feature is disabled, even if the spanning tree mode is changed. The path cost of the port / MSTI is dynamically calculated. This feature is applied only for the ports that are not shutdown during the execution of STP. The calculated path cost is not changed based on the operational status of the port / for a MSTI, once calculated. The manually assigned / already calculated path cost is used even if the dynamic path cost calculation feature is enabled in the switch.
Syntax	**`spanning-tree pathcost dynamic [lag-speed]`** **`no spanning-tree pathcost dynamic [lag-speed]`**
Parameter Description	• **`lag-speed`** - Calculates the path cost for change in speed of the port. This feature is used for LA ports whose speed changes due to addition or deletion of ports from the port-channel. The manually assigned path cost is used even if the lag speed feature is enabled in the switch, if the path cost is assigned manually. The lag speed feature can be enabled, only after enabling the dynamic path cost calculation feature.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Dynamic path cost calculation feature is disabled in the switch.
Note:	The dynamic path cost calculation feature can be configured in the switch, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree Mode should be set, if the functionality is already shutdown.
Example	**`SEFOS(config)# spanning-tree pathcost dynamic`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. • **`spanning-tree - Properties of an interface`** - Configures the port related spanning tree information for all kinds of STPs and creates

port in STP when Automatic Port Create feature is disabled.

- **`show spanning-tree - Summary, Blockedports, Pathcost, Redundancy`** – Displays spanning tree related information available in the switch for the current STP enabled in the switch.

- **`show spanning-tree detail`** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.

- **`show spanning-tree active`** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.

- **`spanning-tree mst- Properties of an interface for MSTP`** - Configures the port related spanning tree information for a specified MSTI.

- **`spanning-tree vlan cost`** - Configures the cost of a port for the specified VLAN.

14.1.10 spanning-tree priority

Command Objective	This command configures the priority value that is assigned to the switch. The no form of this command resets the priority to its default value. The priority value is changed to its default value even if the spanning tree mode is changed. In RSTP, this value is used during the election of root. In MSTP, this value is used during the election of CIST root, CIST regional root, and IST root.
Syntax	**spanning-tree [mst <instance-id>] priority <value(0-61440)>** **no spanning-tree [mst <instance-id(1-64)>] priority**
Parameter Description	• **mst <instance-id>** - Configures the ID of MSTP instance already created in the switch. This value ranges from 1 to 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs. This option is applicable only if the spanning tree mode is set as `mst`. • **priority <value(0-61440)>** - Configures the priority value for the switch and for the MSTI, in RSTP and MSTP respectively. This value ranges from 0 to 61440. The value should be set in steps of 4096, that is, you can set the value as 0, 4096, 8192, 12288 and so on.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	priority - 32768
Note:	The priority value can be configured in the switch, only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. This priority value configuration is not supported in PVRST Mode.
Example	**SEFOS(config)# spanning-tree priority 4096**
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.

- **`show spanning-tree root`** - Displays the spanning tree root information.
- **`show spanning-tree bridge`** - Displays the spanning tree bridge information.
- **`show spanning-tree - Summary, Blockedports, Pathcost, Redundancy`** – Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.
- **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **`instance`** - Creates an MST instance and maps it to VLANs.
- **`show spanning-tree mst - CIST or specified mst Instance`** - Displays multiple spanning tree information for all MSTIs in the switch.
- **`show spanning-tree mst - Port Specific Configuration`** - Displays multiple spanning tree port-specific information for the specified port.
- **`show customer spanning-tree`** – Displays the detailed customer spanning information.

14.1.11 spanning-tree auto-edge

Command Objective	This command enables automatic detection of Edge port parameter of an interface. The no form of this command disables automatic detection of Edge port parameter of an interface. The automatic detection of Edge port parameter is disabled, even if the spanning tree mode is changed. Once automatic detection is enabled, the Edge port parameter is automatically detected and set. The port is set as edge port, if no BPDU is received on the port. The port is set as non-edge port, if any BPDU is received.
Syntax	**`spanning-tree auto-edge`** **`no spanning-tree auto-edge`**
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Automatic detection of Edge port parameter of an interface is enabled.
Note:	The automatic detection of Edge port parameter can be configured in the switch, only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	**`SEFOS(config-if)# spanning-tree auto-edge`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.

14.1.12 spanning-tree - Properties of an interface

Command Objective	This command configures the port-related spanning tree information for all kinds of STPs. This can be applied for any port in RSTP/MSTP mode. This command creates a port in STP when Automatic Port Create feature is disabled. The no form of this command resets the port-related spanning tree information to its default value. The port-related spanning tree information is changed to its default value even if the spanning tree mode is changed. This command also deletes port in STP when Automatic Port Create feature is disabled.
Note:	In STP module, whenever a port is mapped to any context, the corresponding port is created irrespective of whether STP is intended to be enabled on that interface. This leads ~~To~~ to STP scaling issues and this problem is solved by having control at STP module on the port entry creation at STP module itself.
Syntax	**spanning-tree [{cost <value(0-200000000)>|disable|link-type{point-to-point|shared}|portfast|port-priority <value(0-240)>}]** **no spanning-tree [{cost |disable|link-type|portfast|port-priority}]**
Parameter Description	• **cost <value(0-200000000)>** - Configures the port's path cost value that contributes to the path cost of paths containing this particular port. The paths' path cost is used during calculation of shortest path to reach the root. The path cost represents the distance between the root port and designated port. This value ranges from 1 to 200000000. The configured path cost is used even if the dynamic path cost calculation feature or LAGG speed feature is enabled. This configuration is not supported for the spanning tree mode `pvrst`. • **disable** - Disables the spanning tree operation on the port. The port does not take part in the execution of spanning tree operation for preventing undesirable loops in the network. • **link-type** - Configures the link status of the LAN segment attached to the port. The options available are: ▪ **point-to-point** – The port is treated as if it is connected to a point-to-point link. ▪ **shared** - The port is treated as if it is using a shared media connection. • **portfast** - Configures the portfast feature in the port. This feature specifies that the port is connected to only one host and hence can rapidly transit to forwarding. This feature can cause temporary bridging loops, if hubs, concentrators, switches, bridges and so on are connected to this

	port. This feature takes effect only when the interface is shut down. • **port-priority <value(0-240)>** - Configures the priority value assigned to the port. This value is used during port role selection process. This value ranges from 0 to 240. This value should be set in steps of 16, that is, you can set the value as 0, 16, 32, 48, and so on. This configuration is not supported for the spanning tree mode `pvrst`.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	• cost - 200000 for all physical ports, 199999 for port-channels • disable - Spanning tree operation is enabled in the port. • link-type - The port is considered to have a point-to-point link if: ▪ It is an aggregator and all of its members can be aggregated. ▪ The MAC entity is configured for full duplex operation, either manually or through auto negotiation process (that is, negotiation Mode is set as **Auto**). ▪ Otherwise port is considered to have a shared media connection. • portfast - Portfast is disabled. • port-priority - 128
Note:	The port-related spanning tree information can be configured only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. This command executes without the optional parameters only if automatic port-create feature is disabled.
Example	**SEFOS(config-if)# spanning-tree cost 2200** **SEFOS(config-if)# spanning-tree link-type point-to-point** **SEFOS(config-if)# spanning-tree portfast** **SEFOS(config-if)# spanning-tree port-priority 32** **SEFOS(config-if)# spanning-tree**
Related Command(s)	• **automatic-port-create -** Enables or disables the Automatic Port Create feature. • **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.

- **spanning-tree pathcost dynamic** - Enables dynamic path cost calculation feature in the switch.

- **show spanning-tree - Summary, Blockedports, Pathcost, Redundancy** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.

- **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.

- **show spanning-tree active** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.

- **show spanning-tree interface** - Displays the port-related spanning tree information for the specified interface.

- **show spanning-tree root** - Displays the spanning tree root information.

- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.

- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port-specific information for the specified port.

- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN.

- **show spanning-tree interface - inconsistency** - Displays the port-related spanning tree inconsistent state information for the specified interface.

- **show customer spanning-tree** – Displays the detailed customer spanning information.

14.1.13 spanning-tree portfast - disable | trunk

Command Objective	This command configures the portfast mode, where the interface is immediately put into the forwarding state upon linkup without waiting for the timer to expire.
Note:	This command is a standardized implementation of the existing command; **`spanning-tree - Properties of an interface.`** It operates in a similar manner to the existing command. The spanning tree portfast feature is currently not supported in the Global Configuration Mode.
Syntax	**`spanning-tree portfast { disable | trunk}`**
Parameter Description	• **`disable`** - Disables PortFast Mode • **`trunk`** - Enables PortFast Mode
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**`SEFOS(config)# spanning-tree portfast trunk`**
Related Command(s)	• **`spanning-tree Mode -pvrst`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`show spanning-tree interface`** - Displays the spanning tree port-specific configuration. • **`show customer spanning-tree`** - Displays the detailed customer spanning information

14.1.14 spanning-tree portfast - bpdufilter default

Command Objective	This command configures the portfast of the non-trunk ports as bpdufilter default or bpduguard default or default. This is used only for ~~Trunk~~ trunk ports. The no form of this command resets the portfast of non-trunk ports to its default value.
Note:	This command is a standardized implementation of the existing command; **`spanning-tree portfast bpduguard default.`** It operates in a similar manner to the existing command. The spanning tree portfast feature is currently not supported in the Global Configuration Mode.
Syntax	**`spanning-tree portfast {bpdufilter default | default}`** **`no spanning-tree portfast {bpdufilter default | default}`**
Parameter Description	• **`bpdufilter default`** - Enables BPDU filtering on all PortFast ports. • **`default`** - Enables PortFast by default on all access ports.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**`SEFOS(config)# spanning-tree portfast default`**
Related Command(s)	• **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`show spanning-tree interface`** - Displays the spanning tree port-specific configuration.

14.1.15 spanning-tree restricted-role

Command Objective	This command enables the restricted role feature for a port. The restricted role feature blocks the port from being selected as a root port even if it has the best spanning tree priority vector. This port is selected as an alternate port after the root port is selected. This feature allows you to block switches external to a core region of the network from influencing the spanning tree active topology. The blocking of port from being selected as a root port can cause lack of spanning tree connectivity. The no form of this command disables the restricted role feature in the port. The restricted role feature is disabled, even if the spanning tree mode is changed or port is set as L2GP.
Syntax	**`spanning-tree restricted-role`** **`no spanning-tree restricted-role`**
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro_E and Metro
Default	Restricted role feature is disabled in all ports.
Note:	The restricted role feature can be configured only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. This configuration is not supported in PVRST mode.
Example	**`SEFOS(config-if)# spanning-tree restricted-role`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`spanning-tree layer2-gateway-port`** - Configures a port to operate as a L2GP. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.

- **`show spanning-tree active detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.
- **`show spanning-tree interface`** - Displays the port-related spanning tree information for the specified interface.

14.1.16 spanning-tree restricted-tcn

Command Objective	This command enables the topology change guard / restricted TCN feature on a port. The restricted TCN feature blocks the port from propagating the received topology change notifications and topology changes to other ports. This feature allows you to block switches external to a core region of the network from causing address flushing in the region. The blocking of port can cause temporary loss of connectivity after changes in a spanning tree active topology as a result of persistent incorrectly learned station location information. The no form of this command disables the topology change guard / restricted TCN feature on the port. The topology change guard / restricted TCN feature is disabled, even if the spanning tree mode is changed or port is set as L2GP.
Syntax	**`spanning-tree restricted-tcn`** **`no spanning-tree restricted-tcn`**
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Topology change guard / restricted TCN feature is disabled in all ports..
Note:	The topology change guard / restricted TCN feature can be configured only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. This configuration is not supported in PVRST mode.
Example	**`SEFOS(config-if)# spanning-tree restricted-tcn`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`spanning-tree layer2-gateway-port`** - Configures a port to operate as a L2GP. • **`show spanning-tree detail`** - Displays detailed spanning tree-related

information of the switch and all ports enabled in the switch.

- **`show spanning-tree active detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.

- **`show spanning-tree interface`** - Displays the port-related spanning tree information for the specified interface.

14.1.17 spanning-tree layer2-gateway-port

Command Objective	This command configures a port to operate as a L2GP. L2GP operates similar to that of the normal port operation but pretends to continuously receive BPDUs when admin state of the port is Up. The no form of this command configures the port to operate as a normal port. The port operates as normal port even if the spanning tree mode is changed.
Syntax	**`spanning-tree layer2-gateway-port`** **`no spanning-tree layer2-gateway-port`**
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro_E and Metro
Default	The port operates as a normal port.
Note:	• The port can be configured as L2GP only if the BPDU transmit status, restricted role feature, and restricted TCN feature of the port are disabled. • The PIP or CBP ports cannot be set as L2GP. • Ports with SISP-enabled interfaces cannot be set as L2GP. • The port state of the L2GP is always set as discarding. • The topology change guard / restricted TCN feature can be configured only if the spanning tree functionality is not shut down in the switch. The type of spanning tree Mode should be set if the functionality is already shut down.
Example	**`SEFOS(config-if)# spanning-tree layer2-gateway-port`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`spanning-tree restricted-role`** - Enables the restricted role feature for a port. • **`spanning-tree restricted-tcn`** - Enables the topology change guard / restricted TCN feature on a port.

- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.

- **show spanning-tree - Summary, Blockedports, Pathcost, Redundancy** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.

- **show spanning-tree detail** – Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.

- **show spanning-tree active detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.

- **show spanning-tree interface** - Displays the port-related spanning tree information for the specified interface.

- **show spanning-tree – layer 2 gateway port** - Displays spanning tree information for all L2GPs enabled in the switch.

- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.

- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port-specific information for the specified port.

- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN.

- **show spanning-tree vlan - interface** - Displays interface-specific PVRST information for the specified VLAN.

14.1.18 spanning-tree bpdu-receive

Command Objective	This command configures the processing status of the BPDUs received in a port. BPDUs are used to carry bridge-related information that is used during spanning tree operation. The processing status is reset to its default value once the spanning tree mode is changed.
Syntax	**`spanning-tree bpdu-receive {enabled | disabled}`**
Parameter Description	• **`enabled`** - Allows normal processing of BPDUs received on the port. • **`disabled`** - Discards the BPDUs received on the port.
Mode	Interface configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro_E and Metro
Default	enabled
Note:	The processing status of the received BPDUs can be configured only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	**`SEFOS(config-if)# spanning-tree bpdu-receive disabled`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree interface`** - Displays the port-related spanning tree information for the specified interface. • **`show customer spanning-tree`** – Displays the detailed customer spanning information

14.1.19 spanning-tree bpdu-transmit

Command Objective	This command configures the BPDU transmission status of a port. BPDUs are used to carry bridge-related information that is used during spanning tree operation. The transmission status is reset to its default value once the spanning tree mode is changed.
Syntax	**`spanning-tree bpdu-transmit {enabled | disabled}`**
Parameter Description	• **`enabled`** - Allows the transmission of BPDUs from the port. • **`disabled`** - Blocks the transmission of BPDUs from the port.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	enabled
Note:	• BPDU transmission status cannot be enabled on the port that is configured as L2GP. • The BPDU transmission status can be configured only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	**`SEFOS(config-if)# spanning-tree bpdu-transmit enabled`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`spanning-tree layer2-gateway-port`** - Configures a port to operate as a L2GP. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree interface`** - Displays the port-related spanning

tree information for the specified interface.

- **`show customer spanning-tree`** – Displays the detailed customer spanning information

14.1.20 spanning-tree loop-guard

Command Objective	This command enables the loop guard feature in a port. This feature prevents the alternative or root ports from becoming designated ports due to failure in a unidirectional link. This feature is useful when the neighbor bridge is faulty, that is, the bridge cannot send BPDUs but continues to send data traffic. The no form of this command disables the loop guard feature in the port. The loop guard feature is disabled, even if the spanning tree mode is changed.
Syntax	**`spanning-tree loop-guard`** **`no spanning-tree loop-guard`**
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro_E and Metro
Default	Loop guard feature is disabled in all ports.
Note:	The loop guard feature can be configured only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	**`SEFOS(config-if)# spanning-tree loop-guard`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree interface`** - Displays the port-related spanning tree information for the specified interface. • **`show spanning-tree interface – inconsistency`** - Displays the port-related spanning tree inconsistent state information for the specified interface.

14.1.21 spanning-tree – Pseudoroot configuration

Command Objective	This command configures the pseudoroot-related information for a port set as L2GP. The information contains pseudoroot priority and pseudoroot MAC address for the port. This configuration is not utilized in PVRST mode. The no form of this command resets the pseudoroot-related information to the currently available bridge-related information.
Syntax	**spanning-tree [mst <instance-id>] pseudoRootId priority <value(0-61440)> mac-address <ucast_mac>** **no spanning-tree [mst <instance-id(1-64)>] pseudoRootId**
Parameter Description	• **mst <instance-id>/ mst <instance-id(1-64)>** - Configures the ID of MSTP instance already created in the switch. This value ranges from 1 to 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs. This option is applicable only if the spanning tree mode is set as `mst`. • **priority <value(0-61440)>** - Configures the priority of the pseudoroot. Port configured as L2GP uses this value in generated BPDUs as the root identifier. This value ranges from 0 to 61440. The value should be set in steps of 4096, that is, you can set the value as 0, 4096, 8192, 12288 and so on. • **mac-address** - Configures the unicast MAC address of the pseudoroot. Port configured as L2GP uses this value as its address.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	• priority - Priority value assigned to the switch. • mac-address - MAC address assigned to the switch.
Note:	The pseudoroot-related information can be configured only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	**SEFOS(config-if)# spanning-tree mst 1 pseudoRootId priority 8192 mac-address 00:00:12:34:45:55**
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in

the switch.

- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.
- **show spanning-tree active detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.
- **show spanning-tree interface** – Displays the port-related spanning tree information for the specified interface.
- **show spanning-tree – layer 2 gateway port** - Displays spanning tree information for all L2GPs enabled in the switch.
- **instance** - Creates an MST instance and maps it to VLANs.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** – Displays multiple spanning tree port-specific information for the specified port.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN.
- **show spanning-tree vlan - interface** - Displays interface-specific PVRST information for the specified VLAN.

14.1.22 debug spanning-tree

Command Objective	This command enables the tracing of the STP module as per the configured debug levels. The trace statements are generated for the configured trace levels. This command allows combination of debug levels to be configured (that is, more than one level of trace can be enabled or disabled). The debug levels are configured one after the other and not in single execution of the command. The no form of this command disables the tracing of the STP module as per the configured debug levels. The trace statements are not generated for the configured trace levels.
Syntax	**debug spanning-tree ([errors] [init-shut] [management] [memory] [bpdu] [events] [timer] [port-info-state-machine] [port-recieve-state-machine] [port-role-selection-state-machine] [role-transition-state-machine] [state-transition-state-machine] [protocol-migration-state-machine] [topology-change-state-machine] [port-transmit-state-machine] [bridge-detection-state-machine] [pseudoInfo-state-machine] [redundancy] [sem-variables]) [switch <string (32)>] [{ <short (0-7)> | alerts | critical | debugging | emergencies | errors | informational | notification | warnings }]** **no debug spanning-tree {global | {all | errors | init-shut | management | memory | bpdu |events | timer | state-machine {port-info | port-receive | port-role-selection | role-transition | state-transition | protocol-migration | topology-change | port-transmit | bridge-detection | pseudoInfo } redundancy | sem-variables} [switch <context_name>]}**
Parameter Description	• **errors** - Generates debug statements for all failure traces. • **init-shut** - Generates debug statements for init and shutdown traces. This trace is generated on failed and successful initialization, and shutting down of STP-related module and memory. • **management** - Generates debug statements for management traces. This trace is generated whenever you configure any of the STP features. • **memory** - Generates debug statements for memory-related traces. This trace is generated on failed and successful allocation of memory for STP process. • **bpdu** - Generates debug statements for BPDU-related traces. This trace is generated on failed and successful reception, transmission, and processing

of BPDUs.

- **events** - Generates debug statements for event handling traces. This trace is generated to denote events that are posted to the STP configuration queue whenever you configure any of the STP features.
- **timer** - Generates debug statements for timer module traces. This trace is generated on failed and successful start, stop, and restart of STP timers.
- **port-info-state-machine** - Generates debug statements for port information SEM.
- **port-recieve-state-machine** - Generates debug statements for port receive SEM.
- **port-role-selection-state-machine** - Generates debug statements for role selection SEM.
- **role-transition-state-machine** - Generates debug statements for role transition SEM.
- **state-transition-state-machine** - Generates debug statements for state transition SEM.
- **protocol-migration-state-machine** - Generates debug statements for protocol migration SEM.
- **topology-change-state-machine** - Generates debug statements for topology change SEM.
- **port-transmit-state-machine** - Generates debug statements for port transmit SEM.
- **bridge-detection-state-machine** - Generates debug statements for bridge detection SEM.
- **pseudoInfo-state-machine** - Generates debug statements for port receive pseudo information SEM.
- **state machine** - Generates debug statements to denote the event and state of the selected SEM. The options are:
  - **port-info** - Generates debug statements for port information SEM.
  - **port-receive** - Generates debug statements for port receive SEM.
  - **port-role-selection** - Generates debug statements for role selection SEM.
  - **role-transition** - Generates debug statements for role transition SEM.
  - **state-transition** - Generates debug statements for state transition SEM.
  - **protocol-migration** - Generates debug statements for protocol

	migration SEM. ▪ **topology-change** - Generates debug statements for topology change SEM. ▪ **port-transmit** - Generates debug statements for port transmit SEM. ▪ **bridge-detection** - Generates debug statements for bridge detection SEM. ▪ **pseudoInfo** - Generates debug statements for port receive pseudo information SEM. • **redundancy** - Generates debug statements for redundancy code flow traces. This trace is generated in standby node STP while taking backup of configuration information from active node. • **sem-variables** - Generates debug statements for state machine variable changes trace. This trace is generated on failed and successful creation and deletion of semaphore. • **switch <string (32)>** - Configures the tracing of the STP module for the specified context. This value represents unique name of the switch context. This value is a string with the maximum size as 32. This parameter is specific to multiple instance feature. • **<short (0-7)>** - Generates the debug statements for the specified severity level value.This value ranges from 0 to 7. • **alerts** - Generates debug statements for immediate action. • **critical** - Generates debug statements for critical conditions. • **debugging** - Generates debug statements for debugging messages. • **emergencies** - Generates debug statements when system cannot be used. • **errors** - Generates debug statements for error conditions. • **informational** - Generates debug statements for information messages. • **notification** - Generates debug statements for significant messages. • **warnings** - Generates debug statements for warning conditions.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Default	Tracing of the STP module is disabled.
Example	**SEFOS# debug spanning-tree errors 1**

Related Command(s)	**`show debugging`** - Displays the debugging information.

14.1.23 clear spanning-tree detected protocols

Command Objective	This command restarts the protocol migration process on all interfaces in the switch and forces renegotiation with the neighboring switches.
Syntax	**clear spanning-tree detected protocols [{interface <interface-type> <interface-id> | switch <context_name>}]**
Parameter Description	• **interface <interface-type> <interface-id>** - Restarts the protocol migration process on the specified interface. The details to be provided are: ▪ **<interface-type>** - Sets the type of interface. The interface can be: • **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer up to 100 Megabits per second. • **XL-ethernet** – A version of LAN standard architecture that supports data transfer up to 40 Gigabits per second. • **extreme-ethernet** – A version of Ethernet that supports data transfer up to 10 Gigabits per second. • **internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. • **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. ▪ **<interface-id>** - Sets the interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. Only internal-lan or port-channel ID is provided for interface types internal-lan and port-channel. • **switch <context_name>** - Restarts the protocol migration process for the specified context. This value represents unique name of the switch context. This value is a string with the maximum size as 32. This parameter is specific to multiple instance feature.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Example	**SEFOS# clear spanning-tree detected protocols interface extreme-ethernet 0/1**
Related Command(s)	• **show spanning-tree interface** - Displays the port-related spanning tree information for the specified interface.

14.1.24 show spanning-tree - Summary, Blockedports, Pathcost, Redundancy

Command Objective	This command displays spanning tree-related information available in the switch for the current STP enabled in the switch. The information contains priority, address and timer details for root and bridge, status of dynamic path cost calculation feature, status of spanning tree function, STP compatibility version used, configured spanning tree mode, bridge and port-level spanning tree statistics information, and details of ports enabled in the switch. The port details contain port ID, port role, port state, port cost, port priority, and link type.
Syntax	**If switch L2RED_WANTED is set as "no" during compilation of exe:** **`show spanning-tree [{ summary | blockedports | pathcost method }]`** **If switch L2RED_WANTED is set as "yes" during compilation of exe:** **`show spanning-tree [{ summary | blockedports | pathcost method | redundancy }]`**
Parameter Description	• **`summary`** - Displays the currently used STP, applied path cost method and port details such as port ID, port role, port state, and port status. This option cannot be executed in the PVRST mode. • **`blockedports`** - Displays the list of ports in blocked state and the total number of blocked ports. This option cannot be executed in the PVRST mode. • **`pathcost method`** - Displays the port path cost method configured for the switch. • **`redundancy`** - Displays the port role and port state, and dumps the STP port-related information.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	**Single Instance:** **`SEFOS# show spanning-tree`**

```
Root Id         Priority 32768
                Address 00:01:02:03:04:01
                Cost 0
                Port 0 [0]
                This bridge is the root
                Max age 20 Sec 0 cs, forward delay 15 Sec 0 cs
                Hello Time 2 sec 0 cs

MST00

Spanning tree Protocol has been enabled

MST00 is executing the mstp compatible Multiple Spanning
Tree Protocol

Bridge Id       Priority 32768
                Address 00:01:02:03:04:01
                Max age is 20 sec, forward delay is 15 sec
                Dynamic Path Cost is Disabled

Name     Role         State        Cost     Prio   Type
----    ----         -----        ----     ----   ------
Ex0/1  Designated   Forwarding   200000   128    SharedLan
Ex0/2  Designated   Forwarding   200000   128    SharedLan
Ex0/3  Designated   Forwarding   200000   128    SharedLan
Ex0/4  Designated   Forwarding   200000   128    SharedLan
Ex0/5  Designated   Forwarding   200000   128    SharedLan
Ex0/6  Designated   Forwarding   200000   128    SharedLan
Ex0/7  Designated   Forwarding   200000   128    SharedLan
```

SEFOS# show spanning-tree blockedports

```
Blocked Interfaces List:

The Number of Blocked Ports in the system is :1
```

SEFOS# show spanning-tree pathcost method

```
Spanning Tree port pathcost method is Long
```

SEFOS# show spanning-tree summary

```
Spanning tree enabled protocol is RSTP

Spanning Tree port pathcost method is Long

RSTP Port Roles and States

Port-Index  Port-Role    Port-State   Port-Status
----------  ---------    ----------   -----------

1           Designated   Forwarding   Enabled
```

```
2           Designated   Forwarding   Enabled
3           Designated   Forwarding   Enabled
4           Designated   Forwarding   Enabled
5           Designated   Forwarding   Enabled
6           Designated   Forwarding   Enabled
7           Designated   Forwarding   Enabled
8           Designated   Forwarding   Enabled
```

SEFOS# show spanning-tree redundancy

```
Port Role/State for Instance 0 Port 1
=====================
Port Role 3 Port State 5
Port Role/State for Instance 0 Port 2
=====================
Port Role 1 Port State 2
Dumping Data On Port 1
------------------------
RootId 0:00:11:22:33:44:55
Designated BrId 0:00:11:22:33:44:55
Root path Cost 0
Length 0
Protocol Id 0
Port Id 8001
Message Age 0
Max Age 14
Hello Time 2
Fwd Delay Time 15
Dest Addr 00:00:00:00:00:00
Src Addr 00:00:00:00:00:00
Version Length 0
Version 2
BPDU Type 2
Flags e
Dumping Data On Port 2
------------------------
RootId 0:00:11:22:33:44:55
Designated BrId 0:00:11:22:33:44:55
Root path Cost 0
```

```
Length 0
Protocol Id 0
Port Id 8002
Message Age 0
Max Age 14
Hello Time 2
Fwd Delay Time 15
Dest Addr 00:00:00:00:00:00
Src Addr 00:00:00:00:00:00
Version Length 0
Version 2
BPDU Type 2
Flags e
Instance 0 Port 1
======================
Expected FdWile expiry time 0
Expected rcvdInfo exp Time 4654
Expected rrWhile exp Time 0
Expected rbWhile exp Time 0
Expected tcWhile exp Time 0
Instance 0 Port 1
TCN Var 1
STP Version 1
Proposing Flag 0
Info Is 4
Instance 0 Port 2
======================
Expected FdWile expiry time 0
Expected rcvdInfo exp Time 4656
Expected rrWhile exp Time 0
Expected rbWhile exp Time 0
Expected tcWhile exp Time 0
Instance 0 Port 2
TCN Var 1
STP Version 1
Proposing Flag 0
Info Is 4
```

Multiple Instance:

For RSTP

```
SEFOS# show spanning-tree
Switch default

We are the root of the Spanning Tree
Root Id      Priority   32768
             Address    00:05:02:03:04:01
             Cost       0
             Port       0
             Max Age 20 sec 0 cs, Forward Delay 15 sec 0
cs
Bridge is executing the rstp compatible Rapid Spanning
Tree Protocol
Bridge Id       Priority 32768
                Address 00:05:02:03:04:01
                Hello Time 1 sec 58 cs, Max Age 20 sec 0
cs
                Forward Delay 15 sec 0 cs
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is
Disabled
Name       Role         State        Cost     Prio   Type
----       ----         -----        ----     ----   -----
-
```

For MSTP

```
SEFOS# show spanning-tree
Switch default
Root Id         Priority   32768
            Address    00:01:02:03:04:01
            Cost       0
            Port       0 [0]
            This bridge is the root
            Max age 20 Sec 0 cs, forward delay 15 Sec 0 cs
            Hello Time is 2 sec 0 cs
MST00
Spanning tree Protocol Enabled.
```

```
S-VLAN Component: MST00 is executing the mstp compatible
Multiple Spanning Tree

Protocol

Bridge Id    Priority  32768

             Address  00:01:02:03:04:01

             Max age 20 Sec 0 cs, forward delay 15 Sec 0
cs

             Hello Time is 2 sec 0 cs
Name      Role         State        Cost     Prio   Type

----      ----         -----        ----     ----   ------

Ex0/1   Disabled     Discarding   200000   128
SharedLan

Ex0/2   Designated   Forwarding   200000   128
SharedLan

Ex0/3   Designated   Forwarding   200000   128
SharedLan

Ex0/4   Designated   Forwarding   200000   128
SharedLan

Ex0/5   Designated   Forwarding   200000   128
SharedLan

Ex0/6   Designated   Forwarding   200000   128
SharedLan

Ex0/7   Designated   Forwarding   200000   128
SharedLan
```

SEFOS# show spanning-tree summary

```
Switch - default

Spanning Tree port pathcost method is Long

Spanning tree enabled protocol is MSTP

MST00 Port Roles and States

Port-Index  Port-Role    Port-State     Port-Status

----------  ---------    ----------     -----------

49          Disabled     Forwarding   Disabled

Switch - cust1

Spanning Tree port pathcost method is Long

Spanning tree enabled protocol is MSTP

MST00 Port Roles and States

Port-Index  Port-Role    Port-State     Port-Status

----------  ---------    ----------     -----------

1           Designated   Forwarding   Enabled

2           Root         Forwarding   Enabled
```

```
3           Designated   Forwarding   Enabled
4           Disabled     Discarding   Enabled
5           Disabled     Discarding   Enabled
6           Disabled     Discarding   Enabled
Switch - cust2
Spanning Tree port pathcost method is Long
Spanning tree enabled protocol is MSTP
MST00 Port Roles and States
Port-Index  Port-Role    Port-State     Port-Status
----------  ---------    ----------     -----------
7           Designated   Forwarding   Enabled
8           Root         Forwarding   Enabled
9           Alternate    Discarding   Enabled
10          Disabled     Discarding   Enabled
11          Disabled     Discarding   Enabled
12          Disabled     Discarding   Enabled
```

Related Command(s)

- **shutdown - physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface, VLAN interface, port-channel interface, tunnel interface, or OOB interface.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree pathcost dynamic** - Enables dynamic path cost calculation feature in the switch.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates port

in STP when Automatic Port Create feature is disabled.

- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port-related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **spanning-tree vlan** - Configures spanning tree-related information on a per VLAN basis.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

14.1.25 show spanning-tree detail

Command Objective	This command displays detailed spanning tree-related information of the switch and all ports enabled in the switch. The information contains status of spanning tree operation, current selected spanning mode, current spanning tree compatibility version, bridge and root priority, bridge and root addresses, port path cost, port priority, port timers, bridge and port-level spanning tree statistics information, transmit hold-count value, link-type, and status of L2GP, loop guard, BPDU receive, BPDU transmit, restricted TCN, restricted role, and portfast features.
Syntax	**show spanning-tree detail**
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	Single Instance **SEFOS# show spanning-tree detail** MST00 is executing the mstp compatible Multiple Spanning Tree Protocol Bridge Identifier has Priority 32768, Address 00:01:02:03:04:01 Configured Max age 20 sec 0 cs, Forward delay 15 sec 0 cs Configured Hello Time 2 sec 0 cs Dynamic Path Cost Disabled Flush Interval 0 centi-sec, Flush Invocations 1 Flush Indication threshold 0 We are root of the spanning tree Current Root has priority 32768, address 00:01:02:03:04:01 cost of root path is 0 Number of Topology Changes 0, Time since topology Change 0 seconds ago Transmit Hold-Count 6 Root Times : Max age 20 sec 0 cs Forward delay 15

```
sec 0 cs

Port 16 [Ex0/16] of MST00 is Designated, Forwarding
Ex0/16 is operating in the MSTP Mode
Port path cost  200000, Port priority  128,
Port Identifier  128.16. Port HelloTime  2 sec 0 cs,
Timers: Hello - 1, Forward Delay - 0, Topology Change - 0
Error Disable Recovery Interval 508 sec 0 cs

Designated root has priority 32768, address
00:01:02:03:04:01
Designated Bridge has priority 32768, address
00:01:02:03:04:01
Designated Port Id is 128.16, Designated pathcost is 0
Operational Forward delay 15 sec 0 cs, Max age 20 sec 0 cs
Number of Transitions to forwarding State : 1
Auto-Edge is enabled
PortFast is disabled, Oper-Edge is enabled
Link Type is Shared
BPDUs : sent 60, received 0
Restricted Role is disabled.
Restricted TCN is disabled.
bpdu-transmit enabled
bpdu-receive enabled
Root Guard is disabled
Loop Guard is disabled
```

Related Command(s)

- **shutdown - physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface, VLAN interface, port-channel interface, tunnel interface, or OOB interface.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports.

- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch.
- **clear spanning-tree counters** - Deletes all bridge and port-level spanning tree statistics information.
- **spanning-tree pathcost dynamic** - Enables dynamic path cost calculation feature in the switch.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree – Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.
- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port-related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **spanning-tree vlan** - Configures spanning tree-related information on a per VLAN basis.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.

- **`spanning-tree vlan port-priority`** - Configures the priority of a port for the specified VLAN.
- **`spanning-tree vlan cost`** - Configures the cost of a port for the specified VLAN.
- **`base-mac`** - Configures the base unicast MAC address of the switch in the NVRAM.
- **`spanning-tree flush-interval –`** Configures the flush interval timer value.
- **`spanning-tree flush-indication-threshold`** - Configures the flush indication threshold value for a specific instance.

14.1.26 show spanning-tree active

Command Objective	This command displays spanning tree-related information available in the switch for the current STP enabled in the switch. The information contains priority, address and timer details for root and bridge, status of dynamic path cost calculation feature, status of spanning tree function, STP compatibility version used, configured spanning tree mode, bridge and port-level spanning tree statistics information, and details of ports enabled in the switch. The port details contain port ID, port role, port state, port cost, port priority, and link type.
Syntax	**`show spanning-tree active [detail]`**
Parameter Description	• **`detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. The information contains status of spanning tree operation, current selected spanning mode, current spanning tree compatibility version, bridge and root priority, bridge and root addresses, port path cost, port priority, port timers, bridge and port-level spanning tree statistics information, transmit hold-count value, link-type, and status of L2GP, loop guard, BPDU receive, BPDU transmit, restricted TCN, restricted role, and portfast features.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.

Example	**Single Instance:**
	
	`SEFOS# show spanning-tree active`
	`Root Id  Priority  32768`
	`Address  00:01:02:03:04:01`
	`Cost  200000`
	`Port  1 [Ex0/1]`
	`Max age 20 sec 0 cs, forward delay 15 sec 0 cs`
	`Hello Time 2 sec 0 cs`
	`MST00`
	`Spanning tree Protocol has been enabled`
	`MST00 is executing the mstp compatible Multiple Spanning Tree Protocol`

```
Bridge Id   Priority  32768
            Address  00:02:02:03:04:01
            Max age 20 sec 0 cs, forward delay 15 sec 0 cs
            Hello Time 2 sec 0 cs
                Dynamic Path Cost is Disabled
Name    Role        State        Cost     Prio   Type
----     ----      -----        ----     ----   ------
Ex0/1   Root        Forwarding   200000   128    SharedLan
```

Related Command(s)

- **shutdown - physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface, VLAN interface, port-channel interface, tunnel interface, or OOB interface.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch.
- **clear spanning-tree counters** - Deletes all bridge and port-level spanning tree statistics information.
- **spanning-tree pathcost dynamic** - Enables dynamic path cost calculation feature in the switch.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.

- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port-related spanning tree information for a specified MSTI.
- **spanning-tree vlan** - Configures spanning tree-related information on a per VLAN basis.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

14.1.27 show spanning-tree interface

Command Objective	This command displays the port-related spanning tree information for the specified interface. The information contains port ID, port role, port state, port cost, port priority, and link type. The generic command cannot be executed without any option in the PVRST mode.
Syntax	**If switch PVRST_WANTED is set as "no" during compilation of exe:** **`show spanning-tree interface <interface-type> <interface-id> [{ cost | priority | portfast | rootcost | restricted-role | restricted-tcn | state | stats | detail }]`** **If switch PVRST_WANTED is set as "yes" during compilation of exe:** **`show spanning-tree interface <interface-type> <interface-id> [{cost | encapsulationtype | priority | portfast | rootcost | restricted-role | restricted-tcn | state | stats | detail }]`**
Parameter Description	• **`<interface-type>`** - Displays the port-related spanning tree information for the specified type of interface. The interface can be: ▪ **`fastethernet`** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **`XL-ethernet`** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **`extreme-ethernet`** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **`internal-lan`** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **`port-channel`** – Logical interface that represents an aggregator which contains several ports aggregated together. ▪ **`virtual`** - Displays the spanning tree inconsistencies for virtual interface. • **`<interface-id>`** - Displays the port-related spanning tree information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID.

- **cost** - Displays the cost of the port or instances assigned to that port. This option cannot be executed in the PVRST mode.
- **encapsulationtype** - Displays the encapsulation type used in the interface.
- **priority** - Displays the priority of the port or instances assigned to that port. This option cannot be executed in the PVRST mode.
- **portfast** - Displays the status of the portfast feature for the port or instances assigned to that port.
- **rootcost** - Displays the root cost of the port or instances assigned to that port. The root cost defines the path cost to reach the root bridge. This option cannot be executed in the PVRST mode.
- **restricted-role** - Displays the status of the restricted role feature for the port. This option cannot be executed in the PVRST mode.
- **restricted-tcn** - Displays the status of the restricted TCN feature for the port. This option cannot be executed in the PVRST mode.
- **state** - Displays the state of the port. This option cannot be executed in the PVRST mode.
- **stats** - Displays the port-level spanning tree statistics information. This option cannot be executed in the PVRST mode.
- **detail** - Displays detailed spanning tree-related information for the port. The information contains current selected spanning mode, bridge and root priority, bridge and root addresses, port path cost, port priority, port timers, bridge and port-level spanning tree statistics information, link-type, and status of L2GP, loop guard, BPDU receive, BPDU transmit, restricted TCN, restricted role, and portfast features. This option cannot be executed in the PVRST mode.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise Metro_E and Metro

Note: This command can be executed successfully only if the spanning tree functionality is not shut down in the switch.

Example

Single Instance

```
SEFOS# show spanning-tree interface extreme-ethernet 0/1
Instance  Role         State        Cost     Prio Type
--------  ----         -----        ----     ---- ----
MST00     Root         Forwarding   200000   128.1
SharedLan
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 cost

```
Port cost is 200000
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 priority

```
Port Priority is 128
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 portfast

```
PortFast is disabled
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 rootcost

```
Root Cost is 200000
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 state

```
Forwarding
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 stats

```
Statistics for Port Ex0/1
Number of Transitions to forwarding State : 1
Number of RSTP BPDU Count received        : 1692
Number of Config BPDU Count received      : 9
Number of TCN BPDU Count received         : 0
Number of RSTP BPDU Count Transmitted     : 735
Number of Config BPDU Count Transmitted   : 11
Number of TCN BPDU Count Transmitted      : 0
Number of Invalid BPDU Count Transmitted  : 0
Port Protocol Migration Count             : 1
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 detail

```
Switch default

Port 1 [Ex0/1] of MST00 is Disabled  , Discarding
Ex0/1 is operating in the MSTP Mode
Port path cost  200000, Port priority  128,
Port Identifier  128.1. Port HelloTime  2 sec 0 cs,
Timers: Hello - 0, Forward Delay - 0, Topology Change - 0
Error Disable Recovery Interval 23 sec 0 cs
```

```
Designated root has priority 32768, address
00:04:02:03:04:01

Designated Bridge has priority 32768, address
00:04:02:03:04:01

Designated Port Id is 128.1, Designated pathcost is 0

Operational Forward delay 15 sec 0 cs, Max age 20 sec 0 cs

Number of Transitions to forwarding State : 0

Auto-Edge is enabled

PortFast is disabled, Oper-Edge is disabled

Link Type is Shared

BPDUs : sent 0, received 0

Restricted Role is disabled.

Restricted TCN is disabled.

bpdu-transmit enabled

bpdu-receive enabled

Root Guard is disabled

Loop Guard is disabled
```

SEFOS# show spanning-tree interface fast 0/1 restricted-role

```
Restricted Role is Disabled
```

SEFOS# show spanning-tree interface fast 0/1 restricted-tcn

```
Restricted TCN is Disabled
```

Multiple Instance:

SEFOS# show spanning-tree interface extreme-ethernet 0/1

```
Switch - default
Role         State        Cost     Prio Type
----         -----        ----     ---- ----
Root         Forwarding   200000   128  SharedLan
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 cost

```
Port cost is 200000

Switch - default
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 priority

```
Switch – default

Port Priority is 128
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 portfast

```
Switch – default
PortFast is disabled
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 rootcost

```
Switch – default
Root Cost is 200000
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 state

```
Switch – default
Forwarding
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 stats

```
Switch – default
Statistics for Port Ex0/1
Number of Transitions to forwarding State : 1
Number of RSTP BPDU Count received        : 1692
Number of Config BPDU Count received      : 9
Number of TCN BPDU Count received         : 0
Number of RSTP BPDU Count Transmitted     : 735
Number of Config BPDU Count Transmitted   : 11
Number of TCN BPDU Count Transmitted      : 0
Number of Invalid BPDU Count Transmitted  : 0
Port Protocol Migration Count             : 1
```

SEFOS# show spanning-tree interface extreme-ethernet 0/1 detail

```
Switch – default
Port 1 [Ex0/1] is Root      , Forwarding
Port PathCost 200000, Port Priority 128, Port Identifier
128.1
Designated Root has priority 8192, address
00:01:02:03:04:21
Designated Bridge has priority 8192, address
00:01:02:03:04:21
Designated Port Id is 128.1, Designated PathCost 0
No of Transitions to forwarding State :1
PortFast is disabled
```

```
Link Type is Shared
BPDUs : sent 735 , recieved 1729
SEFOS# show spanning-tree interface fast 0/1 restricted-role
Switch – default
Restricted Role is Disabled
SEFOS# show spanning-tree interface fast 0/1 restricted-tcn
Switch – default
Restricted TCN is Disabled
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **clear spanning-tree counters** - Deletes all bridge and port-level spanning tree statistics information.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.
- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.

- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP.
- **clear spanning-tree detected protocols** - Restarts the protocol migration process on all interfaces in the switch and forces renegotiation with the neighboring switches.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port-related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **spanning-tree bpduguard** - Configures the status of BPDU guard feature in an interface.
- **spanning-tree guard** - Configures the various PVRST guard features such as root guard, in a port.
- **spanning-tree encap** - Configures the encapsulation type to be used in an interface.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.
- **errordisable recovery-interval** - Sets the error disable recovery timer in an interface

14.1.28 show spanning-tree root

Command Objective	This command displays the spanning tree root information. The information contains root ID, root path cost, maximum age time, forward delay time and root port, for the RSTP. The information also contains the instance ID for MSTP.
Syntax	**show spanning-tree root [{ address | cost | forward-time | id | max-age | port | priority | detail }]**
Parameter Description	• **address** - Displays the MAC address of the root bridge. • **cost** - Displays the cost of the root bridge. • **forward-time** - Displays the forward delay time of the root bridge. • **id** - Displays the ID of the root bridge. • **max-age** - Displays the maximum age time of the root bridge. • **port** - Displays the ID of the root port. • **priority** - Displays the priority of the root bridge. • **detail** - Displays the root priority, root address, root cost, root port, forward delay time, and maximum age time.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. This configuration is not supported in PVRST mode.
Example	**Single Instance:** **SEFOS# show spanning-tree root** Root ID RootCost MaxAge FwdDly RootPort ------- -------- ------ ------ -------- 80:00:00:01:02:03:04:11 0 20 sec 0 cs 15 sec 0 cs 0 **SEFOS# show spanning-tree root address** Root Bridge Address is 00:01:02:03:04:11 **SEFOS# show spanning-tree root cost** Root Cost is 0

```
SEFOS# show spanning-tree root   forward-time
Forward delay is 15 sec 0 cs
SEFOS# show spanning-tree root id
Root Bridge Id is 80:00:00:01:02:03:04:11
SEFOS# show spanning-tree root max-age
Root MaxAge is 20 secs 0 cs
SEFOS# show spanning-tree root port
Root Port is 0
SEFOS# show spanning-tree root  priority
Root Priority is 32768
SEFOS# show spanning-tree root detail
We are the root of the Spanning Tree
Root Id     Priority   32768
            Address    00:01:02:03:04:11
            Cost       0
            Port       0
            Max Age 20 sec 0 cs, Forward Delay 15 sec 0 cs
```

Multiple Instance:

```
SEFOS# show spanning-tree root
Switch - default
Instance  Root ID        RootCost  MaxAge FwdDly RootPort
--------  -------        --------  ------ ------ --------
MST00 80:00:00:01:02:03:04:01 0  20 sec 0 cs 15 sec 0 cs 0
Switch - cust1
Instance  Root ID         RootCost MaxAge FwdDly RootPort
--------  -------     --------  ------ ------ --------
MST00 00:00:00:01:02:03:04:04 200000  20 sec 0 cs 15 sec 0
cs    Ex0/2
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the

computation of loop free topology.

- **`spanning-tree priority`** - Configures the priority value that is assigned to the switch.
- **`spanning-tree - Properties of an interface`** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.
- **`spanning-tree mst hello-time`** - Configures the hello time for an interface that is enabled.
- **`base-mac`** - Configures the base unicast MAC address of the switch in the NVRAM.

14.1.29 show spanning-tree bridge

Command Objective	This command displays the spanning tree bridge information. The information contains bridge ID, hello time, maximum age time, forward delay time, and protocol enabled, for the RSTP. The information also contains the instance ID for MSTP.
Syntax	**show spanning-tree bridge [{ address | forward-time | hello-time | id | max-age | protocol | priority | detail }]**
Parameter Description	• **address** - Displays the MAC address of the bridge. • **forward-time** - Displays the forward delay time of the bridge. • **hello-time** - Displays the hello time of the bridge. • **id** - Displays the ID of the bridge. • **max-age** - Displays the maximum age time of the bridge. • **protocol** - Displays the protocol currently enabled in the bridge. • **priority** - Displays the priority of the bridge. • **detail** - Displays the priority, address, maximum age time and forward delay time for the bridge.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. This configuration is not supported in PVRST mode.
Example	**Single Instance:** **SEFOS# show spanning-tree bridge address** Bridge Address is 00:01:02:03:04:21 **SEFOS# show spanning-tree bridge forward-time** Bridge Forward delay is 15 sec **SEFOS# show spanning-tree bridge**

```
Bridge ID                HelloTime MaxAge  FwdDly Protocol
---------                --------- ------ ------ --------
80:00:00:01:02:03:04:21  2 s 0 cs  20 s 0 cs 15 s 0 cs
rstp
```

```
SEFOS# show spanning-tree bridge  hello-time
Bridge Hello Time is 2 sec 0 cs
SEFOS# show spanning-tree bridge  id
Bridge ID is 80:00:00:01:02:03:04:21
SEFOS# show spanning-tree bridge  max-age
Bridge Max Age is 20 sec 0 cs
SEFOS# show spanning-tree bridge protocol
Bridge Protocol Running is RSTP
SEFOS# show spanning-tree bridge priority
Bridge Priority is 32768
SEFOS# show spanning-tree bridge  detail
Bridge Id     Priority 32768
              Address  00:05:02:03:04:01
              Max age is 20 sec 0 cs, forward delay is 15
sec 0 cs
```

Multiple Instance:

```
SEFOS# show spanning-tree bridge
Switch - default
MST Instance Bridge ID           MaxAge FwdDly Protocol
------------ ---------           ------ ------ --------
MST00  0 :00:00:01:02:03:04:01 20 s 0 cs 15 s 0 cs  mstp
Switch - cust1
MST Instance Bridge ID            MaxAge FwdDly Protocol
------------ ---------              ------ ------ --------
MST00    0 :00:00:01:02:03:04:02 20 s 0 cs 15 s 0 cs  mstp
SEFOS# show spanning-tree bridge address
Switch - default
MST00     00:01:02:03:04:01
Switch - cust1
MST00     00:01:02:03:04:0
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in

the switch.

- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

14.1.30 show spanning-tree – layer 2 gateway port

Command Objective	This command displays spanning tree information for all L2GPs enabled in the switch. The information contains pseudoroot priority, pseudo root MAC address, and state of the L2GP.
Syntax	**show spanning-tree [interface <interface-type> <interface-id>] layer2-gateway-port [switch <context_name>]**
Parameter Description	• **<interface-type>** - Displays L2GP-related spanning tree information for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. • **<interface-id>** - Displays L2GP-related spanning tree information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID. • **switch <context_name>** - Displays L2GP-related spanning tree information for the specified context. This value represents unique name of the switch context. This value is a string with the maximum size as 32. This parameter is specific to multiple instance feature.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down.
Example	**SEFOS# show spanning-tree interface extreme-ethernet 0/1 layer2-gateway-port switch default**

```
Switch default
 Port Ex0/1
                          PseudoRootId
 Instance      Priority         MacAddress          State
----------    ----------   ------------------   ----------
 MST00          4096        00:00:11:22:33:44   Forwarding
 MST01          8192        00:00:12:34:45:55   Forwarding
 MST02          4096        00:00:12:34:45:5a   Forwarding
```

Related Command(s)

- **shutdown - physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface, VLAN interface, port-channel interface, tunnel interface, or OOB interface.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree Mode** - Sets the typeof spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree layer2-gateway-port** – Configures a port to operate as a L2GP.
- **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

14.1.31 show customer spanning-tree

Command Objective	This command displays the customer spanning tree information.
Syntax	**show customer spanning-tree [cep interface <interface-type> <interface-number>] [{ detail | active [detail] }]**
Parameter Description	• **cep interface<interface-type> <interface-number>** - Displays the customer spanning tree information for the specified Customer Edge Port. The interface type can be: ▪ **<interface-type>** - Displays the customer spanning tree-related information for the CEP type of interface. The interface can be: • **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. • **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. • **internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. • **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. Note: This command does not support virtual interfaces, tunnels, or interface VLANs type of interfaces ▪ **<interface-number>** - Displays the customer spanning tree-related information for the CEP interface number. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID. • **detail** - Displays the port and bridge configuration in detail. This includes designated bridge details, designated port details, timer values, root bridge, Designated PathCost, Linktype, PortFast, BPDUs and so on. • **active** - Displays the details of the active ports-related configuration (active ports are those ports that are participating in the spanning tree). This includes active port's- Root Identifier and Bridge identifier's details like priority, address,hello Time, max age, and forward delay. ▪ **detail** - Displays the port and bridge configuration in detail. This includes designated bridge details, designated port details, timer values, root bridge, Designated PathCost, Linktype, PortFast, BPDUs and so on.

Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	• The port must be configured as CEP. • This command displays output only if spanning tree is enabled.
Example	**SEFOS# show customer spanning-tree cep interface extreme-ethernet 0/4** Switch default Port [Ex0/4] We are the root of the Spanning Tree Root Id Priority 65535 Address 00:07:02:03:04:04 Cost 0 Root Ports Hello Time 2 sec 0 cs, Max Age 20 sec 0 cs, Forward Delay 15 sec 0 cs Customer Spanning Tree Enabled Protocol RSTP Bridge Id Priority 65535 Address 00:07:02:03:04:04 Hello Time 2 sec 0 cs, Max Age 20 sec 0 cs, Forward Delay 15 sec 0 cs Name Role State Cost Prio Type ---- ---- ----- ---- --- ------ CEP-Ex0/4 Designated Forwarding 200000 32 P2P **SEFOS# show customer spanning-tree** Switch default Port [Ex0/4] We are the root of the Spanning Tree Root Id Priority 65535 Address 00:07:02:03:04:04 Cost 0

```
                Root Ports
                Hello Time 2 sec 0 cs, Max Age 20 sec 0
cs,
                Forward Delay 15 sec 0 cs

Customer Spanning Tree Enabled Protocol RSTP
Bridge Id       Priority 65535
                Address 00:07:02:03:04:04
                Hello Time 2 sec 0 cs, Max Age 20 sec 0
cs,
                Forward Delay 15 sec 0 cs
Name                Role         State        Cost
Prio   Type
----                ----         -----        ----     ---
-   ------
CEP-Ex0/4           Designated   Forwarding   200000   32
P2P

 ------------------------------------------------------
```

SEFOS# show customer spanning-tree detail

```
Switch default

Port [Ex0/4]
 CVLAN Bridge for Interface 0/4 is enabled
Executing RSTP to participate in Customer Spanning Tree
Protocol
Bridge Identifier has priority 65535, Address
00:07:02:03:04:04
Configured Hello time 2 sec 0 cs, Max Age 20 sec 0 cs,
Forward Delay 15 sec 0 cs
We are the root of the customer spanning tree
Number of Topology Changes 0
Time since topology Change 0 seconds ago
Transmit Hold-Count 6
Max Age 20 sec 0 cs, Forward Delay 15 sec 0 cs
Hello Time 2 sec 0 cs

Customer Edge Port (Ex0/4) [Physical] is Designated,
```

```
Forwarding

Port PathCost 200000, Port Priority 32, Port Identifier
32.4

Designated Root has priority 65535, address
00:07:02:03:04:04

Designated Bridge has priority 65535, address
00:07:02:03:04:04

Designated Port Id is 32.4, Designated PathCost 200000

No of Transitions to forwarding State :1

PortFast is enabled

LinkType is point to Point

BPDUs : sent 64 , received 0

Timers: Hello - 0, Forward Delay - 0, Topology Change - 0
 ---------------------------------------------------------
```

Related Command(s)

- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.

14.1.32 link-type

Command Objective	This command sets the spanning tree link type of a service-instance. This command configures the link-type as point-to-point or shared LAN segment on which another bridge is present for a service-instance. The command is used at PIP only. The no form of the command sets the spanning tree link type of a service-instance to its default value.
Syntax	**`link-type { point-to-point | shared }`** **`no link-type`**
Parameter Description	• **`point-to-point`** - Sets the spanning tree link type of a service-instance as point-to-point. • **`shared`** - Configures shared LAN segment on which another bridge is present.
Mode	Service Instance Configuration Mode
Package	Metro and Metro_E
Default	shared
Example	**`SEFOS(config-switch-si)# link-type shared`**
Related Command(s)	• **`service instance -`** Configures a service-instance in the switch and enters into the service-instance configuration mode. • **`show service-instance config`** - Displays all the data related to the ISID parameter entered. • **`show link-type`** - Displays the link-type configured on a service-instance. • **`show customer spanning-tree`** – Displays the detailed customer spanning information.

14.1.33 spanning-tree forwarddelay optimization alternate-role

Command Objective	This command enables or disables the optimization for spanning tree-related protocol during transition from alternate to designated port role. When role translation takes place from alternate to designated, the value with which forward-delay timer starts is controlled by executing this command.
Syntax	**`spanning-tree forwarddelay optimization alternate-role {enabled | disabled}`**
Parameter Description	• **`enabled`** - Enables optimization for spanning tree-related protocol in alternate port role transition. • **`disabled`** - Disables the optimization for spanning tree-related protocol in alternate port role transition.
Mode	Global Configuration Mode / Switch Configuration Mode
Package	Metro and Metro_E
Note:	This command executes only if the RSTP is enabled.
Default	enabled
Example	**`SEFOS(config)# spanning-tree forwarddelay optimization alternate-role enabled`**
Related Command(s)	• **`spanning-tree mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. The current selected type of spanning tree is enabled and the existing spanning tree type is disabled in the switch.

14.1.34 show spanning-tree interface - bpduguard

Command Objective	This command displays spanning tree bpduguard configuration for RSTP, MSTP, and PVRST.
Syntax	**show spanning-tree interface <ifXtype> <ifnum> bpduguard**
Parameter Description	• **<ifXtype>** - Displays the spanning tree bpduguard configuration for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. ▪ **virtual** – Virtual interface is an abstract virtualized representation of a network interface that may or may not correspond directly to a physical interface. • **<ifnum>** - Displays the spanning tree bpduguard configuration for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan virtual and port-channel ID is provided for interface types internal-lan, virtual and port-channel. For example: 1 represents internal-lan and port-channel ID. • **bpduguard** - Displays the status of the BPDU guard feature for the interface.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch.
Example	**SEFOS# show spanning-tree interface extreme-ethernet 0/1 bpduguard** Switch default

```
Interface BPDU Guard  is Enabled
```

Related Command(s)

- **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch.
- **`spanning-tree`** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **`spanning-tree bpduguard`** - Configures the status of BPDU guard feature in an interface.

14.1.35 show spanning-tree performance-data

Command Objective	This command displays spanning tree performance data for RSTP and MSTP.
Syntax	**MSTP_WANTED is set as "Yes" while compiling exe** **`show spanning-tree performance-data [interface <interface-type> <interface-id> [instance <instance-id>]]`** **MSTP_WANTED is set as "No" while compiling exe** **`show spanning-tree performance-data [interface <interface-type> <interface-id>]`**
Parameter Description	• **`<interface-type>`** - Displays spanning tree performance-related information for the specified type of interface. The interface can be: ▪ **`fastethernet`** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **`XL-ethernet`** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **`extreme-ethernet`** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **`internal-lan`** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **`port-channel`** – Logical interface that represents an aggregator which contains several ports aggregated together. • **`<interface-id>`** - Displays spanning tree performance data-related information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID. • **`<instance-id>`**- Displays spanning tree performance data for the specified MST Instance ID.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Note:	This command can be executed successfully only if the spanning tree functionality is started in the switch.
Example	**`SEFOS# show spanning-tree performance-data`**

```
Switch default

 STP Performance data

 ====================
 Received Event Time Stamp(In millisecs)        : 0
 Port State Change Time Stamp(In millisecs)     : 0
```

MSTP_WANTED is set as Yes while compiling exe

```
SEFOS# show spanning-tree performance-data in Ex 0/1
Switch default

 STP Performance data at Port 1

 ================================
Rcvd Event Time Stamp(In millisecs) : 0
Rcvd Event                          : PORT_DOWN

Inst Number     PortStateChangeTimeStamp
 -----------     ------------------------
 1               0
```

```
SEFOS# show spanning-tree performance-data in Ex 0/1
instance 1
Instance number: 1

Switch default

 STP Performance data for instance 1 at Port 1

 ================================================
 Rcvd Event Time Stamp(In millisecs)           : 0
 Rcvd Event                                    : PORT_DOWN
 Port State Change Time Stamp(In millisecs)    : -0
```

Related Command(s)

- **instance** - Creates an MST instance and maps it to VLANs.
- **spanning tree mode –** Sets the type of spanning tree to be executed.

- **`set performance-data status`** - Enables or disables the collection of performance data for the RSTP and MSTP protocol.

14.1.36 debug customer spanning-tree - all

Command Objective	This command enables tracing and generates debug statements for customer spanning tree debugging support The no form of the command disables tracing for customer spanning tree debugging support
Syntax	**debug customer spanning-tree cep interface <interface-type> <interface-number> all [{ <short (0-7)> | alerts | critical | debugging | emergencies | errors | informational | notification | warnings }]**
Parameter Description	• **<interface-type>** - Generates debug statements for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. • **<interface-id>** - Generates debug statements for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID. • **all** - Generates debug statements for all kinds of traces. • **<short (0-7)>** - Generates the debug statements for the specified severity level value.This value ranges from 0 to 7. • **alerts** - Generates debug statements for immediate action. • **critical** - Generates debug statements for critical conditions. • **debugging** - Generates debug statements for debugging messages. • **emergencies** - Generates debug statements when system cannot be

	used. • **errors** - Generates debug statements for error conditions. • **informational** - Generates debug statements for information messages. • **notification** - Generates debug statements for significant messages. • **warnings** - Generates debug statements for warning conditions.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Default	Tracing of the STP module is disabled.
Note:	Debug customer spanning tree can be executed only on customer edge ports. To set port type as customer edge ports, bridgemode is set as provider-edge bridge mode.
Example	**SEFOS# debug customer spanning-tree cep interface extreme-ethernet 0/2 all**
Related Command(s)	**show debugging** - Displays the debugging information.

14.1.37 debug customer spanning-tree

Command Objective	This command enables tracing and generates debug statements for customer spanning tree debugging support. The no form of the command disables tracing for customer spanning tree debugging support.
Syntax	**debug customer spanning-tree cep interface <interface-type> <interface-number> ([errors] [init-shut] [management] [memory] [bpdu] [events] [timer] [port-info-state-machine] [port-recieve-state-machine] [port-role-selection-state-machine] [role-transition-state-machine] [state-transition-state-machine] [protocol-migration-state-machine] [topology-change-state-machine] [port-transmit-state-machine] [bridge-detection-state-machine] [pseudoInfo-state-machine] [redundancy] [sem-variables])[{ <short (0-7)> | alerts | critical | debugging | emergencies | errors | informational | notification | warning }]** **no debug customer spanning-tree cep interface <interface-type> <interface-number> { all | errors | init-shut | management | memory | bpdu |events | timer | state-machine {port-info | port-recieve | port-role-selection | role-transition | state-transition | protocol-migration | topology-change | port-transmit | bridge-detection | pseudoInfo} redundancy | sem-variables }**
Parameter Description	• **<interface-type>** - Generates debug statements for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. • **<interface-id>** - Generates debug statements for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface

types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID.

- **errors** - Generates debug statements for all failure traces.
- **init-shut** - Generates debug statements for init and shutdown traces. This trace is generated on failed and successful initialization, and shutting down of STP-related module and memory.
- **management** - Generates debug statements for management traces. This trace is generated whenever you configure any of the STP features.
- **memory** - Generates debug statements for memory-related traces. This trace is generated on failed and successful allocation of memory for STP process.
- **bpdu** - Generates debug statements for BPDU-related traces. This trace is generated on failed and successful reception, transmission, and processing of BPDUs.
- **events** - Generates debug statements for event handling traces. This trace is generated to denote events that are posted to the STP configuration queue whenever you configure any of the STP features.
- **timer** - Generates debug statements for timer module traces. This trace is generated on failed and successful start, stop, and restart of STP timers.
- **port-info-state-machine** - Generates debug statements for port information SEM.
- **port-recieve-state-machine** - Generates debug statements for port receive SEM.
- **port-role-selection-state-machine** - Generates debug statements for role selection SEM.
- **role-transition-state-machine** - Generates debug statements for role transition SEM.
- **state-transition-state-machine** - Generates debug statements for state transition SEM.
- **protocol-migration-state-machine** - Generates debug statements for protocol migration SEM.
- **topology-change-state-machine** - Generates debug statements for topology change SEM.
- **port-transmit-state-machine** - Generates debug statements for port transmit SEM.
- **bridge-detection-state-machine** - Generates debug statements for

bridge detection SEM.

- **pseudoInfo-state-machine** - Generates debug statements for port receive pseudo information SEM.
- **state machine** - Generates debug statements to denote the event and state of the selected SEM. The options are:
  - **port-info** - Generates debug statements for port information SEM.
  - **port-receive** - Generates debug statements for port receive SEM.
  - **port-role-selection** - Generates debug statements for role selection SEM.
  - **role-transition** - Generates debug statements for role transition SEM.
  - **state-transition** - Generates debug statements for state transition SEM.
  - **protocol-migration** - Generates debug statements for protocol migration SEM.
  - **topology-change** - Generates debug statements for topology change SEM.
  - **port-transmit** - Generates debug statements for port transmit SEM.
  - **bridge-detection** - Generates debug statements for bridge detection SEM.
  - **pseudoInfo** - Generates debug statements for port receive pseudo information SEM.
- **redundancy** - Generates debug statements for redundancy code flow traces. This trace is generated in standby node STP while taking backup of configuration information from active node.
- **sem-variables** - Generates debug statements for state machine variable changes trace. This trace is generated on failed and successful creation and deletion of semaphore.
- **<short (0-7)>** - Generates the debug statements for the specified severity level value.This value ranges from 0 to 7.
- **alerts** - Generates debug statements for immediate action.
- **critical** - Generates debug statements for critical conditions.
- **debugging** - Generates debug statements for debugging messages.
- **emergencies** - Generates debug statements when system cannot be used.
- **errors** - Generates debug statements for error conditions.
- **informational** - Generates debug statements for information messages.

		• **notification** - Generates debug statements for significant messages. • **warnings** - Generates debug statements for warning conditions.
Mode		Privileged EXEC Mode
Package		Workgroup, Enterprise Metro_E and Metro
	Note:	Debug customer spanning tree can be executed only on customer edge ports. To set port type as customer edge ports, bridgemode is set as provider-edge bridge mode.
Default		Tracing of the STP module is disabled
Example		**SEFOS# debug customer spanning-tree cep interface extreme-ethernet 0/2 errors**
Related Command(s)		**show debugging** - Displays the debugging information.

14.1.38 spanning-tree bpduguard

Command Objective	This command configures the status of BPDU guard feature in an interface. The BPDU guard feature disables the port and puts the port in error-disabled state on receiving BPDU, if the portfast feature is enabled on the port. This feature prevents the devices connected to the port from participating in STP operation. Once disabled, the port can be enabled only manually. The no form of this command disables the BPDU guard feature.
Syntax	**spanning-tree bpduguard {disable | enable | none}** **no spanning-tree bpduguard**
Parameter Description	• **disable** - Disables BPDU guard feature in the interface and the port state is maintained till it is manually made up. • **enable** - Enables BPDU guard feature in the interface to prevent temporary loops and moves the port to disabled discarding state when BPDU is received on this port. • **none** - Removes BPDU guard on the specified interface. Global BPDU guard configuration takes effect if this port is an edge port.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	BPDU guard feature is disabled.
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch.
Example	**SEFOS(config-if)# spanning-tree bpduguard enable** RstpBpduguard Enabled
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **show spanning-tree interface** - Displays the port-related spanning tree information for the specified interface.

14.1.39 spanning-tree portfast bpduguard default

Command Objective	This command enables BPDU Guard functionality globally on all edge ports. BPDU guard puts an interface in the error-disabled state when it receives a bridge protocol data unit. Portfast specifies that port has only hosts connected and hence change to forwarding state rapidly. The no form of the command disables BPDU Guard functionality globally on all edge ports.
Syntax	**`spanning-tree portfast bpduguard default`** **`no spanning-tree portfast bpduguard default`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Spanning tree portfast bpduguard is started and enabled in the switch.
Note:	This command executes only if spanning tree is started in the switch.
Example	**`SEFOS(config)# spanning-tree portfast bpduguard default`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`show spanning-tree - Summary, Blockedports, Pathcost, Redundnacy`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree mst - CIST or specified mst Instance`** - Displays multiple spanning tree information for all MSTIs in the switch. • **`show spanning-tree mst - Port Specific Configuration`** - Displays multiple spanning tree port-specific information for the specified port..

14.1.40 debug spanning-tree global/all

Command Objective	This command enables the tracing of the STP module as per the configured debug levels. The trace statements are generated for the configured trace levels. This command allows combination of debug levels to be configured (that is, more than one level of trace can be enabled or disabled). The debug levels are configured one after the other and not in single execution of the command. The no form of this command disables the tracing of the STP module as per the configured debug levels. The trace statements are not generated for the configured trace levels.
Syntax	**`debug spanning-tree { global | all }`**
Parameter Description	• **`global`** - Generates debug statements for global traces. This trace is used to provide the status of STP task initialization, memory-pool creation, and event-reception in STP task. Note: This parameter is specific to Multiple Instance. • **`all`** - Generates debug statements for all kinds of traces.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Default	Tracing of the STP module is disabled.
Example	**`SEFOS# debug spanning-tree all`**
Related Command(s)	**`show debugging`** - Displays the debugging information.

14.1.41 spanning-tree guard

Command Objective	This command configures the various guard features such as root guard, in a port. The no form of this command resets the guard feature to its default value.
Syntax	**spanning-tree guard {root | none | loop}** **no spanning-tree guard**
Parameter Description	• **root** - Enables root guard feature in the port. This feature prevents the port from becoming root port or blocked port. The port changes to the root-inconsistent state if it receives superior BPDUs. The port automatically reverts back to forwarding state once the superior BPDUs are not received. Note: Root Guard implementation in PVRST is applicable only for trunk ports. • **none** - Disables both root and loop guard features in the port. • **loop** - Enables loop guard feature in the port. This feature changes the port to an inconsistent state if no BPDUs are received. Thus isolating the failure and letting spanning tree converge to a stable topology until the port starts receiving BPDUs again. Note: This parameter can be configured only for point-to-point links. Loop guard feature is not supported for shared links. Note: PVRST Loop Guard feature can be enabled on all port types – access, trunk & hybrid, but the behavior of a loop-guard enabled hybrid port in an interoperation scenario is not defined in the implementation.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	None
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch.
Example	**SEFOS(config-if)# spanning-tree guard root**
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.

- **`spanning-tree link-type`** - Configures the link type for the spanning tree.
- **`switchport Mode trunk`** – Configures the port as trunk port.
- **`show spanning-tree interface`** - Displays the port-related spanning tree information for the specified interface.
- **`show spanning-tree interface - inconsistency`** - Displays the port-related spanning tree inconsistent state information for the specified interface.

14.1.42 errordisable recovery-interval

Command Objective	This command sets the error disable recovery timer in an interface. The error disable recovery time is the amount of time required to bring the interface out of the error-disabled state. The range is from 30 to 65535 seconds.
Syntax	**`errordisable recovery-interval <seconds(30-65535)>`**
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	30000
Note:	This command executes only if the spanning tree functionality is not shut down in the switch.
Example	**`SEFOS(config-if)# errordisable recovery-interval 666`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`show spanning-tree interface`** - Displays the port-related spanning tree information for the specified interface.

14.1.43 show spanning-tree interface - inconsistency

Command Objective	This command displays the spanning tree root and loop inconsistent state information for RSTP, MSTP & PVRST. Loop inconsistent state occurs when the non-designated port ,on expiry of received information , transitions to Designated/Discarding state when the superior BPDU's are not received, with the loop guard feature being enabled on that port. Root inconsistent state occurs when the designated port receives a superior BPDU when the designated port is trying to transition to the Root Port.
Syntax	**`show spanning-tree interface <ifXtype> <ifnum> inconsistency`**
Parameter Description	• **`<ifXtype>`** - Displays the port-related spanning tree root and loop inconsistent state information for the specified type of interface. The interface can be: ▪ **`fastethernet`** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **`XL-ethernet`** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **`extreme-ethernet`** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **`port-channel`** – Logical interface that represents an aggregator which contains several ports aggregated together. Note: This command does not support virtual interfaces, tunnels, interface VLANs or internal LAN type of interfaces. • **`<ifnum>`** - Displays the port-related spanning tree root and loop inconsistent state information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro_E and Metro
Note:	This command executes only if the spanning tree functionality is not shut down in the switch.

Example	**For PVRST** **SEFOS# show spanning-tree interface extreme-ethernet 0/1 inconsistency** Switch default VLAN 1 Loop Inconsistent **For MSTP** **SEFOS# show spanning-tree interface extreme-ethernet 0/1 inconsistency** Switch default MST00 Loop Inconsistent **For RSTP** **SEFOS# show spanning-tree interface extreme-ethernet 0/1 inconsistency** Switch default Loop Inconsistent
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **spanning-tree guard** - Configures the various guard features such as root guard, loop gurad, in a port. • **spanning-tree loop-guard** - Enables the loop guard feature in a port. • **spanning-tree - Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.

14.1.44 set performance-data-status

Command Objective	This command enables or disables the collection of performance data for the for RSTP and MSTP protocol.
Syntax	**`set performance-data-status {enable | disable}`**
Parameter Description	• **`enable`** - Enables the collection of RSTP and MSTP performance data on all ports in the device. • **`disable`** - Disables the collection of RSTP and MSTP performance data on all ports in the device.
Mode	Global Configuration Mode/ Switch configuration Mode
Package	Workgroup, Enterprise Metro_E and Metro
Default	Collection of performance data is disabled.
Note:	This command executes only if the spanning tree functionality is not shut down in the switch.
Example	**`SEFOS(config)# set performance-data-status enable`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree`** - Enables the spanning tree operation in the switch for the selected spanning tree mode. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`show spanning-tree performance-data`** - Displays spanning tree performance data for RSTP and MSTP

14.1.45 spanning-tree bpdufilter

Command Objective	This command configures the status of BPDU filter feature in an interface. The no form of this command disables the BPDU filter on the interface.
Note:	This command is a standardized implementation of the existing command; **`spanning-tree - Properties of an interface.`** Its operation is similar to the existing command.
Syntax	**`spanning-tree bpdufilter {disable | enable }`** **`no spanning-tree bpdufilter`**
Parameter Description	• **`disable`** - Disables BPDU filter in the interface and the port state is maintained till it is manually made up. • **`enable`** - Enables BPDU filter in the interface to prevent temporary loops and moves the port to disabled discarding state when BPDU is received on this port.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Enterprise
Default	BPDU filter feature is disabled.
Example	**`SEFOS(config-if)# spanning-tree bpdufilter enable`**
Related Command(s)	• **`spanning-tree portfast - bpdufilter`** - Configures the portfast of the non-trunk ports as bpdufilter default or default. • **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`show spanning-tree - Summary, Blockedports, Pathcost, Redundancy`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.

14.1.46 spanning-tree flush-interval

Command Objective	This command configures the flush interval timer value (in centiseconds), which controls the number of flush indications invoked from spanning tree module per instance basis. This value ranges from 0 to 500 centiseconds. If the flush interval timer is set to zero, port and instance-based flushing occurs(default functionality). If it is set to non-zero, instance-based flushing occurs (dependent on the flush-indication-threshold value). The no form of the command resets the flush-interval timer to the default value.
Syntax	**`spanning-tree flush-interval <centi-seconds (0-500)>`** **`no spanning-tree flush-interval`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	flush-interval - 0 centi-secs
Note:	This command is not applicable for PVRST.
Example	**`SEFOS(config)# spanning-tree flush-interval 20`**
Related Command(s)	• **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`spanning-tree flush-indication-threshold`** – Sets the spanning tree flush indication threshold for a specific instance. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.

14.1.47 spanning-tree flush-indication-threshold

Command Objective	This command configures the flush indication threshold value for a specific instance. This indicates the number of flush indications to go before the flush-interval timer method triggers. This value ranges from 0 to 65535. When flush indication threshold is default value and flush interval is non-default value, instance-based flushing occurs during the first flush indication trigger. When the flush indication threshold value is non-default(x) and flush-interval value is non-default, port and instance-based flushing is triggered until the threshold(x) is reached. Once the threshold is reached, instance-based flushing is triggered & timer starts. The no form of the command sets the flush indication threshold of the specific instance to the default value.
Syntax	**spanning-tree [mst <instance-id>] flush-indication-threshold <value (0-65535)>** **no spanning-tree flush-indication-threshold**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	flush-indication-threshold - 0
Note:	This command is not applicable for PVRST.
Example	**SEFOS(config)# spanning-tree flush-indication-threshold 2**
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **spanning-tree flush-interval** – Sets the spanning tree flush interval timer value. • **instance** - Creates an MST instance and maps it to VLANs. • **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.

14.2 MSTP

Oracle MSTP is a portable implementation of the IEEE 802.1s standard. It is used to configure spanning tree on per VLAN basis or multiple VLANs per spanning tree. It allows you to build several MST over VLAN trunks, and group or associate VLANs to spanning tree instances. The topology of one instance is independent of the other instance. It provides multiple forwarding paths for data traffic and enables load balancing. It improves the overall network fault tolerance, as failure in one instance does not affect the other instances.

This section describes all the commands for MSTP configurations. These commands are available only if the switch MSTP_WANTED is set as “yes” during compilation of exe.

The list of commands for the configuration of MSTP is as follows:

- spanning-tree mst configuration
- spanning-tree mst max-instance
- spanning-tree mst root
- spanning-tree mst forward-time
- spanning-tree mst max-age
- name
- revision
- instance
- spanning-tree mst- Properties of an interface for MSTP
- spanning-tree mst hello-time
-
-
-

14.2.1 spanning-tree mst configuration

Command Objective	This command enters into MSTP configuration mode where instance-specific and MST region configuration can be done.
Syntax	**`spanning-tree mst configuration`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command can be executed successfully only if the spanning tree functionality is started and enabled in the switch. The type of spanning tree mode should be set as `mst`.
Example	**`SEFOS(config)#spanning-tree mst configuration`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.

14.2.2 spanning-tree mst max-instance

Command Objective	This command configures the maximum number of active MSTIs that can be created. This value ranges from 1 to 64. This configuration allows you to limit the number of spanning tree instances to be allowed in the switch. This does not count the special MSTID such as PTETID, used to identify the VIDs which are used by ESPs. The no form of this command resets maximum MSTP instance value to its default value.
Syntax	**`spanning-tree mst max-instance <short(1-64)>`** **`no spanning-tree mst max-instance`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	64
Note:	This command can be executed successfully only if the spanning tree functionality is started and enabled in the switch. The type of spanning tree mode should be set as `mst`.
Example	**`SEFOS(config)# spanning-tree mst max-instance 1`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`instance`** - Creates an MST instance and maps it to VLANs.

14.2.3 spanning-tree mst root

Command Objective	This command enables BPDU (Bridge Protocol Data Unit) transmission and reception on the interface. This command is a standardized implementation of the existing command; **`spanning-tree priority`**. It operates in a similar manner to the existing command**.** The no form of the command disables BPDU transmission and reception on the interface.
Syntax	**`spanning-tree mst {instance-id <instance-id(1-64)>} root {primary | secondary}`** **`no spanning-tree mst {instance-id <instance-id(1-64)>} root`**
Parameter Description	• **`instance-id <instance-id(1-64)>`** - Configures the ID of MSTP instance already created in the switch. This value ranges from 1 to 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs. This option is applicable only if the spanning tree mode is set as `mst`. • **`primary`** - Sets high priority (low value) for the switch so that the switch can be made the bridge root of the spanning tree instance. The priority value is set as 24576. • **`secondary`** - Sets the switch as a secondary root, if the primary root fails. The priority value is set as 28672.
Mode	Global Configuration Mode
Note:	This command executes only if • instance is created, • spanning tree mode is set as `mst`.
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**`SEFOS(config)# spanning-tree mst instance-id 1 root secondary`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed,

enables spanning tree operation, and starts spanning tree functionality in the switch.

- **`spanning-tree mst configuration`** – Enters into MSTP configuration mode, where instance-specific and MST region configuration can be done.
- **`instance`** - Creates an MST instance and maps it to VLANs.
- **`show spanning-tree detail`** - Displays detailed spanning tree information
- **`show spanning-tree active`** - Displays spanning tree information of active ports

14.2.4 spanning-tree mst forward-time

Command Objective	This command configures the forward timer of the spanning tree. The no form of the command sets the forward timer to the default value. The forward timer controls the speed at which a port changes its spanning tree state from Blocking state to Forwarding state. The timer value ranges between 4 and 30 seconds. Note: This command is currently not supported.
Note:	The values configured for the spanning tree forward timers should satisfy the following conditions: `2* (forward-time - 1) >= max-age`, and `max-age >= 2 * (hello-time +1)` This command is a standardized implementation of the existing command; **`spanning-tree timers`**. It operates in a similar manner to the existing command.
Syntax	**`spanning-tree mst forward-time <seconds(4-30)>`** **`no spanning-tree mst forward-time`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	forward-time - 15 secs
Note:	• The STP forward timers can be configured in the switch only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. • This spanning tree timer's configuration is not supported in PVRST mode.
Example	**`SEFOS(config)# spanning-tree mst forward-time 4`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`show spanning-tree - Summary, Blockedports, Pathcost, Redundancy`** - Displays spanning tree-related information available in the

switch for the current STP enabled in the switch.

- **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.
- **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **`show spanning-tree interface detail`** - Displays detailed spanning tree-related information for the specified port.
- **`show spanning-tree root`** - Displays the spanning tree root information.
- **`show spanning-tree bridge`** - Displays the spanning tree bridge information.
- **`show spanning-tree mst - CIST or specified mst Instance`** - Displays multiple spanning tree information for all MSTIs in the switch.
- **`show spanning-tree mst - Port Specific Configuration`** - Displays multiple spanning tree port-specific information for the specified port.

14.2.5 spanning-tree mst max-age

Command Objective	This command configures the max-age timer of the spanning tree. The max-age timer denotes the time (in seconds) after which the spanning tree protocol information learned from the network on any port will be discarded. The timer value ranges between 6 and 40 seconds. The no form of the command sets the max-age timer to the default value. Note: Max-age timer can be configured in centiseconds through SNMP
Note:	The values configured for the spanning tree forward timers should satisfy the following conditions: `2* (forward-time - 1) >= max-age`, and `max-age >= 2 * (hello-time +1)` This command is a standardized implementation of the existing command; **`spanning-tree timers`**. It operates in a similar manner to the existing command.
Syntax	**`spanning-tree mst max-age <seconds(6-40)>`** **`no spanning-tree mst max-age`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	max-age - 20 secs
Note:	• The STP forward timers can be configured in the switch only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set if the functionality is already shut down. • This spanning tree timer's configuration is not supported in PVRST mode.
Example	**`SEFOS(config)# spanning-tree mst max-age 7`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree

functionality in the switch.

- **show spanning-tree - Summary, Blockedports, Pathcost, Redundancy** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree interface detail** - Displays detailed spanning tree-related information for the specified port.
- **show spanning-tree root** - Displays the spanning tree root information.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port-specific information for the specified port.

14.2.6 name

Command Objective	This command configures the name for the MST region. The name is unique and used to identify the specific MST region. Each MST region contains multiple spanning tree instances and runs a special instance of spanning tree known as IST to disseminate STP topology information to other STP instances. The no form of this command resets the name to its default value.
Syntax	**name <string(optional max Length)>** **no name**
Mode	MSTP Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Same as that of the base MAC address of the switch.
Example	**SEFOS(config-mst)#name regionone**
Related Command(s)	• **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM. • **spanning-tree mst configuration** - Enters into MSTP configuration mode, where instance-specific and MST region configuration can be done. • **show spanning-tree mst configuration** - Displays multiple spanning tree instance-related information.

14.2.7 revision

Command Objective	This command configures the revision number for the MST region. This value ranges from 0 to 65535. The no form of this command resets the revision number to its default value.
Syntax	**revision <value(0-65535)>** **no revision**
Mode	MSTP Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	0
Example	**SEFOS(config-mst)#revision 100**
Related Command(s)	• **spanning-tree mst configuration** - Enters into MSTP configuration mode, where instance-specific and MST region configuration can be done. • **show spanning-tree mst configuration** - Displays multiple spanning tree instance-related information.

14.2.8 instance

Command Objective	This command creates an MST instance and maps it to VLANs. The no form of this command deletes the instance, or unmaps, specific VLANs from the MST instance.
Syntax	**instance <instance-id(1-64|4094)> vlan <vlan-range>** **no instance <instance-id (1-64)> [vlan <vlan-range>]**
Parameter Description	• **<instance-id(1-64|4094)>** - Configures the ID of MSTP instance to be created or deleted and mapped with or unmapped from VLAN. This value ranges from 1 to 64. The special value 4094 can be used in the switch that supports PBB-TE. Except VLAN instance mapping, other commands for `stp` configurations will not be applicable in this mode.This special value represents PTETID that identifies VID used by ESPs. • **vlan <vlan-range>** - Configures a VLAN ID or list of VLAN IDs that should be mapped with or unmapped from the specified MST instance. This value is a string whose maximum size is 9. For example, the value is provided as 4000-4010 to represent the list of VLANs IDs from 4000 to 4010.
Mode	MSTP configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Instance 0 is created and mapped with all VLANs (1-4094).
Example	**SEFOS(config-mst)# instance 1 vlan 2**
Related Command(s)	• **spanning-tree mst configuration** - Enters into MSTP configuration mode, where instance-specific and MST region configuration can be done. • **spanning-tree priority** - Configures the priority value that is assigned to the switch. • **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP. • **spanning-tree mst max-instance** - Configures the maximum number of active MSTIs that can be created. • **spanning-tree mst- Properties of an interface for MSTP** - Configures the port-related spanning tree information for a specified MSTI.

- **`show spanning-tree mst - CIST or specified mst Instance`** - Displays multiple spanning tree information for all MSTIs in the switch.
- **`show spanning-tree mst configuration`** - Displays multiple spanning tree instance-related information.
- **`show spanning-tree mst - Port Specific Configuration`** - Displays multiple spanning tree port-specific information for the specified port.
- **`show spanning-tree performance-data`** - Displays spanning tree performance data for RSTP and MSTP.

14.2.9 spanning-tree mst- Properties of an interface for MSTP

Command Objective	This command configures the port-related spanning tree information for a specified MSTI in a port. The no form of this command resets the spanning tree information of a port to its default value.
Syntax	**spanning-tree mst <instance-id(1-64)> { cost <value(1-200000000)>| port-priority <value(0-240)> | disable }** **no spanning-tree {mst <instance-id(1-64)>} {cost|port-priority | disable}**
Parameter Description	• **<instance-id(1-64)>** - Configures the ID of MSTP instance already created in the switch.This value ranges from 1 to 64. • **cost<value(1-200000000)>** - Configures the port's path cost value that contributes to the path cost of paths containing this particular port. The paths' path cost is used during calculation of shortest path to reach the root. The path cost represents the distance between the root port and designated port. This value ranges from 1 to 200000000. The configured path cost is used, even if the dynamic path cost calculation feature or LAGG speed feature is enabled. • **port-priority<value(0-240)>** - Configures the priority value assigned to the port. This value is used during port role selection process. This value ranges from 0 to 240. This value should be set in steps of 16, that is, you can set the value as 0, 16, 32, 48, and so on. The MSTP puts the interface with lowest number in forwarding state and blocks all other interfaces, provided all interfaces have the same priority value. • **disable** - Disables the spanning tree operation on the port. The port does not take part in the execution of spanning tree operation for preventing undesirable loops in the network.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	• cost - 200000 for all physical ports; 199999 for port-channels • port-priority - 128 • disable - Spanning tree operation is enabled in the port.
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode

	should be set as `mst`
Example	**`SEFOS(config-if)#spanning-tree mst 2 cost 4000`** **`SEFOS(config-if)#spanning-tree mst 1 port-priority 32`** **`SEFOS(config-if)#spanning-tree mst 1 disable`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`spanning-tree pathcost dynamic`** - Enables dynamic path cost calculation feature in the switch. • **`instance`** - Creates an MST instance and maps it to VLANs. • **`show spanning-tree - Summary, Blockedports, Pathcost, Redundancy`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree interface`** - Displays the port-related spanning tree information for the specified interface. • **`show spanning-tree mst - CIST or specified mst Instance`** - Displays multiple spanning tree information for all MSTIs in the switch.

14.2.10 spanning-tree mst hello-time

Command Objective	This command configures the spanning tree hello time. The no form of this command resets the hello time to its default value. The hello time represents the time interval (in seconds) between two successive configuration BPDUs generated by the switch on the port. This value is either 1 or 2 seconds. This value is applied to all active MSTIs. Note: Hello Time can be configured in centiseconds through SNMP
Syntax	**spanning-tree mst hello-time<value(1-2)>** **no spanning-tree mst hello-time**
Mode	Global Configuration Mode, Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	2 seconds
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set as `mst`.
Example	**SEFOS(config-if)#spanning-tree mst hello-time 1** **SEFOS(config)#spanning-tree mst hello-time 1**
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **show spanning-tree - Summary, Blockedports, Pathcost, Redundancy** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **show spanning-tree interface** - Displays the port-related spanning tree information for the specified interface.

- **`show spanning-tree root`** - Displays the spanning tree root information.
- **`show spanning-tree bridge`** - Displays the spanning tree bridge information.
- **`show spanning-tree mst - Port Specific Configuration`** - Displays multiple spanning tree port-specific information for the specified port.

14.2.11 show spanning-tree mst - CIST or specified mst Instance

Command Objective	This command displays multiple spanning tree information for all MSTIs in the switch. The information contains MSTI ID, VLAN IDs mapped to the instance, bridge address and priority, root address and priority, IST root address, priority and path cost, forward delay, maximum age, maximum hop count, and port details of interfaces enabled in the switch. The port details contain interface ID, port role, port state, port cost, port priority, and port link type.
Syntax	**show spanning-tree mst [<instance-id(1-64|4094)>] [detail]**
Parameter Description	• **<instance-id(1-64|4094)>** - Displays the multiple spanning tree information for the specified MSTI. This value ranges from 1 to 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs. • **detail** - Displays the detailed multiple spanning tree information for the MSTI. This information contain MSTI ID, VLAN IDs mapped to the instance, bridge address and priority, root address and priority, IST root address, priority and path cost, forward delay, maximum age, maximum hop count, and BPDUs sent and received in the port.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set as `mst`.
Example	**Single Instance:** **SEFOS# show spanning-tree mst 1** ## MST01 Vlans mapped: 2 Bridge Address 00:01:02:03:04:11 Priority 32768 Root Address 00:01:02:03:04:11 Priority 32768 Root this switch for MST01 Interface Role Sts Cost Prio.Nbr Type --------- ---- --- ---- -------- ---- Ex0/1 Master Forwarding 200000 128.1 SharedLan **SEFOS# show spanning-tree mst 1 detail**

```
 ## MST01
Vlans mapped:    2
Bridge     Address 00:01:02:03:04:11     Priority 32768
Root       Address 00:01:02:03:04:11     Priority 32768
Root       this switch for MST01
Ex0/1 of MST01 is Master    , Forwarding
Port info   port id 128.1     priority 128   cost 200000
Designated root   address 00:01:02:03:04:11     priority
32768 cost 0
Designated bridge address 00:01:02:03:04:11     priority
32768 port id 128.1
```

Multiple Instance:

```
SEFOS# show spanning-tree mst 1
Switch – default
## MST01
Vlans mapped:    2
Bridge     Address 00:01:02:03:04:11     Priority 32768
Root       Address 00:01:02:03:04:11     Priority 32768
Root       this switch for MST01
Interface Role       Sts       Cost    Prio.Nbr  Type
--------- ----       ---       ----    --------  ----
Ex0/1  Master   Forwarding   200000    128.1   SharedLan
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **clear spanning-tree counters** - Deletes all bridge and port-level spanning tree statistics information.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.

- **spanning-tree – Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP.
- **spanning-tree mst max-hops** - Configures the maximum number of hops permitted in the MST.
- **instance** - Creates an MST instance and maps it to VLANs.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port-related spanning tree information for a specified MSTI.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.
- **shutdown – physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface, VLAN interface, port-channel interface, tunnel interface, or OOB interface.

14.2.12 show spanning-tree mst configuration

Command Objective	This command displays multiple spanning tree instance-related information. This information contains the MST region name, MST region revision, and a list containing MSTI IDs and VLAN IDs mapped to the corresponding MSTI.
Syntax	**show spanning-tree mst configuration**
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set as `mst`.
Example	**Single Instance:** **SEFOS# show spanning-tree mst configuration** Name [00:02:02:03:04:01] Revision 0 Instance Vlans mapped -------- ---------- 0 1,3-1024,1025-2048,2049-3072, 3073-4094 1 2 ---------- **Multiple Instance:** **SEFOS# show spanning-tree mst configuration** Switch - default Name [00:01:02:03:04:01] Revision 0 Instance Vlans mapped -------- ---------- 0 1-1024,1025-2048,2049-3072,3073-4094 ---------- Switch - cust1 Name [00:01:02:03:04:02] Revision 0

```
Instance        Vlans mapped
 --------      -----------------------------------------
  0              1-1024,1025-2048,2049-3072,3073-4094
 ---------------------------------------------------
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **name** - Configures the name for the MST region.
- **revision** - Configures the revision number for the MST region.
- **instance** - Creates an MST instance and maps it to VLANs.

14.2.13 show spanning-tree mst - Port Specific Configuration

Command Objective	This command displays multiple spanning tree port-specific information for the specified port. This information contains interface ID, edge port status, port link type, port hello time, BPDUs sent and received on the port, and instance-related details. The instance details contain MSTI ID, MSTI role, MSTI status, MSTI cost, and MSTI priority.
Syntax	**show spanning-tree mst [<instance-id(1-64|4094)>] interface <interface-type> <interface-id> [{ stats | hello-time | detail }]**
Parameter Description	• **<instance-id(1-64|4094)>** - Displays the multiple spanning tree port specific information for the specified MSTI. This value ranges from 1 to 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs. • **<interface-type>** - Displays the multiple spanning tree port specific information for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. • **<interface-id>** - Displays the multiple spanning tree port specific information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID. • **stats** - Displays the number of BPDUs sent and received for the MSTIs assigned to the specified interface. • **hello-time** - Displays the hello time of the MSTIs assigned to the specified interface. • **detail** - Displays detailed multiple spanning tree port specific information

	for the specified interface. The information contains port priority, port cost, root address, priority and cost, IST address, priority and cost, bridge address, priority and cost, forward delay, maximum age, maximum hop count, and BPDUs sent and received.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set as `mst`.

Example

```
SEFOS# show spanning-tree mst 1 interface extreme-ethernet 0/1
Switch default
Ex0/1 of MST00 is Disabled  , Discarding
Edge port: no
Link type: Shared
Port Hello Timer: 2 sec 0 cs
Bpdus sent 0 , Received 0
Instance  Role         Sts          Cost     Prio.Nbr
--------  ----         ---          ----     --------
0         Disabled     Discarding   200000   128.1

SEFOS# show spanning-tree mst 1 interface extreme-ethernet 0/1 stats
MST01     Bpdus sent 2, Received 0

SEFOS# show spanning-tree mst 1 interface extreme-ethernet 0/1 hello-time
MST01     2 secs 0 cs

SEFOS# show spanning-tree mst 1 interface extreme-ethernet 0/1 detail
Ex0/1 of MST01 is Master    , Forwarding
Port info     port id 128.1       priority 128   cost 200000
Designated root  address 00:01:02:03:04:11     priority 32768 cost 0
Designated bridge address 00:01:02:03:04:11     priority 32768 port id 128.1
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for

the selected spanning tree mode.

- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.

- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.

- **clear spanning-tree counters** - Deletes all bridge and port-level spanning tree statistics information.

- **spanning-tree priority** - Configures the priority value that is assigned to the switch.

- **spanning-tree – Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.

- **spanning-tree layer2-gateway-port** – Configures a port to operate as a L2GP.

- **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP.

- **spanning-tree mst max-hops** - Configures the maximum number of hops permitted in the MST.

- **instance** - Creates an MST instance and maps it to VLANs.

- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.

14.3 PVRST+

Oracle PVRST+ is an enhancement of RSTP, which works in conjunction with VLAN to provide better control over traffic in the network. It maintains a separate spanning tree for each active VLAN in the network, thus providing load balancing through multiple instances of spanning tree, fault tolerance, and rapid reconfiguration support through RSTP.

Note: For each VLAN, a spanning tree instance is created. Number of spanning tree instances supported in PVRST depends on the number of instances supported by the hardware. PVRST operates only on supported instances.

The PVRST-related Commands are available only if the switch PVRST_WANTED is set as “yes” during compilation of the exe.

14.3.1 spanning-tree vlan

Command Objective

This command configures spanning tree-related information on a per VLAN basis.

The no form of this command resets the spanning tree-related information to its default values.

Note:

The values configured for the spanning tree forward timers should satisfy the following conditions:
`2* (forward-time - 1) >= max-age`, and

`max-age >= 2 * (hello-time +1)`

Syntax

`spanning-tree vlan <vlan-id/vfi_id> {forward-time <seconds(4-30)> | hello-time <seconds(1-10)> | max-age <seconds(6-40)> | hold-count <integer(1-10)> | brg-priority <integer(0-61440)> | root {primary | secondary}}`

`no spanning-tree vlan <vlan-id/vfi_id> {forward-time | hello-time | max-age | hold-count | brg-priority | root}`

Parameter Description

- **`<vlan-id/vfi_id>`** - Configures the spanning tree-related information for the specified VLAN/ VFI ID. This value ranges from 1 to 65535.
  - **`<vlan –id>`** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094
  - **`<vfi-id>`**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535

    Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries.

    Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW.

    Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range.

- **`forward-time <seconds(4-30)>`** - Configures the number of seconds a port waits before changing from the listening and learning

	states to the forwarding state. This value ranges from 4 to 30 seconds. • **hello-time <seconds(1-10)>** - Configures the time interval (in seconds) between two successive configuration BPDUs generated by the root switch. This value ranges from 1 to 10 seconds. • **max-age <seconds(6-40)>** - Configures the maximum expected arrival time (in seconds) of hello BPDUs. STP information learned from the network on any port is discarded, once the configured arrival time expires. The spanning tree topology is re-computed after this time interval. This value ranges from 6 to 40 seconds. • **hold-count <integer(1-10)>** - Configures the maximum number of packets that can be sent in a given hello time interval. This value is used to limit the maximum transmission rate of the switch and to avoid flooding. This value ranges from 1 to 10. • **brg-priority <integer(0-61440)>** - Configures the bridge priority to be assigned for the specified VLAN. This value ranges from 0 to 61440. The value should be set in increments of 4096, that is, the value can be set as 0, 4096, 8192, 12288 and so on. • **root {primary | secondary}** - Configures the root type for the given VLAN interface. The options are; ▪ **primary** - Configures the switch to become root for a given VLAN. The priority of the switch is lowered until it becomes root. ▪ **secondary** - Configures the switch to become backup root for a given VLAN. The priority of the switch is lowered until it becomes one priority higher than the root, so it can become root if the current root fails.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	• forward-delay - 15 seconds • hello-time - 2 seconds • max-age - 20 seconds • hold-count - 3 • brg-priority - 32768 + VLAN ID
Note:	• This command can be executed only if the type of spanning tree mode is set as `pvrst`. • The configuration can be done only for the VLANs that are activated in the switch.
Example	**SEFOS(config)# spanning-tree vlan 1 forward-time 18**

Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **show spanning-tree active** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN. • **show spanning-tree vlan - bridge** - Displays the PVRT-related information of the bridge for the specified VLAN ID. • **show spanning-tree vlan - root** - Displays the PVRT-related information of the root, for the specified VLAN ID. • **show spanning-tree vlan - interface** - Displays interface-specific PVRST information for the specified VLAN. • **vlan active** - Activates a VLAN in the switch.

14.3.2 spanning-tree encap

Command Objective	This command configures the encapsulation type to be used in an interface. The encapsulation defines the VLAN services available and identifies or tags frames transmitted between switches. The no form of this command resets the encapsulation type to its default value.
Syntax	**spanning-tree encap {dot1q | ISL}** **no spanning-tree encap**
Parameter Description	• **dot1q** - Configures the encapsulation type as dot1Q. The port sends BPDUs for the native VLAN as normal IEEE RSTP BPDUs. The port sends BPDUs for other VLANs with proprietary tunneled address. The PVRST unaware bridge considers these BPDUs as data packets and forwards them through the VLAN. This option is automatically set for the port if the port is configured as access port. • **ISL** - Configures the encapsulation type as ISL. The port sends BPDUs for all VLANs as normal RSTP BPDUs (including the IEEE Ethernet header) encapsulated within an additional proprietary ISL Ethernet header that contains the VLAN ID. This option can be set only for the port that is configured as trunk port.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	dot1q
Note:	This command can be executed successfully, only if • the spanning tree functionality is not shut down in the switch. • the type of spanning tree mode is set as pvrst. • the port is configured as trunk port.
Example	**SEFOS(config-if)# spanning-tree encap ISL**
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.

- **`show spanning-tree interface`** - Displays the port-related spanning tree information for the specified interface.
- **`switchport Mode`** - Configures the mode of operation for a switch port.
- **`switchport Mode trunk`** – Configures the port as trunk port.

14.3.3 spanning-tree vlan status

Command Objective	This command configures the status of PVRST on a port for the specified VLAN. PVRST works in conjunction with VLAN to provide better control over traffic in the network. It maintains a separate spanning tree for each active VLAN in the network, thus providing load balancing through multiple instances of spanning tree, fault tolerance, and rapid reconfiguration support through RSTP.
Syntax	**`spanning-tree vlan <vlan-id/vfi_id> status {disable | enable}`**
Parameter Description	• **`vlan <vlan-id/vfi_id>`** - Configures the status of PVRST on the port for the specified VLAN/ VFI ID. This value ranges from 1 to 65535. ▪ **`<vlan –id>`** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094 ▪ **`<vfi-id>`**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535 Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries. Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW. Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range. • **`disable`** - Disables the PVRST operation on the port for the specified VLAN ID. • **`enable`** - Enables the PVRST operation on the port for the specified VLAN ID.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	status - enable

Example	**SEFOS(config-if)# spanning-tree vlan 1 status disable**
Note:	• This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set as `pvrst`. • The configuration can be done only for the VLANs that are activated in the switch.
Related Command(s)	• **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch. • **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **show spanning-tree - Summary, Blockedports, Pathcost, Redundancy** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **show spanning-tree detail** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **show spanning-tree active** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST-related information for the specified VLAN. • **show spanning-tree vlan - interface** – Displays interface-specific PVRST information for the specified VLAN. • **vlan active** - Activates a VLAN in the switch.

14.3.4 spanning-tree vlan port-priority

Command Objective	This command configures the priority of a port for the specified VLAN. The no form of this command resets port priority for the given VLAN to its default value.
Syntax	**spanning-tree vlan <vlan-id/vfi_id> port-priority <priority(0-240)>** **no spanning-tree vlan <vlan-id/vfi_id> port-priority**
Parameter Description	• **vlan <vlan-id/vfi_id>** - Configures the priority of the port for the specified VLAN / VFI ID. This value ranges from 1 to 65535. ▪ **<vlan –id>** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094 ▪ **<vfi-id>**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535 Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries. Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW. Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range. • **port-priority <priority(0-240)>** - Configures the priority value assigned to the port. This value is used during port role selection process. This value ranges from 0 to 240. This value should be set in steps of 16, that is, you can set the value as 0, 16, 32, 48 and so on.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	port-priority - 128
Note:	• This command can be executed successfully only if the spanning tree

	functionality is not shut down in the switch. The type of spanning tree mode should be set as `pvrst`. • The configuration can be done only for the VLANs that are activated in the switch.
Example	**`SEFOS(config-if)# spanning-tree vlan 1 port-priority 16`**
Related Command(s)	• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`show spanning-tree – Summary, Blockedports, Pathcost, Redundancy`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree vlan – Summary, Blockedports, Pathcost`** - Displays PVRST-related information for the specified VLAN. • **`show spanning-tree vlan – interface`** - Displays interface-specific PVRST information for the specified VLAN. • **`vlan active`** - Activates a VLAN in the switch.

14.3.5 spanning-tree vlan cost

Command Objective	This command configures the cost of a port for the specified VLAN. The no form of this command resets port cost to its default value.
Syntax	**spanning-tree vlan <vlan-id/vfi_id> cost <cost(0-200000000)>** **no spanning-tree vlan <vlan-id/vfi_id> cost**
Parameter Description	• **vlan <vlan-id/vfi_id>** - Configures the cost of the port for the specified VLAN/ VFI ID. This value ranges from 1 to 65535. ▪ **<vlan –id>** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094 ▪ **<vfi-id>**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535 Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries. Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW. Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range. • **cost <cost(0-200000000)>** - Configures the port's path cost value that contributes to the path cost of paths containing this particular port. The paths' path cost is used during calculation of shortest path to reach the root. The path cost represents the distance between the root port and designated port. This value ranges from 1 to 200000000. The configured path cost is used, even if the dynamic path cost calculation feature or LAGG speed feature is enabled.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise, Metro and Metro_E

Default		cost - 200000
	Note:	• This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set as `pvrst`. • The configuration can be done only for the VLANs that are activated in the switch.
Example		**`SEFOS(config-if)# spanning-tree vlan 1 cost 250`**
Related Command(s)		• **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch. • **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch. • **`spanning-tree pathcost dynamic`** - Enables dynamic path cost calculation feature in the switch. • **`show spanning-tree - Summary, Blockedports, Pathcost, Redundancy`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree detail`** - Displays detailed spanning tree-related information of the switch and all ports enabled in the switch. • **`show spanning-tree active`** - Displays spanning tree-related information available in the switch for the current STP enabled in the switch. • **`show spanning-tree vlan - Summary, Blockedports, Pathcost`** - Displays PVRST-related information for the specified VLAN. • **`show spanning-tree vlan - root`** - Displays the PVRT-related information of the root, for the specified VLAN ID. • **`show spanning-tree vlan - interface`** - Displays interface-specific PVRST information for the specified VLAN. • **`vlan active`** - Activates a VLAN in the switch.

14.3.6 show spanning-tree vlan - Summary, Blockedports, Pathcost

Command Objective	This command displays PVRST-related information for the specified VLAN. This information contain spanning tree status, spanning tree mode set, port details, root cost, root port and priority, address, hello time, maximum age, and forward delay of the root and bridge. The port details contain interface ID, port role, port state, port cost, port priority, and port link type.
Syntax	**show spanning-tree vlan <vlan-id/vfi_id> [{blockedports | | pathcost-method | summary }]**
Parameter Description	• **vlan <vlan-id/vfi_id>** - Displays the PVRST-related information for the specified VLAN / VFI ID. This value ranges from 1 to 65535. ▪ **<vlan –id>** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094 ▪ **<vfi-id>**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535 Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries. Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW. Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range. • **blockedports** - Displays the list of ports in blocked state and the total number of blocked ports for the specified VLAN. • **pathcost-method** - Displays the path cost method configured for the specified VLAN. • **summary** - Displays the currently used STP, applied path cost method and port details such as port ID, port role, port state, and port status.
Mode	Privileged EXEC Mode

Package		Workgroup, Enterprise, Metro and Metro_E
	Note:	• This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set as `pvrst`. • The configuration can be done only for the VLANs that are activated in the switch.
Example		**Single Instance:**

SEFOS# show spanning-tree vlan 1 blockedports

```
Blocked Interfaces List:
Ex0/2,Ex0/3,Ex0/4,Ex0/5,Ex0/6,Ex0/7,Ex0/8,Ex0/9,Ex0/10,Ex
0/11,
Ex0/12,Ex0/13,Ex0/14,Ex0/15,Ex0/16,Ex0/17,Ex0/18,Ex0/19,E
x0/20,
Ex0/21,Ex0/22,Ex0/23,Ex0/24,
The Number of Blocked Ports in the system is :23
```

SEFOS# show spanning-tree vlan 1 pathcost-method

```
Spanning Tree port pathcost method is Long
```

SEFOS# show spanning-tree vlan 1 summary

```
Spanning tree enabled protocol is PVRST
Spanning-tree pathcost method is long
PVRST Port Roles and States
Port-Index  Port-Role    Port-State   Port-Status
----------  ---------    ----------   -----------
1           Designated   Forwarding   Enabled
2           Designated   Forwarding   Enabled
3           Designated   Discarding   Enabled
4           Designated   Discarding   Enabled
5           Designated   Discarding   Enabled
6           Designated   Discarding   Enabled
7           Designated   Discarding   Enabled
8           Designated   Discarding   Enabled
9           Designated   Discarding   Enabled
10          Designated   Discarding   Enabled
11          Designated   Discarding   Enabled
12          Designated   Discarding   Enabled
13          Designated   Discarding   Enabled
```

```
14          Designated   Discarding   Enabled
15          Designated   Discarding   Enabled
16          Designated   Discarding   Enabled
17          Designated   Discarding   Enabled
18          Designated   Discarding   Enabled
19          Designated   Discarding   Enabled
20          Designated   Discarding   Enabled
21          Designated   Discarding   Enabled
22          Designated   Discarding   Enabled
23          Designated   Discarding   Enabled
24          Designated   Discarding   Enabled
```

Multiple Instance:

```
SEFOS# show spanning-tree vlan 1 blockedports switch default
Switch default
Blocked Interfaces List:
The Number of Blocked Ports in the system is :0
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports.
- **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch.
- **clear spanning-tree counters** - Deletes all bridge and port-level spanning tree statistics information.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree – Pseudoroot configuration** - Configures the pseudoroot-related information for a port set as L2GP.
- **spanning-tree - Properties of an interface** - Configures the port-related spanning tree information for all kinds of STPs and creates

port in STP when Automatic Port Create feature is disabled.

- **`spanning-tree vlan`** - Configures spanning tree-related information on a per VLAN basis.
- **`spanning-tree vlan status`** - Configures the status of PVRST on a port for the specified VLAN.
- **`spanning-tree vlan port-priority`** - Configures the priority of a port for the specified VLAN.
- **`spanning-tree vlan cost`** - Configures the cost of a port for the specified VLAN.
- **`vlan active`** - Activates a VLAN in the switch.
- **`base-mac`** - Configures the base unicast MAC address of the switch in the NVRAM.

14.3.7 show spanning-tree vlan - bridge

Command Objective	This command displays the PVRT-related information of the bridge for the specified VLAN ID. The information contains bridge ID, hello time, maximum age, forward delay, and STP Mode set.
Syntax	**show spanning-tree vlan <vlan-id/vfi_id> bridge [{address | detail | forward-time | hello-time | id | max-age | priority [system-id] | protocol}]**
Parameter Description	• **vlan <vlan-id/vfi_id>** - Displays the PVRST-related information of the bridge for the specified VLAN / VFI ID. This value ranges from 1 to 65535. ▪ **<vlan –id>** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094 ▪ **<vfi-id>**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535 Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries. Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW. Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range. • **address** - Displays the address of the bridge. • **detail** - Displays the detailed PVRST-related information for the bridge. This information contain bridge priority, bridge address, hello time, maximum age, and forward delay. • **forward-time** - Displays the forward delay value of the bridge. • **hello-time** - Displays the hello time value of the bridge. • **id** - Displays the ID of the bridge. • **max-age** - Displays the maximum age of the bridge.

- **priority [system-id]** - Displays the priority of the bridge.
  - **system-id** - Displays the address of the bridge.
- **protocol** - Displays the type of STP executed in the bridge.

Mode

Privileged EXEC Mode

Package

Workgroup, Enterprise, Metro and Metro_E

Note:

- This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set as `pvrst`.
- The configuration can be done only for the VLANs that are activated in the switch.

Example

Single Instance:

```
SEFOS# show spanning-tree vlan 1 bridge
Bridge ID                HelloTime MaxAge FwdDly Protocol
---------                --------- ------ ------ --------
80:00:00:01:02:03:04:01  2 sec 0 cs 20 sec 0 cs 15 sec 0
cs Pvrst
SEFOS# show spanning-tree vlan 1 bridge address
Bridge Address is 00:01:02:03:04:01
SEFOS# show spanning-tree vlan 1 bridge detail
Bridge Id       Priority 32769,
                Address 00:01:02:03:04:01
                Hello Time 2 sec 0 cs, Max Age 20 sec 0
cs, Forward Delay 15 sec 0 cs
SEFOS# show spanning-tree vlan 1 bridge forward-time
Bridge Forward delay is  15 sec 0 cs
SEFOS# show spanning-tree vlan 1 bridge hello-time
Bridge Hello Time is 2 sec 0 cs
SEFOS# show spanning-tree vlan 1 bridge id
Bridge ID is 80:00:00:01:02:03:04:01
SEFOS# show spanning-tree vlan 1 bridge max-age
Bridge Max Age is 20 sec 0 cs
SEFOS# show spanning-tree vlan 1 bridge priority
Bridge Priority is 32769
```

```
SEFOS# show spanning-tree vlan 1 bridge priority system-id
Bridge Address is 00:01:02:03:04:01
SEFOS# show spanning-tree vlan 1 bridge protocol
Bridge Protocol Running is PVRST
```

Multiple Instance:

```
SEFOS# show spanning-tree vlan 1 bridge address
Switch default
Bridge Address is 00:01:02:03:04:01
SEFOS# show spanning-tree vlan 1 bridge priority
Switch default
Bridge Priority is 32769
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree vlan** - Configures spanning tree-related information on a per VLAN basis.
- **vlan active** - Activates a VLAN in the switch.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

14.3.8 show spanning-tree vlan - root

Command Objective	This command displays the PVRT-related information of the root, for the specified VLAN ID. The information contains root ID, root cost, hello time, maximum age, forward delay, and root port.
Syntax	**show spanning-tree vlan <vlan-id/vfi_id> root [{address | cost | detail | forward-time | hello-time | id | max-age | port | priority [system-id] }]**
Parameter Description	• **vlan<vlan-id(1-4094)>** - Displays the PVRST-related information of the root for the specified VLAN/ VFI ID. This value ranges from 1 to 65535. ▪ **<vlan –id>** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094 ▪ **<vfi-id>**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535 Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries. Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW. Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range. • **address** - Displays the address of the root. • **cost** - Displays the cost of the root. • **detail** - Displays the detailed PVRST-related information for the root. This information contain root priority, root address, root cost, root port, hello time, maximum age, and forward delay. • **forward-time** - Displays the forward delay value of the root. • **hello-time** - Displays the hello time value of the root. • **id** - Displays the ID of the root. • **max-age** - Displays the maximum age of the root.

- **port** - Displays the root port ID.
- **priority** - Displays the priority of the root.
- **system-id** - Displays the address of the root.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise, Metro and Metro_E

Example

Single Instance:

```
SEFOS# show spanning-tree vlan 1 root
Root ID         RootCost HelloTime MaxAge FwdDly RootPort
-------         -------- --------- ------ ------ --------
80:01:00:01:02:03:04:01  0  2 sec 0 cs 20 sec 0 cs 15 sec 0
cs 0
SEFOS# show spanning-tree vlan 1 root address
Root Bridge Address is 00:01:02:03:04:01
SEFOS# show spanning-tree vlan 1 root cost
Root Cost is 0
SEFOS# show spanning-tree vlan 1 root detail
We are the root of the Spanning Tree
Root Id          Priority   32769
                 Address    00:01:02:03:04:01
                 Cost       0
                 Port       0
Hello Time 2 sec 0 cs, Max Age 20 sec 0 cs, Forward Delay
15 sec 0 cs
SEFOS# show spanning-tree vlan 1 root forward-time
Forward delay is 15 sec 0 cs
SEFOS# show spanning-tree vlan 1 root hello-time
Hello Time is 2 sec 0 cs
SEFOS# show spanning-tree vlan 1 root id
Root Bridge Id is 80:01:00:01:02:03:04:01
SEFOS# show spanning-tree vlan 1 root max-age
Root MaxAge is 20 secs 0 cs
SEFOS# show spanning-tree vlan 1 root port
Root Port is 0
```

SEFOS# show spanning-tree vlan 1 root priority

```
Root Priority is 32769
```

Multiple Instance:

SEFOS# show spanning-tree vlan 1 root cost

```
Switch default
Root Cost is 0
```

SEFOS# show spanning-tree vlan 1 root forward-time

```
Switch default
Forward delay is 15 sec 0 cs
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **spanning-tree vlan** - Configures spanning tree-related information on a per VLAN basis.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **vlan active** - Activates a VLAN in the switch.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM

14.3.9 show spanning-tree vlan - interface

Command Objective	This command displays interface-specific PVRST information for the specified VLAN. The information contains port role, port state, port cost, and port priority.
Syntax	**`show spanning-tree vlan <vlan-id/vfi_id> interface <ifXtype> <ifnum> [{ cost | detail | priority | rootcost | state | stats }]`**
Parameter Description	• **`vlan <vlan-id/vfi_id>`** - Displays the interface-specific PVRST-related information for the specified VLAN / VFI ID. This value ranges from 1 to 65535. ▪ **`<vlan –id>`** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094 ▪ **`<vfi-id>`**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535 Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries. Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW. Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range. • **`<ifXtype>`** - Displays the interface-specific PVRST-related information for the specified type of interface. The interface can be: ▪ **`fastethernet`** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **`XL-ethernet`** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **`extreme-ethernet`** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **`internal-lan`** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **`port-channel`** – Logical interface that represents an aggregator which contains several ports aggregated together.

- **<ifnum>** - Displays the interface-specific PVRST-related information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only internal-lan and port-channel ID is provided for interface types internal-lan and port-channel. For example: 1 represents internal-lan and port-channel ID.
- **cost** - Displays the cost of the specified port.
- **detail** - Displays detailed interface-specific PVRST-related information for the port. The information contains port role, port state, bridge and root priority, bridge and root addresses, port path cost, port priority, port timers, and number of BPDUs sent and received through the port.
- **priority** - Displays the priority of the specified port.
- **rootcost** - Displays the root cost of the port. The root cost defines the path cost to reach the root bridge.
- **state** - Displays the state of the port.
- **stats** - Displays the port-level spanning tree statistics information.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise, Metro and Metro_E

Example

Single Instance:

```
SEFOS# show spanning-tree vlan 1 interface extreme-
ethernet 0/1
Role         State        Cost     Prio
----         -----        ----     ----
Designated   Forwarding   200000   128
SEFOS# show spanning-tree vlan 1 interface extreme-
ethernet 0/1 cost
Port cost is 200000
SEFOS# show spanning-tree vlan 1 interface extreme-
ethernet 0/1 detail
Port 1 [Ex0/1] of VLAN 1 is Designated, Forwarding
Port PathCost 200000   , Port Priority 128      , Port
Identifier  128.1
Designated Root has priority 32769, address
00:01:02:03:04:01
Designated Bridge has priority 32769, address
```

```
00:01:02:03:04:01
Designated Port Id is 128.1, Designated PathCost 0
Timers: Hello Time - 2 sec 0 cs, MaxAge - 20 sec 0 cs,
Forward Delay - 15 sec 0 cs, Hold - 1 sec 0 cs
No of Transitions to forwarding State :1
BPDUs : sent 59 , recieved 0
```

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 priority

```
Port Priority is 128
```

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 rootcost

```
Root Cost is 0
```

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 state

```
Forwarding
```

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 stats

```
Statistics for Port Ex0/1
Number of Transitions to forwarding State : 1
Number of RSTP BPDU Count received        : 0
Number of Config BPDU Count received      : 0
Number of TCN BPDU Count received         : 0
Number of RSTP BPDU Count Transmitted     : 97
Number of Config BPDU Count Transmitted   : 0
Number of TCN BPDU Count Transmitted      : 0
Port Protocol Migration Count             : 0
```

Multiple Instance:

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 cost

```
Switch default
Port cost is 200000
```

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 detail

```
Switch default
Port 1 [Ex0/1] of VLAN 1 is Designated, Forwarding
Port PathCost 200000   , Port Priority 128      , Port Identifier  128.1
Designated Root has priority 32769, address
```

```
00:01:02:03:04:01
Designated Bridge has priority 32769, address
00:01:02:03:04:01
Designated Port Id is 128.1, Designated PathCost 0
Timers: Hello Time - 2 sec 0 cs, MaxAge - 20 sec 0 cs,
Forward Delay - 15 sec 0 cs, Hold - 1 sec 0 cs
No of Transitions to forwarding State :1
BPDUs : sent 233 , recieved 0
```

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 priority

```
Switch default
Port Priority is 128
```

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 rootcost

```
Switch default
Root Cost is 0
```

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 state

```
Switch default
Forwarding
```

SEFOS# show spanning-tree vlan 1 interface extreme-ethernet 0/1 stats

```
Switch default
Statistics for Port Ex0/1
Number of Transitions to forwarding State : 1
Number of RSTP BPDU Count received        : 0
Number of Config BPDU Count received      : 0
Number of TCN BPDU Count received         : 0
Number of RSTP BPDU Count Transmitted     : 261
Number of Config BPDU Count Transmitted   : 0
Number of TCN BPDU Count Transmitted      : 0
Port Protocol Migration Count             : 0
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree Mode** - Sets the type of spanning tree to be executed,

enables spanning tree operation, and starts spanning tree functionality in the switch.

- **`clear spanning-tree counters`** - Deletes all bridge and port-level spanning tree statistics information.
- **`spanning-tree layer2-gateway-port`** – Configures a port to operate as a L2GP.
- **`spanning-tree – Pseudoroot configuration`** - Configures the pseudoroot-related information for a port set as L2GP.
- **`spanning-tree vlan`** - Configures spanning tree-related information on a per VLAN basis.
- **`spanning-tree vlan status`** - Configures the status of PVRST on a port for the specified VLAN.
- **`spanning-tree vlan port-priority`** - Configures the priority of a port for the specified VLAN.
- **`spanning-tree vlan cost`** - Configures the cost of a port for the specified VLAN.
- **`vlan active`** - Activates a VLAN in the switch.
- **`base-mac`** - Configures the base unicast MAC address of the switch in NVRAM.

14.3.10 show spanning-tree vlan - active

Command Objective	This command displays PVRST-related information for the specified active VLAN. This information contain spanning tree status, spanning tree mode set, port details, root cost, root port and priority, address, hello time, maximum age, and forward delay of the root and bridge. The port details contain interface ID, port role, port state, port cost, port priority, and port link type.
Syntax	**`show spanning-tree vlan <vlan-id/vfi-id> active [detail]`**
Parameter Description	• **`vlan <vlan-id/vfi_id>`** - Displays the interface-specific PVRST-related information for the specified VLAN / VFI ID. This value ranges from 1 to 65535. ▪ **`<vlan –id>`** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094 ▪ **`<vfi-id>`**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535 Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries. Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW. Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range. • **`active [detail] –`** Displays the detailed PVRST-related information for the specified active VLAN ID. The information contains current selected spanning mode, current spanning tree compatibility version, bridge and root priority, bridge and root addresses, port path cost, port priority, timer values, bridge and port-level spanning tree statistics information, and transmit hold-count value.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	• This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode

should be set as `pvrst`.

- The configuration can be done only for the VLANs that are activated in the switch.

Example

Single Instance:

```
SEFOS# show spanning-tree vlan 1 active
Spanning-tree for VLAN 1
We are the root of the Spanning Tree
Root Id         Priority   32769
                Address    00:01:02:03:04:01
                Cost       0
                Port       0
                Hello Time 2 Sec 0 cs, Max Age 20 Sec 0 cs,
                Forward Delay 15 Sec 0 cs
Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 32769
                Address 00:01:02:03:04:01
                Hello Time 2 Sec 0 cs, Max Age 20 Sec 0 cs,
                Forward Delay 15 Sec 0 cs
                Dynamic Path Cost is Disabled
              Dynamic Path Cost Lag-Speed Change is
Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
Ex0/1    Designated   Forwarding   200000   128
SharedLan
```

```
SEFOS# show spanning-tree vlan 1 active detail
Bridge is executing the rstp compatible PVRST Protocol
Bridge Identifier has priority 32769, Address
00:01:02:03:04:01
Configured Hello time 2 sec 0 cs, Max Age 20 sec 0 cs,
Forward Delay 15 sec 0 cs
We are the root of the spanning tree
Number of Topology Changes 1
Time since topology Change 0 seconds ago
Transmit Hold-Count 3
Root Times: Max Age 20 sec 0 cs, Forward Delay 15 sec 0 cs,
Hello Time 2 sec 0 cs
Port 1 [Ex0/1] of VLAN 1 is Designated, Forwarding
```

```
Port PathCost 200000   , Port Priority 128      , Port
Identifier  128.1

Designated Root has priority 32769, address
00:01:02:03:04:01

Designated Bridge has priority 32769, address
00:01:02:03:04:01

Designated Port Id is 128.1, Designated PathCost 0

Timers: Hello Time - 2 sec 0 cs, MaxAge - 20 sec 0 cs,

Forward Delay - 15 sec 0 cs, Hold - 1 sec 0 cs

No of Transitions to forwarding State :1

BPDUs : sent 745 , recieved 0
```

Multiple Instance:

```
SEFOS# show spanning-tree vlan 1 active

Switch default

Spanning-tree for VLAN 1

We are the root of the Spanning Tree

Root Id         Priority   32769

                Address    00:01:02:03:04:01

                Cost       0

                Port       0

                Hello Time 2 Sec 0 cs, Max Age 20 Sec 0 cs,

                Forward Delay 15 Sec 0 cs

Spanning Tree Enabled Protocol PVRST

Bridge Id       Priority 32769

                Address 00:01:02:03:04:01

                Hello Time 2 Sec 0 cs, Max Age 20 Sec 0 cs,

                Forward Delay 15 Sec 0 cs

                Dynamic Path Cost is Disabled

              Dynamic Path Cost Lag-Speed Change is
Disabled

Name     Role         State        Cost     Prio   Type

----     ----         -----        ----     ----   ------

Ex0/1    Designated   Forwarding   200000   128
SharedLan
```

Related Command(s)

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.

- **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.
- **`spanning-tree compatibility`** - Sets the STP compatibility version in the switch for all ports.
- **`spanning-tree transmit hold-count`** - Sets the transmit hold-count value for the switch.
- **`clear spanning-tree counters`** - Deletes all bridge and port-level spanning tree statistics information.
- **`spanning-tree layer2-gateway-port`** - Configures a port to operate as a L2GP.
- **`spanning-tree – Pseudoroot configuration`** - Configures the pseudoroot-related information for a port set as L2GP.
- **`spanning-tree - Properties of an interface`** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.
- **`spanning-tree vlan`** - Configures spanning tree-related information on a per VLAN basis.
- **`spanning-tree vlan status`** - Configures the status of PVRST on a port for the specified VLAN.
- **`spanning-tree vlan port-priority`** - Configures the priority of a port for the specified VLAN.
- **`spanning-tree vlan cost`** - Configures the cost of a port for the specified VLAN.
- **`vlan active`** - Activates a VLAN in the switch.

14.3.11 show spanning-tree vlan - detail

Command Objective	This command displays the detailed PVRST-related information for the specified VLAN. This information contain spanning tree status, spanning tree mode set, port details, root cost, root port and priority, address, hello time, maximum age, and forward delay of the root and bridge. The port details contain interface ID, port role, port state, port cost, port priority, and port link type.
Syntax	**`show spanning-tree vlan <vlan-id/vfi-id> detail [active]`**
Parameter Description	• **`vlan <vlan-id/vfi_id>`** - Displays the interface-specific PVRST-related information for the specified VLAN / VFI ID. This value ranges from 1 to 65535. ▪ **`<vlan –id>`** - VLAN ID is a unique value that represents the specific VLAN. This value ranges from 1 to 4094 ▪ **`<vfi-id>`**. - VFI ID is a VLAN created in the system which contains pseudo wires and attachment circuits as member ports . This creates a logical LAN for the VPLS service. This value ranges from 4096 to 65535 Note: The VLAN ID 4095 is reserved and may be used to indicate a wildcard match for the VID in management operations or filtering database entries. Note: VFI IDs 4096 and 4097 are reserved identifiers used in MPLS PW. Note: The theoretical maximum for the maximum number of VFI is 65535 but the actual number of VFI supported is a sizing constant. Based on this, the maximum number of VFI ID accepted in the management interface is restricted. For example if 100 VFIs are supported, the maximum number of VFI supported will be restricted to maximum number of VLANs with an added hundred. An error message is displayed for any value beyond this range. • **`detail [active]`**– Displays the detailed PVRST-related information for the specified VLAN ID. The information contains current selected spanning mode, current spanning tree compatibility version, bridge and root priority, bridge and root addresses, port path cost, port priority, timer values, bridge and port-level spanning tree statistics information, and transmit hold-count value. ▪ **`active`** - Displays the detailed PVRST-related information only for the active interfaces.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E

Note:

- This command can be executed successfully only if the spanning tree functionality is not shut down in the switch. The type of spanning tree mode should be set as `pvrst`.
- The configuration can be done only for the VLANs that are activated in the switch.

Example

Single Instance:

```
SEFOS# show spanning-tree vlan 1 detail active
Bridge is executing the rstp compatible PVRST Protocol
Bridge Identifier has priority 32769, Address
00:01:02:03:04:01
Configured Hello time 2 sec 0 cs, Max Age 20 sec 0 cs,
Forward Delay 15 sec 0 cs
Dynamic Path Cost is Disabled
We are the root of the spanning tree
Number of Topology Changes 1
Time since topology Change 0 seconds ago
Transmit Hold-Count 3
Root Times: Max Age 20 sec 0 cs, Forward Delay 15 sec 0 cs,
Hello Time 2 sec 0 cs
Port 1 [Ex0/1] of VLAN 1 is Designated, Forwarding
Port PathCost 200000   , Port Priority 128      , Port
Identifier  128.1
Designated Root has priority 32769, address
00:01:02:03:04:01
Designated Bridge has priority 32769, address
00:01:02:03:04:01
Designated Port Id is 128.1, Designated PathCost 0
Timers: Hello Time - 2 sec 0 cs, MaxAge - 20 sec 0 cs,
Forward Delay - 15 sec 0 cs, Hold - 1 sec 0 cs
No of Transitions to forwarding State :1
BPDUs : sent 762 , recieved 0
```

Related Command(s)

- **`shutdown spanning-tree`** - Shuts down spanning tree functionality in the switch.
- **`spanning-tree`** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **`spanning-tree Mode`** - Sets the type of spanning tree to be executed, enables spanning tree operation, and starts spanning tree functionality in the switch.

- **`spanning-tree compatibility`** - Sets the STP compatibility version in the switch for all ports.
- **`spanning-tree transmit hold-count`** - Sets the transmit hold-count value for the switch.
- **`clear spanning-tree counters`** - Deletes all bridge and port-level spanning tree statistics information.
- **`spanning-tree layer2-gateway-port`** - Configures a port to operate as a L2GP.
- **`spanning-tree – Pseudoroot configuration`** - Configures the pseudoroot-related information for a port set as L2GP.
- **`spanning-tree – Properties of an interface`** - Configures the port-related spanning tree information for all kinds of STPs and creates port in STP when Automatic Port Create feature is disabled.
- **`spanning-tree vlan`** - Configures spanning tree-related information on a per VLAN basis.
- **`spanning-tree vlan status`** - Configures the status of PVRST on a port for the specified VLAN.
- **`spanning-tree vlan port-priority`** - Configures the priority of a port for the specified VLAN.
- **`spanning-tree vlan cost`** - Configures the cost of a port for the specified VLAN.
- **`vlan active`** - Activates a VLAN in the switch.
- **`base-mac`** - Configures the base unicast MAC address of the switch in the NVRAM.

CHAPTER 15

LA

LA (Link Aggregation) is a method of combining physical network links into a single logical link for increased bandwidth. LA increases the capacity and availability of the communications channel between devices (both switches and end stations) using existing Fast Ethernet and Gigabit Ethernet technology. LA also provides load balancing where the processing and communication activity is distributed across several links in a trunk, so that no single link is overwhelmed. By taking multiple LAN connections and treating them as a unified and aggregated link, practical benefits in many applications can be achieved. LA provides the following important benefits:

- Higher link availability
- Increased link capacity

Improvements are obtained using existing hardware (no upgrading to higher-capacity link technology is necessary).

15.1 shutdown port-channel

Command Objective	This command shuts down LA feature in the switch, and releases all resources allocated to the LA feature. The no form of the command starts and enables LA feature in the switch, and allocates required memory to the LA module. The LA feature is made available in the switch only if the LA is enabled in the switch. LA feature allows aggregating individual point-to-point links into a port-channel group, so that the capacity and availability of the communications channel between devices are increased using the existing interface technology.
Syntax	**`shutdown port-channel`** **`no shutdown port-channel`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Default	LA is started in the switch, but not enabled. That is, LA operational status is disabled.
Note:	LA cannot be started in the switch if the base bridge mode is configured as transparent bridging.
Example	**`SEFOS(config)# shutdown port-channel`**
Related Command(s)	• **`base bridge-Mode`** - Configures the base mode (either 802.1d transparent bridge mode or 802.1q VLAN-aware bridge mode) in which the VLAN feature should operate on the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`lacp system-priority`** - Configures the LACP priority that is associated with actor's system ID. • **`lacp system-identifier`** - Configures the global LACP system ID. • **`port-channel load-balance`** - Configures the load balancing policy for all port-channels created in the switch. • **`lacp port-priority`** - Configures the LACP port priority. • **`lacp port-identifier`** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.

- **channel-group** - Adds the port as a member of the specified port-channel that is already created in the switch.
- **lacp wait-time** - Configures the LACP wait-time for an interface.
- **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port, to avoid timing out of the aggregated link.
- **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **default port** - Configures the port that should be set as default port for a port-channel.
- **port-channel max-ports** - Configures the maximum number of ports that can be attached to a port-channel.
- **show etherchannel-channel** - Displays etherchannel information for the specified port-channel groups created in the switch.
- **show interfaces - etherchannel** - Displays etherchannel details for all aggregated ports and port-channels.
- **show lacp** - Displays LACP counter/neighbor information for all port-channels.
- **interface-configuration and deletion** - Allows interface configuration such as out-of-band management, port-channel, tunnel and so on.
- **d-lag -** Sets the D-LAG parameters.
- **d-lag - for active-active -** Sets the D-LAG-related parameters.
- **show etherchannel-detail** - Displays the etherchannel-related information.
- **show etherchannel** - Displays etherchannel information for port-channels created in the switch.
- **set port-channel independentmode** - Enables or disables Independent mode when the remote partner information is not available in the system.

15.2 set port-channel

Command Objective	This command configures the admin status of LA in the switch. The LA feature is made available in the switch only if the LA is enabled in the switch. LA feature allows aggregating individual point-to-point links into a port-channel group, so that the capacity and availability of the communications channel between devices are increased using the existing interface technology.
Syntax	**`set port-channel { enable | disable }`**
Parameter Description	• **`enable`** - Enables LA feature in the switch. Also starts the LA in the switch if the LA is shut down. • **`disable`** - Disables LA feature in the switch.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Default	disable
Example	**`SEFOS(config)# set port-channel enable`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`lacp system-priority`** - Configures the LACP priority that is associated with actor's system ID. • **`lacp system-identifier`** - Configures the global LACP system ID. • **`port-channel load-balance`** - Configures the load balancing policy for all port-channels created in the switch. • **`lacp port-priority`** - Configures the LACP port priority. • **`lacp port-identifier`** - Configures the LACP actor admin port ID to be filled in the LACP PDUs. • **`channel-group`** - Adds the port as a member of the specified port-channel that is already created in the switch. • **`lacp wait-time`** - Configures the LACP wait-time for an interface. • **`lacp timeout`** - Configures the LACP timeout period within which LACPDUs should be received on a port, to avoid timing out of the

aggregated link.

- **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **default port** - Configures the port that should be set as default port for a port-channel.
- **port-channel max-ports** - Configures the maximum number of ports that can be attached to a port-channel.
- **show etherchannel-channel** - Displays etherchannel information for the specified port-channel groups created in the switch.
- **show interfaces - etherchannel** - Displays etherchannel details for all aggregated ports and port-channels.
- **show lacp** - Displays LACP counter/neighbor information for all port-channels.
- **interface-configuration and deletion** - Allows interface configuration such as out-of-band management, port-channel, tunnel and so on
- **d-lag -** Sets the D-LAG parameters.
- **d-lag - for active-active -** Sets the D-LAG-related parameters.
- **show etherchannel-detail** - Displays the etherchannel-related information.
- **show etherchannel** - Displays etherchannel information for port-channels created in the switch.
- **set port-channel independentmode** - Enables or disables Independent mode when the remote partner information is not available in the system.

15.3 channel-protocol

Command Objective	This command enables link aggregation in the switch. This command is a standardized implementation of the existing command; **`set port-channel.`** It operates in a similar manner to the existing command. The no form of the command disables link aggregation in the switch.
Syntax	**`channel-protocol { lacp | pagp }`** **`no channel-protocol`**
Parameter Description	• **`lacp`** - Configures LACP (Link Aggregation Control Protocol) to manage channeling. • **`pagp`** - Configures PAgP (Port Aggregation Protocol) to manage channeling. This feature has been included to adhere to the industry standard CLI syntax. This feature is currently not supported.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Default	Link aggregation is disabled
Example	**`SEFOS(config)# channel-protocol lacp`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`set port-channel`** - Configures the admin status of LA in the switch • **`lacp system-priority`** - Configures the LACP priority that is associated with actor's system ID. • **`lacp system-identifier`** - Configures the global LACP system ID. • **`port-channel load-balance`** - Configures the load balancing policy for all port-channels created in the switch. • **`lacp port-priority`** - Configures the LACP port priority. • **`lacp port-identifier`** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.

- **channel-group** - Adds the port as a member of the specified port-channel that is already created in the switch.
- **lacp wait-time** - Configures the LACP wait-time for an interface.
- **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port, to avoid timing out of the aggregated link.
- **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **default port** - Configures the port that should be set as default port for a port-channel.
- **port-channel max-ports** - Configures the maximum number of ports that can be attached to a port-channel.
- **show interfaces – etherchannel** - Displays etherchannel details for all aggregated ports and port-channels.
- **show lacp** - Displays LACP counter/neighbor information for all port-channels.
- **interface-configuration and deletion** - Allows interface configuration such as out-of-band management, port-channel, tunnel and so on
- **show etherchannel-detail** - Displays the etherchannel-related information
- **show etherchannel** - Displays etherchannel information for port-channels created in the switch.
- **show etherchannel-channel** - Displays etherchannel information for the specified port-channel groups created in the switch.
- **set port-channel independentmode** - Enables or disables Independent mode when the remote partner information is not available in the system.

15.4 lacp system-priority

Command Objective	This command configures the LACP priority associated with actor's system ID. This priority value ranges between 0 and 65535. The switch with the lowest LACP decides the standby and active links in the LA. The no form of the command resets the LACP priority to its default value.
Syntax	**`lacp system-priority <0-65535>`** **`no lacp system-priority`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Default	32768
Note:	This command executes successfully, only if • the LA functionality is started and enabled in the switch. • D-LAG status is disabled.
Example	**`SEFOS(config)# lacp system-priority 5`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`set d-lag disable -`** Disables Distributed Link Aggregation in the port-channel. • **`show etherchannel-detail`** - Displays the etherchannel-related information. • **`show etherchannel`** - Displays etherchannel information for port-channels created in the switch. • **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch.

15.5 lacp system-identifier

Command Objective	This command configures the global LACP system ID. The system ID denotes a 6-octet unicast MAC address value that is used as a unique identifier for the switch containing the aggregator. The no form of the command resets the global LACP System ID to its default value.
Syntax	**lacp system-identifier <aa:aa:aa:aa:aa:aa>** **no lacp system-identifier**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Note:	This command executes successfully only if the LA functionality is started and enabled in the switch.
Example	**SEFOS(config)#lacp system-identifier 00:01:02:03:04:05**
Related Command(s)	• **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch. • **set port-channel** - Configures the admin status of LA in the switch. • **show etherchannel-detail** - Displays the etherchannel-related information. • **show etherchannel** - Displays etherchannel information for port-channels created in the switch. • **show etherchannel-channel** - Displays etherchannel information for the specified port-channel groups created in the switch.

15.6 port-channel load-balance

Command Objective	This command configures the load balancing policy for all port-channels created in the switch. The policy sets the rule for distributing the Ethernet traffic among the aggregated links to establish load balancing. The no form of the command resets the load balancing policy to its default value.
Syntax	**`port-channel load-balance { src-mac | dest-mac | src-dest-mac | src-ip |dest-ip | src-dest-ip | vlan-id }`** **`no port-channel load-balance`**
Parameter Description	• **`src-mac`** - Specifies that the load distribution is based on the source MAC address. The bits of the source MAC address in the packet are used to select the port in which the traffic should flow. Packets from different hosts use different ports in the channel, but packets from the same host use the same port. • **`dest-mac`** - Specifies that the load distribution is based on the destination host MAC address. The bits of the destination MAC address in the packet are used to select the port in which the traffic should flow. Packets to the same destination are sent on the same port, but packets to different destinations are sent on different ports in the channel. • **`src-dest-mac`** - Specifies that the load distribution is based on the source and destination MAC address. The bits of the source and destination MAC address in the packet are used to select the port in which the traffic should flow. • **`src-ip`** - Specifies that the load distribution is based on the source IP address. The bits of the source IP address in the packet are used to select the port in which the traffic should flow. • **`dest-ip`** - Specifies that the load distribution is based on the destination IP address. The bits of the destination IP address in the packet are used to select the port in which the traffic should flow. • **`src-dest-ip`** - Specifies that the load distribution is based on the source and destination IP address. The bits of the source and destination IP address in the packet are used to select the port in which the traffic should flow. • **`vlan-id`** - Specifies that the load distribution is based on VLAN ID. The VLAN ID in the packet is used to select the port in which the traffic should flow.

Mode	Global Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Default	src-dest-mac
Note:	• This command executes successfully only if ▪ Port-Channel is created in the system and mapped to a context. ▪ LA functionality is started and enabled in the switch. • The following parameters are not supported in BCM target. ▪ vlan-id Note: For the complete list of unsupported BCM commands , Refer Chapter 68, section 68.1.40, BCM Unsupported Commands.
Example	**`SEFOS(config)# port-channel load-balance mac-src-dest-vid 1`**
Related Command(s)	• **`no shutdown port-channel`** - Enables down LA in the switch and releases the allocated resources to the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`interface-configuration and deletion`** - Allows interface configuration such as out-of-band management, port-channel, tunnel and so on. • **`show etherchannel-detail`** - Displays the etherchannel-related information. • **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch.

15.7 lacp port-priority

Command Objective	This command configures the LACP port priority. This value ranges from 0 to 65535. This port priority is used in combination with LACP port identifier during the identification of the best ports in a port-channel. The priority determines if the link is an active link or a standby link, when the number of ports in the aggregation exceeds the maximum number supported by the hardware. The links with lower priority become active links. The no form of the command resets the LACP port priority to its default value.
Syntax	**`lacp port-priority <0-65535>`** **`no lacp port-priority`**
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro and Metro_E
Default	128
Note:	• This command executes successfully only if the LA functionality is started and enabled in the switch. • This configuration takes effect only on the interface that is configured for LACP.
Example	**`SEFOS(config-if)# lacp port-priority 1`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`channel-group`** - Adds the port as a member of the specified port-channel that is already created in the switch. • **`default port`** - Configures the default port for a port-channel. • **`show interfaces - etherchannel`** - Displays etherchannel details for all aggregated ports and port-channels. • **`show lacp`** - Displays LACP counter information for all port-channels. • **`show etherchannel-detail`** - Displays the etherchannel-related information.

- **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch.

15.8 lacp port-identifier

Command Objective	This command configures the LACP actor admin port ID to be filled in the LACP PDUs. This value represents the concerned aggregation port. It ranges from 1 to 65535. The maximum limit depends on the board. For example, if the board has only 24 ports, then the maximum value will be 24. That is, the value ranges from 1 to 24.
Syntax	**`lacp port-identifier <1-65535>`**
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro and Metro_E
Default	The port ID is set as the LACP actor admin port ID.
Note:	• This command executes successfully only if the LA functionality is started and enabled in the switch. • This configuration takes effect only on the interface that is configured for LACP.
Example	**`SEFOS(config-if)# lacp port-identifier 2`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`channel-group`** - Adds the port as a member of the specified port-channel that is already created in the switch. • **`default port`** - Configures the port that should be set as default port for a port-channel. • **`show interfaces - etherchannel`** - Displays etherchannel details for all aggregated ports and port-channels. • **`show etherchannel-detail`** - Displays the etherchannel-related information. • **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch.

15.9 channel-group

Command Objective	This command adds the port as a member of the specified port-channel that is already created in the switch. The no form of the command deletes the aggregation of the port from all port-channels.
Syntax	**channel-group <channel-group-number(1-65535)> Mode {auto [non-silent] | desirable [non-silent] | on | active | passive }** **no channel-group**
Parameter Description	• **<channel-group-number(1-65535)>** - Adds the port as a member of the specified port-channel. This is a unique value that represents the specific port-channel created. This value ranges from 1 to 65535. • **Mode** - Configures the LACP activity for the port: ▪ **auto** - Places a port into a passive negotiating state in which the port responds to received PAgP packets, but does not initiate PAgP packet negotiation. This feature has been included to adhere to the industry standard CLI syntax. This feature is currently not supported. ▪ **desirable** - Places a port into an active negotiating state in which the port initiates negotiations with other ports by sending PAgP packets. This feature has been included to adhere to the industry standard CLI syntax. This feature is currently not supported. ▪ **[non-silent]** - Used with the **auto** or **desirable** keyword when traffic is expected from the other device. This feature has been included to adhere to the industry standard CLI syntax. This feature is currently not supported. ▪ **active** - Starts LACP negotiation un-conditionally. ▪ **passive** - Starts LACP negotiation only when LACP packet is received from peer. ▪ **on** - Forces the interface to channel without LACP. This is equivalent to manual aggregation.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro and Metro_E
Note:	This command can be executed successfully only if the LA functionality is started and enabled in the switch.
Example	**SEFOS(config-if)# channel-group 2 Mode active**

Related Command(s)

- **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **`set port-channel`** - Configures the admin status of LA in the switch.
- **`lacp port-priority`** - Configures the LACP port priority.
- **`lacp port-identifier`** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
- **`lacp wait-time`** - Configures the LACP wait-time for an interface.
- **`lacp timeout`** - Configures the LACP timeout period within which LACPDUs should be received on a port, to avoid timing out of the aggregated link.
- **`default port`** - Configures the port that should be set as default port for a port-channel.
- **`show interfaces – etherchannel`** - Displays etherchannel details for all aggregated ports and port-channels.
- **`show lacp`** - Displays LACP counter/neighbor information for all port-channels.
- **`interface-configuration and deletion`** - Allows interface configuration such as out-of-band management, port-channel, tunnel and so on.
- **`show d-lag – detail –`** Displays detailed D-LAG information.
- **`show d-lag – counters –`** Displays D-LAG counters information.
- **`show etherchannel-detail`** - Displays the etherchannel-related information
- **`show etherchannel`** - Displays etherchannel information for port-channels created in the switch
- **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch

15.10 lacp wait-time

Command Objective	This command configures the LACP wait-time for an interface. This value ranges from 0 to 10 seconds. The wait-time represent the time (in seconds) till which the port waits before entering into aggregation after receiving partner information (that is, this represents the time taken to attach to the port-channel). The no form of the command resets the LACP wait-time to its default value.
Syntax	**`lacp wait-time <0-10>`** **`no lacp wait-time`**
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro and Metro_E
Default	2
Note:	• This command can be executed successfully only if the LA functionality is started and enabled in the switch. • This configuration takes effect only on the interface that is configured for LACP.
Example	**`SEFOS(config-if)# lacp wait-time 1`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`channel-group`** - Adds the port as a member of the specified port-channel that is already created in the switch. • **`default port`** - Configures the port that should be set as default port for a port-channel. • **`show etherchannel-detail`** - Displays the etherchannel-related information. • **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch. • **`show interfaces - etherchannel`** - Displays etherchannel details for all aggregated ports and port-channels.

15.11 lacp timeout

Command Objective	This command configures the LACP timeout period within which LACPDUs should be received on a port to avoid timing out of the aggregated link. The no form of the command sets the LACP timeout period to its default value.
Syntax	**`lacp timeout {long | short }`** **`no lacp timeout`**
Parameter Description	• **`long`** - Configures the LACP timeout period as 90 seconds. The LACP PDU should be received every 30 seconds. • **`short`** - Configures the LACP timeout period as 3 seconds. The LACP PDU should be received every second.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro and Metro_E
Default	long
Note:	• This command can be executed successfully only if the LA functionality is started and enabled in the switch. • This configuration takes effect only on the interface that is configured for LACP.
Example	**`SEFOS(config-if)# lacp timeout short`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`channel-group`** - Adds the port as a member of the specified port-channel that is already created in the switch. • **`default port`** - Configures the port that should be set as default port for a port-channel. • **`show interfaces – etherchannel`** - Displays etherchannel details for all aggregated ports and port-channels. • **`show lacp`** - Displays LACP counter/neighbor information for all port-channels.

- **`show etherchannel-detail`** - Displays the etherchannel-related information.
- **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch.

15.12 lacp rate

Command Objective	This command configures the LACP rate. This command is a standardized implementation of the existing command; **`lacp timeout`**. It operates in a similar manner to the existing command. The no form of the command sets the LACP rate to its default value.
Syntax	**`lacp rate {normal | fast }`** **`no lacp rate`**
Parameter Description	• **`normal`** - Ingresses the LACP control packets at normal rate. That is, LACP PDU should be received every 30 seconds and the timeout value (no packet is received from peer) is set as 90 seconds. • **`fast`** - Ingresses the LACP control packets at fast rate. That is, LACP PDU should be received every 1 second and the timeout value is set as 3 seconds.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro and Metro_E
Default	normal
Note:	• This command can be executed successfully only if the LA functionality is started and enabled in the switch. • This configuration takes effect only on the interface that is configured for LACP.
Example	**`SEFOS(config-if)# lacp rate fast`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`channel-group`** - Adds the port as a member of the specified port-channel that is already created in the switch. • **`lacp timeout`** - Configures the LACP timeout period. • **`default port`** - Configures the port that should be set as default port for a port-channel.

- **`show etherchannel`** - Displays etherchannel information for all port-channel groups created in the switch.
- **`show interfaces – etherchannel`** - Displays etherchannel details for all aggregated ports and port-channels.
- **`show lacp`** - Displays LACP counter/neighbor information for all port-channels.
- **`show etherchannel-detail`** - Displays the etherchannel-related information.
- **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch.

15.13 lacp admin-key

Command Objective	This command configures the LACP actor admin key and LACP mode for a port.
Syntax	**lacp admin-key <(Admin Key)1-65535> [Mode {active | passive}]**
Parameter Description	• **admin-key** - Configures the LACP actor admin key that is used while port participates in dynamic aggregation selection. The port is made as part of best aggregation selected based on system ID and admin key.This value ranges from 1 to 65535. • **Mode** - Configures the LACP mode for the port. The different options are: ▪ **active** - Starts LACP negotiation un-conditionally. ▪ **passive** - Starts LACP negotiation only when LACP packet is received from peer.
Mode	Interface Configuration Mode (Physical Interface Mode)
Package	Workgroup, Enterprise Metro and Metro_E
Default	Mode - active
Note:	• This command can be executed successfully only if the LA functionality is started and enabled in the switch. • The admin key can be configured only for ports that select aggregator dynamically (the port is configured as default interface for a port-channel).
Example	**SEFOS(config-if)# lacp admin-key 1 Mode active**
Related Command(s)	• **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch. • **set port-channel** - Configures the admin status of LA in the switch. • **default port** - Configures the default port for a port-channel. • **show etherchannel-detail** - Displays the etherchannel-related information. • **show etherchannel-channel** - Displays etherchannel information for the specified port-channel groups created in the switch. • **show interfaces - etherchannel** - Displays etherchannel details for all aggregated ports and port-channels.

- **`show lacp`** - Displays LACP counter/neighbor information for all port-channels.

15.14 default port

Command Objective	This command configures the port that should be set as default port for a port-channel. The configured port attaches with the port-channel and participates only in dynamic aggregation selection. The no form of the command deletes the default port assigned for the port-channel.
Syntax	**default port <interface-type> <interface-id>** **no default port**
Parameter Description	• **<interface-type>** - Configures the type of interface to be set as default port for the port-channel. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **i-lan** – Internal LAN created on a bridge per IEEE 802.1ap. • **<interface-id>** - Configures the ID of the interface to be set as default port. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided, for interface type i-lan. For example: 1 represents i-lan ID.
Mode	Interface Configuration Mode (Port Channel Interface Mode)
Package	Workgroup, Enterprise Metro and Metro_E
Note:	• This command can be executed successfully only if the LA functionality is started and enabled in the switch. • Only one port can be set as a default port. • The port that is to be set as default port should have not been added as a member port for any of the port-channel.
Example	**SEFOS(config-if)# default port extreme-ethernet 0/2**

Related Command(s)	• **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch. • **set port-channel** - Configures the admin status of LA in the switch. • **lacp port-priority** - Configures the LACP port priority. • **lacp port-identifier** - Configures the LACP actor admin port ID to be filled in the LACP PDUs. • **no channel-group** - Deletes the aggregation of the port from all port-channels. • **lacp wait-time** - Configures the LACP wait-time for an interface. • **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port, to avoid timing out of the aggregated link. • **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port. • **show etherchannel-detail** - Displays the etherchannel-related information. • **show etherchannel-channel** - Displays etherchannel information for the specified port-channel groups created in the switch. • **show interfaces - etherchannel** - Displays etherchannel details for all aggregated ports and port-channels. • **show lacp** - Displays LACP counter/neighbor information for all port-channels.

15.15 port-channel max-ports

Command Objective	This command configures the maximum number of ports that can be attached to a port-channel. This value ranges from 2 to 8. The best ports are maintained in active state and other ports are maintained in standby state, if the total number of ports attached to the port-channel exceeds the configured value.
Syntax	**`port-channel max-ports <integer (2-8)>`**
Mode	Interface Configuration Mode (Port Channel Interface Mode)
Package	Workgroup, Enterprise Metro and Metro_E
Default	8
Note:	This command can be executed successfully only if the LA functionality is started and enabled in the switch.
Example	**`SEFOS(config-if)# port-channel max-ports 5`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`show etherchannel-detail`** - Displays the etherchannel-related information. • **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch.

15.16 debug lacp

Command Objective	This command enables the tracing of the LACP as per the configured debug levels. The trace statements are generated for the configured trace levels. This command allows combination of debug levels to be configured (that is, more than one level of trace can be enabled or disabled). The debug levels are configured one after the other and not in single execution of the command. The no form of the command disables the tracing of the LACP as per the configured debug levels. The trace statements are not generated for the configured trace levels.
Syntax	**debug lacp [{ init-shutdown | mgmt | data | events | packet | os | failall | buffer | all }]** **no debug lacp [{ init-shutdown | mgmt | data | events | packet | os | failall | buffer | all }]**
Parameter Description	• **init-shutdown** - Generates debug statements for init and shutdown traces. These traces are generated during module initialization and shutdown. • **mgmt** - Generates debug statements for management traces. This trace is generated whenever you configure any of the LA features. • **data** - Generates debug statements for data path traces. This trace is generated during failure in packet processing. • **events** - Generates debug statements for event traces. This trace is generated when any of packets are sent successfully or when an ACK is received. • **packet** - Generates debug statements for packet dump traces. This trace is generated for all events generated during processing of packets. • **os** - Generates debug statements for OS resource-related traces. This trace is generated during failure in message queues. • **failall** - Generates debug statements for all kind of failure traces. • **buffer** - Generates debug statements for buffer-related traces. • **all** - Generates debug statements for all kinds of traces.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro and Metro_E

Default	init-shutdown
Example	`SEFOS# debug lacp data`

15.17 debug etherchannel

Command Objective	This command enables the tracing of the link aggregation module as per the configured debug levels. The trace statements are generated for the configured trace levels. This command is a standardized implementation of the existing command; **`debug lacp`**. It operates in a similar manner to the existing command. The no form of the command disables the tracing of the link aggregation as per the configured debug levels. The trace statements are not generated for the configured trace levels.
Syntax	**`debug etherchannel {[all] [detail] [error] [event] [idb]}`** **`no debug etherchannel {[all] [detail] [error] [event] [idb]}`**
Parameter Description	• **`all`** - Generates debug statements for all kinds of traces. • **`detail`** - Generates detailed debug statements for traces. • **`error`** - Generates debug statements for all failure traces. • **`event`** - Generates debug statements for event traces. This trace is generated when any of packets are sent successfully or when an ACK is received. `event` generates error messages for the following scenarios ▪ Packet reception or transmission ▪ Timer expiry ▪ Port creation or deletion indication ▪ Port status change indication • **`idb`** - Generates debug statements for interface descriptor block traces. This feature has been included to adhere to the industry standard CLI syntax. This feature is currently not supported.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro and Metro_E
Example	**`SEFOS# debug etherchannel detail`**

15.18 show etherchannel - channel

Command Objective	This command displays etherchannel information for the specified port-channel groups created in the switch.
Syntax	**If the switch L2RED_WANTED is set as "no" during compilation of exe:** **show etherchannel <channel-group-number(1-65535)> { detail | load-balance | port | port-channel | summary | protocol }** **If the switch L2RED_WANTED is set as "yes" during compilation of exe:** **show etherchannel <channel-group-number(1-65535)> { detail | load-balance | port | port-channel | summary | protocol | redundancy}**
Parameter Description	• **<channel-group-number(1-65535)>** - Displays etherchannel information for the specified port-channel group. This is a unique value that represents the specific port-channel created. This value ranges from 1 to 65535. • **detail** - Displays detailed etherchannel information. The information contains admin and oper status of port-channel module, LACP system priority, status of protocol operate mode for each group, port details for each group, and port-channel details. The port details contain port state, group to which the port belongs, port mode, aggregation state, port-channel ID, pseudo port-channel ID, admin key, oper key, port number, port state and LACP port-priority, wait-time, port identifier, activity, and timeout. The port-channel details contain port-channel ID, number of member ports, ID of hot standby port, port state, status of protocol operate mode, aggregator MAC, and default port ID. • **load-balance** - Displays the load balancing policy applied for each port-channel groups. • **port** - Displays the status of protocol operate mode and port details for each group. The port details contain port state, group to which the port belongs, port mode, aggregation state, port-channel ID, pseudo port-channel ID, admin key, oper key, port number, port state and LACP port-priority, wait-time, port identifier, activity, and timeout. • **port-channel** - Displays the admin and oper status of port-channel module, and port-channel details. The port-channel details contain port-channel ID, number of member ports, ID of hot standby port, port state, status of protocol operate mode, aggregator MAC, and default port ID. • **summary** - Displays the admin and oper status of port-channel module, number of channel groups used, number of aggregators, group IDs, and

port-channel ID, status of protocol operate mode, and member ports for each group.

- **protocol** - Displays the status of protocol operate mode for each port-channel group.

- **redundancy** - Displays the actor information and synchronized partner information for the port, port state flags decode information, and aggregation state. The actor information contains channel group ID, pseudo port-channel ID, and current split interval timer count value. The partner information contains partner system ID, flags, LACP partner port priority, and LACP partner oper key. The decode information contains LACP activity and LACP timeout.

  Note: This parameter displays the output only in NPSIM exe.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise Metro and Metro_E

Note: This command executes successfully only if

- LA functionality is started in the switch.
- Port channel is created in the system.

Example

```
SEFOS# show etherchannel 1 detail
Port-channel Module Admin Status is enabled
Port-channel Module Oper Status is enabled
Port-channel Independent mode is disabled
Port-channel System Identifier is  00:01:02:03:04:05
LACP System Priority: 5

                Channel Group Listing
                ---------------------

Group: 1
----------
Protocol :LACP

                Ports in the Group
                ------------------

Port : Ex0/2
-------------
```

```
Port State = Up in Bundle
Channel Group : 1
Mode : Active
Port-channel = Po1
Pseudo port-channel = Po1
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Port Identifier = 2
LACP Activity : Active
LACP Timeout : Long

Aggregation State : Aggregation, Collecting,
Distributing, Defaulted

                LACP Port   Admin  Oper   Port    Port
Port     State  Priority    Key    Key    Number  State
-----------------------------------------------------------
------------
Ex0/2    Bundle  128         1      1      0x2     0xae

Port-channel : Po1
-------------------

Number of Ports = 1
HotStandBy port = null
Port state = Port-channel Ag-Inuse
Protocol = LACP
Aggregator-MAC  00:03:02:03:04:41
Maximum number of Ports  = 5

Port-Channel Mtu         = 1500
Port-Channel Speed       = 0 Mbps
Port-Channel High Speed  = 0 Mbps
Port-channel member ports speed = 100 Mbps
Port-Channel member ports High Speed  = 100 Mbps
SEFOS# show etherchannel 1 load-balance
```

```
                Channel Group Listing
                ---------------------

Group : 1
----------
Source and Destination Mac VID
```

SEFOS# show etherchannel 1 port

```
                Channel Group Listing
                ---------------------

Group: 1
----------
Protocol :LACP

                Ports in the Group
                ------------------


Port : Ex0/2
-------------

Port State = Up in Bundle
Channel Group : 1
Mode : Active
Port-channel = Po1
Pseudo port-channel = Po1
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Port Identifier = 2
LACP Activity : Active
LACP Timeout : Long

Aggregation State : Aggregation, Sync, Collecting,
Distributing, Defaulted

                LACP Port   Admin  Oper   Port    Port
Port     State  Priority    Key    Key    Number  State
-------------------------------------------------------
```

```
------------
Ex0/2    Bundle  128         1      1      0x2     0xbe
SEFOS# show etherchannel 1  port-channel

Port-channel Module Admin Status is enabled
Port-channel Module Oper Status is enabled
Port-channel Independent mode is enabled
Port-channel System Identifier is  00:01:02:03:04:05
LACP System Priority: 5

                Channel Group Listing
                ---------------------
Group : 1
----------e : L2

               Port-channels in the group:
               ---------------------------

Port-channel : Po1
-------------------

Number of Ports = 1
HotStandBy port = null
Port state = Port-channel Ag-Not-Inuse
Protocol = LACP
Aggregator-MAC  00:04:02:03:04:41
Maximum number of Ports  = 5

Port-Channel Mtu         = 1500
Port-Channel Speed       = 0 Mbps
Port-Channel High Speed  = 0 Mbps
Port-Channel Member Ports Speed = 100 Mbps
Port-Channel Member Ports High Speed  = 100 Mbps
SEFOS# show etherchannel 1  summary
Port-channel Module Admin Status is enabled
Port-channel Module Oper Status is enabled
```

```
Port-channel Independent mode is disabled
Port-channel System Identifier is  00:01:02:03:04:05
LACP System Priority: 5

Flags:
D - down         P - in port-channel
I - stand-alone  H - Hot-standby (LACP only)
U - in-use       d - default port

Number of channel-groups in use: 1
Number of aggregators: 1

Group  Port-channel    Protocol   Ports
------------------------------------------------------------
----------------
1      Po1(D)          LACP       Ex0/2(Pd)
SEFOS# show etherchannel 1  protocol
                Channel Group Listing
                ---------------------
Group : 1
----------
Group Status : L2
Protocol : LACP

SEFOS# show etherchannel 1 redundancy
Actor Information for Port : Ex0/1
-------------

Channel Group : 1
Pseudo port-channel = Po1
CurrentWhile Split Interval Tmr Count = 0
```

Related Command(s)

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.

- **`lacp system-priority`** - Configures the LACP priority that is associated with actor's system ID.
- **`port-channel load-balance`** - Configures the load balancing policy for all port-channels created in the switch.
- **`lacp port-priority`** - Configures the LACP port priority.
- **`lacp port-identifier`** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
- **`channel-group`** - Adds the port as a member of the specified port-channel that is already created in the switch.
- **`lacp wait-time`** - Configures the LACP wait-time for an interface.
- **`lacp timeout`** - Configures the LACP timeout period within which LACPDUs should be received on a port, to avoid timing out of the aggregated link.
- **`lacp admin-key`** - Configures the LACP actor admin key and LACP mode for a port.
- **`default port`** - Configures the port that should be set as default port for a port-channel.
- **`interface-configuration and deletion`** - Allows interface configuration such as out-of-band management, port-channel, tunnel and so on.
- **`show etherchannel-detail`** - Displays the etherchannel-related information
- **`show etherchannel`** - Displays etherchannel information for port-channels created in the switch
- **`set port-channel independentmode`** - Enables or disables Independent mode when the remote partner information is not available in the system

15.19 show etherchannel - detail

Command Objective	This command displays the etherchannel-related information for all Port channels created in the switch.
Syntax	**If the switch L2RED_WANTED is set as "no" during compilation of exe:** **`show etherchannel { detail | load-balance | port | port-channel | summary | protocol }`** **If the switch L2RED_WANTED is set as "yes" during compilation of exe:** **`show etherchannel { detail | load-balance | port | port-channel | summary | protocol | redundancy}`**
Parameter Description	• **`detail`** - Displays detailed etherchannel information. The information contains admin and oper status of port-channel module, LACP system priority, status of protocol operate mode for each group, port details for each group, and port-channel details. The port details contain port state, group to which the port belongs, port mode, aggregation state, port-channel ID, pseudo port-channel ID, admin key, oper key, port number, port state and LACP port-priority, wait-time, port identifier, activity, and timeout. The port-channel details contain port-channel ID, number of member ports, ID of hot standby port, port state, status of protocol operate mode, aggregator MAC, and default port ID. • **`load-balance`** - Displays the load balancing policy applied for all port-channel groups. • **`port`** - Displays the status of protocol operate mode and port details for each group. The port details contain port state, group to which the port belongs, port mode, aggregation state, port-channel ID, pseudo port-channel ID, admin key, oper key, port number, port state and LACP port-priority, wait-time, port identifier, activity, and timeout. • **`port-channel`** - Displays the admin and oper status of port-channel module, and port-channel details. The port-channel details contain port-channel ID, number of member ports, ID of hot standby port, port state, status of protocol operate mode, aggregator MAC, and default port ID. • **`summary`** - Displays the admin and oper status of port-channel module, number of channel groups used, number of aggregators, group IDs, and port-channel ID, status of protocol operate mode, and member ports for each group. • **`protocol`** - Displays the status of protocol operate mode for each port-channel group. • **`redundancy`** - Displays the actor information and synchronized partner

information for the port, port state flags decode information, and aggregation state. The actor information contains channel group ID, pseudo port-channel ID, and current split interval timer count value. The partner information contains partner system ID, flags, LACP partner port priority, and LACP partner oper key. The decode information contains LACP activity and LACP timeout.

Note: This parameter displays the output only in NPSIM exe

Mode Privileged EXEC Mode

Package Workgroup, Enterprise Metro and Metro_E

Note: This command executes successfully only if the LA functionality is started in the switch.

Example

```
SEFOS# show etherchannel detail

Port-channel Module Admin Status is enabled
Port-channel Module Oper Status is enabled
Port-channel Independent mode is disabled
Port-channel System Identifier is  00:01:02:03:04:05
LACP System Priority: 5

                Channel Group Listing
                ---------------------
Group: 1
----------
Protocol :LACP

                Ports in the Group
                ------------------

Port : Ex0/2
-------------

Port State = Up in Bundle
Channel Group : 1
Mode : Active
Port-channel = Po1
Pseudo port-channel = Po1
```

```
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Port Identifier = 2
LACP Activity : Active
LACP Timeout : Long

Aggregation State : Aggregation, Sync, Collecting,
Distributing, Defaulted

                LACP Port   Admin  Oper   Port    Port
Port     State  Priority    Key    Key    Number  State
-------------------------------------------------------
------------
Ex0/2    Bundle 128         1      1      0x2     0xbe

Port-channel : Po1
-------------------

Number of Ports = 1
HotStandBy port = null
Port state = Port-channel Ag-Inuse
Protocol = LACP
Aggregator-MAC  00:03:02:03:04:41
Maximum number of Ports  = 5

Port-Channel Mtu         = 1500
Port-Channel Speed       = 100 Mbps
Port-Channel High Speed  = 0 Mbps
Port-Channel Member Ports Speed = 100 Mbps
Port-Channel Member Ports High Speed  = 100 Mbps
```

SEFOS# show etherchannel load-balance

```
                Channel Group Listing
                ---------------------

Group : 1
----------
Source and Destination Mac VID
```

```
SEFOS# show etherchannel port

                Channel Group Listing
                ---------------------

Group: 1
----------
Protocol :LACP

                Ports in the Group
                ------------------


Port : Ex0/2
-------------

Port State = Up in Bundle
Channel Group : 1
Mode : Active
Port-channel = Po1
Pseudo port-channel = Po1
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Port Identifier = 2
LACP Activity : Active
LACP Timeout : Long

Aggregation State : Aggregation, Sync, Collecting,
Distributing, Defaulted

                LACP Port   Admin  Oper   Port    Port
Port     State  Priority    Key    Key    Number  State
-------------------------------------------------------------
------------
Ex0/2    Bundle 128         1      1      0x2     0xbe

SEFOS# show etherchannel port-channel

Port-channel Module Admin Status is enabled
```

```
Port-channel Module Oper Status is enabled
Port-channel Independent mode is enabled
Port-channel System Identifier is  00:01:02:03:04:05
LACP System Priority: 5

                Channel Group Listing
                ---------------------
Group : 1
----------e : L2

               Port-channels in the group:
               ---------------------------

Port-channel : Po1
------------------

Number of Ports = 1
HotStandBy port = null
Port state = Port-channel Ag-Not-Inuse
Protocol = LACP
Aggregator-MAC  00:04:02:03:04:41
Maximum number of Ports  = 5

Port-Channel Mtu         = 1500
Port-Channel Speed       = 0 Mbps
Port-Channel High Speed  = 0 Mbps
Port-Channel Member Ports Speed = 100 Mbps
Port-Channel Member Ports High Speed  = 100 Mbps
SEFOS# show etherchannel protocol

                Channel Group Listing
                ---------------------
Group : 1
----------
Group Status : L2
Protocol : LACP
```

```
SEFOS# show etherchannel redundancy
Actor Information for Port : Ex0/1
-------------


Channel Group : 1
Pseudo port-channel = Po1
CurrentWhile Split Interval Tmr Count = 0
```

Related Command(s)

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **lacp system-priority** - Configures the LACP priority that is associated with actor's system ID.
- **port-channel load-balance** - Configures the load balancing policy for all port-channels created in the switch.
- **lacp port-priority** - Configures the LACP port priority.
- **lacp port-identifier** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
- **channel-group** - Adds the port as a member of the specified port-channel that is already created in the switch.
- **lacp wait-time** - Configures the LACP wait-time for an interface.
- **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port, to avoid timing out of the aggregated link.
- **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **default port** - Configures the port that should be set as default port for a port-channel.
- **interface-configuration and deletion** - Allows interface configuration such as out-of-band management, port-channel, tunnel and so on.
- **show etherchannel** - Displays etherchannel information for port-channels created in the switch
- **show etherchannel-channel** - Displays etherchannel information for the specified port-channel groups created in the switch

- **`set port-channel independentmode`** - Enables or disables Independent mode when the remote partner information is not available in the system

15.20 show etherchannel

Command Objective	This command displays etherchannel information for port-channels created in the switch. This information contains admin and oper status of port-channel module, and status of protocol operate mode for each group.
Syntax	**show etherchannel**
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro and Metro_E
Note:	This command executes successfully only if the LA functionality is started and enabled in the switch.
Example	**SEFOS# show etherchannel** Port-channel Module Admin Status is enabled Port-channel Module Oper Status is enabled Port-channel Independent mode is disabled Port-channel System Identifier is 00:01:02:03:04:05 LACP System Priority: 5 Channel Group Listing ----------
	Group : 1 ---------- Group Status : L2 Protocol : LACP
Related Command(s)	• **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch. • **set port-channel** - Configures the admin status of LA in the switch. • **lacp system-priority** - Configures the LACP priority that is associated with actor's system ID. • **channel-group** - Adds the port as a member of the specified port-channel that is already created in the switch. • **lacp wait-time** - Configures the LACP wait-time for an interface.

- **`lacp timeout`** - Configures the LACP timeout period within which LACPDUs should be received on a port, to avoid timing out of the aggregated link.
- **`lacp admin-key`** - Configures the LACP actor admin key and LACP mode for a port.
- **`default port`** - Configures the port that should be set as default port for a port-channel.
- **`interface-configuration and deletion`** - Allows interface configuration such as out-of-band management, port-channel, tunnel and so on.
- **`show etherchannel-detail`** - Displays the etherchannel-related information.
- **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch.

15.21 show interfaces - etherchannel

Command Objective	This command displays etherchannel details for all aggregated ports and port-channels. The port details contain port state, group to which the port belongs, port mode, aggregation state, port-channel ID, pseudo port-channel ID, admin key, oper key, port number, port state and LACP port-priority, wait-time, port identifier, activity, and timeout. The port-channel details contain port-channel ID, number of member ports, ID of hot standby port, port state, status of protocol operate mode, aggregator MAC, and default port ID.
Syntax	**show interfaces [<interface-type> <interface-id>] etherchannel**
Parameter Description	• **<interface-type>** - Displays the etherchannel details for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **i-lan** – Internal LAN created on a bridge per IEEE 802.1ap. • **<interface-id>** - Displays the etherchannel details for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided, for interface type i-lan. For example: 1 represents i-lan ID.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro and Metro_E
Note:	This command executes successfully only if the LA functionality is started and enabled in the switch.
Example	**SEFOS# show interfaces extreme-ethernet 0/1 etherchannel** Port : Ex0/1 -------------

```
Port State = Up, Independent
Channel Group :  1
Mode : Active
Port-channel = Null
Pseudo port-channel = Po1
LACP port-priority  = 1
LACP Wait-time  = 1 secs
LACP Admin Port = 2
LACP Activity : Active
LACP Timeout : Short

Aggregation State : Aggregation, Sync, Defaulted Expired

                LACP Port   Admin  Oper   Port    Port
Port     State  Priority    Key    Key    Number  State
-------------------------------------------------------
Ex0/1    Indep  1           1      1      0x1     0xf3
SEFOS# show interfaces etherchannel
Port : Ex0/2
-------------

Port State = Up, Independent
Channel Group : 1
Mode : Active
Port-channel = Null
Pseudo port-channel = Po1
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Port Identifier = 2
LACP Activity : Active
LACP Timeout : Long

Aggregation State : Aggregation, Sync, Defaulted Expired

                LACP Port   Admin  Oper   Port    Port
```

```
Port     State   Priority    Key    Key    Number  State
-----------------------------------------------------------
-
Ex0/2    Indep   128         1      1      0x2     0xb3

Port-channel : Po1
------------------

Number of Ports = 1
HotStandBy port = null
Port state = Port-channel Ag-Not-Inuse
Protocol = LACP
Aggregator-MAC  00:04:02:03:04:41
Maximum number of Ports  = 5

Port-Channel Mtu         = 1500
Port-Channel Speed       = 0 Mbps
Port-Channel High Speed  = 0 Mbps
Port-Channel Member Ports Speed = 100 Mbps
Port-Channel Member Ports High Speed  = 100 Mbps
```

Related Command(s)

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **lacp port-priority** - Configures the LACP port priority.
- **lacp port-identifier** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
- **channel-group** - Adds the port as a member of the specified port-channel that is already created in the switch.
- **lacp wait-time** - Configures the LACP wait-time for an interface.
- **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port, to avoid timing out of the aggregated link.
- **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **default port** - Configures the port that should be set as default port for

a port-channel.

- **`set port-channel independentmode`** - Enables or disables Independent mode when the remote partner information is not available in the system.

15.22 show lacp

Command Objective	This command displays LACP counter/neighbor information for all port-channels.
Syntax	**show lacp [<port-channel(1-65535)>] { counters | neighbor [detail] }**
Parameter Description	• **<port-channel(1-65535)>** - Displays LACP counter/neighbor information for the specified port-channel. This is a unique value that represents the specific port-channel created. This value ranges from 1 to 65535. • **counters** - Displays the LACP counter information. The information contains port ID, LACPDUs sent and received, number of markers sent and received, number of marker response sent and received, number of LACPDUs packets, and number of LACPDUs errors. • **neighbor [detail] - neighbor** - Displays LACP neighbor information. This information contains partner system ID, flags details, LACP partner port priority, operational key, and port state. detail - Displays detailed LACP neighbor information. This information contain partner system ID, flags, aggregation state, and LACP partner port priority, partner oper key, partner port state, activity, and timeout.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro and Metro_E
Note:	This command can be executed successfully only if the LA functionality is started and enabled in the switch.

Example

```
SEFOS# show lacp 1 counters
         LACPDUs       Marker       Marker Response
LACPDUs
Port    Sent Recv     Sent  Recv    Sent   Recv      Pkts
Err
-------------------------------------------------------------

Channel group: 1
------------------
Ex0/1    394   352     0     0       0      0         0   0
Ex0/2    318   297     0     0       0      0         0   0

SEFOS# show lacp neighbor detail
Flags:
```

```
A - Device is in Active Mode
P - Device is in Passive Mode
Channel group 1 neighbors
Port Ex0/1
----------
Partner System ID               : 00:01:02:03:04:21
Flags                           : P
LACP Partner Port Priority      : 128
LACP Partner Oper Key           : 2
LACP Partner Port State         : 0x3c
Port State Flags Decode
------------------------
Activity : Passive
LACP Timeout : Long
Aggregation State : Aggregation, Sync, Collecting,
Distributing
Port Ex0/2
----------
Partner System ID               : 00:01:02:03:04:21
Flags                           : P
LACP Partner Port Priority      : 128
LACP Partner Oper Key           : 2
LACP Partner Port State         : 0x3c
Port State Flags Decode
------------------------
Activity : Passive
LACP Timeout : Long
Aggregation State : Aggregation, Sync, Collecting,
Distributing
```

Related Command(s)

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **lacp port-priority** - Configures the LACP port priority.
- **channel-group** - Adds the port as a member of the specified port-channel that is already created in the switch.
- **lacp timeout** - Configures the LACP timeout period within which

LACPDUs should be received on a port, to avoid timing out of the aggregated link.

- **`lacp admin-key`** - Configures the LACP actor admin key and LACP mode for a port.
- **`default port`** - Configures the port that should be set as default port for a port-channel.
- **`interface-configuration and deletion`** - Allows interface configuration such as out-of-band management, port-channel, tunnel and so on.

15.23 set d-lag

Command Objective	This command enables or disables distributed link aggregation functionality in the port-channel. The status can be modified irrespective of whether the corresponding port-channel is enabled or disabled.
Syntax	**`set d-lag { enable | disable }`**
Parameter Description	• **`enable`** - Enables load-sharing functionality in D-LAG nodes. • **`disable`** - Disables the D-LAG load-sharing functionality in the D-LAG node.
Mode	Port Channel Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Default	disable
Note:	This command executes only if D-LAG System Identifier and D-LAG distribute ports are configured.
Example	**`SEFOS(config-if)# set d-lag enable`**
Related Command(s)	• **`d-lag -`** Sets the D-LAG parameters. • **`lacp system-priority`** - Configures the LACP priority associated with actor's system ID. • **`show d-lag - detail-`** Displays detailed D-LAG information.

15.24 d-lag redundancy

Command Objective	This command enables or disables D-LAG redundancy feature in port-channel. D-LAG redundancy configuration must be uniform across all the D-LAG nodes. If D-LAG redundancy feature is enabled in one node then it should be enabled in all the nodes that are part of the same D-LAG. Configuring this object to different values across the nodes of the same D-LAG results in improper working of D-LAG redundancy feature.
Syntax	**`d-lag redundancy { on | off }`**
Parameter Description	• **`on`** - Enables the redundancy feature in D-LAG node. If D-LAG redundancy feature is enabled, master-slave-selection algorithm can be used to select master, slave, or backup-master. • **`off`** - Disables the redundancy feature in D-LAG node.
Mode	Interface Configuration Mode (Port Channel)
Package	Workgroup, Enterprise Metro and Metro_E
Default	off
Example	**`SEFOS(config-if)# d-lag redundancy on`**
Related Command(s)	• **`show d-lag – detail`** - Displays detailed D-LAG information. • **`d-lag-`** Sets the D-LAG parameters such as distribute-port, system-identifier, system-priority, periodic-sync-time, and master-slave-selection-wait-time. • **`set d-lag`** - Enables or disables distributed link aggregation functionality in the port-channel.

15.25 d-lag

Command Objective

This command sets the D-LAG parameters such as distribute-port, distribute-port list, system-identifier, system-priority, periodic-sync-time, and master-slave-selection-wait-time.

The no form of the command sets the Distributed LAG priority of the system to default value.

Syntax

```
d-lag ([{distribute-port <iftype> <ifnum> | distribute-port-list <iftype> <0/a, 0/b, 0/c-d,...>}] [system-identifier <aa:aa:aa:aa:aa:aa>] [system-priority <0-65535>] [periodic-sync-time <time in milliseconds (0-90000)>] [master-slave-selection-wait-time <time in milliseconds (0-90000)>] )

no d-lag ([{distribute-port| distribute-port-list}] [system-identifier] [system-priority])
```

Parameter Description

- **distribute-port** - Configures the distributing port on which D-LAG periodic-sync and D-LAG event-update messages will be sent or received for D-LAG internal communication between the D-LAG nodes. Ports which are already part of port-channel cannot be configured as distributing port.

  Note: D-LAG node should immediately detect and handle distributing port failure with high priority and allow load to be carried on the all the configured ports.

  - **<iftype> -** Sets the distributing port for specified interface type. The interface can be:
    - **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second.
    - **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second.
    - **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second.
    - **i-lan** – Internal LAN created on a bridge per IEEE 802.1ap.
  - **<ifnum> -** Sets the distributing port for specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan. For example: 0/1 represents that the slot number is 0 and port number is 1. i-lan ID is provided, for interface type i-lan. For example: 1 represents i-lan ID.

  Note: Distribute port can be configured only if D-LAG status is disabled.

- **distribute-port-list** - Configures the distributing port list on which D-LAG periodic-sync and D-LAG event-update messages will be sent or

received for D-LAG internal communication between the D-LAG nodes. Ports which are already part of port-channel cannot be configured as distributing port list.

- **<iftype>** - Sets the distributing port for specified interface type. The interface can be:
  - **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second.
  - **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second.
  - **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second.
  - **i-lan** – Internal LAN created on a bridge per IEEE 802.1ap.
- **<0/a, 0/b, 0/c-d,...>** - Sets the list of interfaces or a specific interface identifier. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. Only i-lan or portchannel ID is provided for interface types internal-lan and port-channel. Use comma as a separator without space while configuring list of interfaces. Example: 0/1,0/3 or 1,3 or 0/1-3.

  Note: Distribute port list can be configured only if D-LAG status is disabled.

- **system-identifier <aa:aa:aa:aa:aa:aa>** - Configures the common system identifier in D-LAG nodes to be used for communicating with the peer node when D-LAG status is enabled. System identifier is a 6-octet unicast MAC address value that is used as a unique identifier.

  Note: System identifier can be configured only if D-LAG status is disabled. Disabling D-LAG orport-channel does not delete or reset the value.

  Note: The `system-identifier` identifies the D-LAG node and is used in master-slave-selection process when redundancy feature is enabled in a D-LAG node to elect master/slave.

- **system-priority <0-65535>** - Configures common system priority in D-LAG nodes to be used for communicating with the peer node. This value ranges from 0 to 65535.

  Note: System priority can be configured only if D-LAG status is disabled.Disabling D-LAG does not delete or reset the value.

  Note: This value is used in master-slave-selection process when redundancy feature is enabled in a D-LAG node to elect master/slave.

- **periodic-sync-time <time in milliseconds (0-90000)>** - Configures the D-LAG periodic sync timer used in Distributed Link Aggregation. Periodic-sync timer is running individually in each D-LAG node. The configured value of this timer is applicable only from the next

start or restart of the timer. This value ranges from 0 to 90000 in milliseconds. If the value is set as 0, then no periodic-sync messages will be sent from that D-LAG node.

Note: Periodic sync time should be same in all D-LAG nodes, When configured with different values across the D-LAG nodes of the same D-LAG may result in deletion of maintained neighbor node information because of keep alive mechanism and when D-LAG redundancy feature is enabled then repeated toggling of role played by D-LAG nodes may be observed.

- **master-slave-selection-wait-time <time in milliseconds (0-90000)>** - Configures the period for the master slave selection wait-timer used in Distributed Link Aggregation. This value ranges from 0 to 90000 in milliseconds. The master slave selection wait-timer is started in D-LAG node to synchronize the LAG information from the other D-LAG node, and on expiry of this timer master-slave-selection algorithm will be applied.

Note: The master slave selection wait-timer is started only if D-LAG status and D-LAG redundancy feature is enabled.

Mode

Port Channel Configuration Mode

Package

Workgroup, Enterprise Metro and Metro_E

Default

- system-priority – 32768
- periodic-sync-time – 1000 milliseconds
- master-slave-selection-wait-time – 0 milliseconds

Example

```
SEFOS(config-if)# d-lag system-identifier
00:00:00:12:01:ef distribute-port extreme-ethernet 0/3
system-priority 1 periodic-sync-time 90000 master-slave-
selection-wait-time 1

SEFOS(config-if)# d-lag system-identifier
00:00:00:12:01:ef distribute-port-list Ex 0/3 system-
priority 1 periodic-sync-time 90000 master-slave-
selection-wait-time 1
```

Related Command(s)

- **set d-lag disable -** Disables Distributed Link Aggregation in the port-channel.
- **d-lag redundancy on -** Enables D-LAG redundancy mechanism in the port-channel.
- **show d-lag - detail-** Displays detailed D-LAG information.

15.26 show d-lag - detail

Command Objective	This command displays detailed D-LAG information such as DLAG status, DLAG Redundancy status, DLAG Distributing Port information, DLAG system-identifier, system-priority, periodic-sync-time, and master-slave-selection-wait-time.
Syntax	**show d-lag [<port-channel(1-65535)>] {consolidated | detail}**
Parameter Description	• **<port-channel(1-65535)>** - Displays the detailed D-LAG information for the specified port-channel. This is a unique value that represents the specific port-channel created. This value ranges from 1 to 65535. • **consolidated** - Displays consolidated D-LAG information. • **detail** - Displays detailed D-LAG information.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro and Metro_E
Example	**SEFOS# show d-lag 1 consolidated** D-LAG Configuration for the System: ---------- DLAG status : Enabled Role Played : Master D-LAG Distributing Ports : Ex0/3 D-LAG system MAC : 00:00:00:12:01:ef D-LAG system priority : 1 D-LAG periodic sync time : 90 seconds Maximum keep alive count : 3 D-LAG Configuration : Channel Group 1 ---------- DLAG status : Enabled D-LAG Redundancy : Off D-LAG Maximum number of Ports allowed : 5 Consolidated Ports Info:- ----------

```
                LACP Port    Port
Port     State  Priority     Property
-----------------------------------------
Ex0/2    Bundle 128          Local
```

SEFOS# show d-lag 1 detail

```
D-LAG Configuration for the System:
-------------------------------------------------
DLAG status                              : Enabled
Role Played                              : Master
D-LAG Distributing Ports                 : Ex0/3
D-LAG system MAC                         : 00:00:00:12:01:ef
D-LAG system priority                    : 1
D-LAG periodic sync time                 : 90 seconds
Maximum keep alive count                 : 3


D-LAG Configuration : Channel Group 1
-----------------------------------------------------------
DLAG status                              : Enabled
D-LAG Redundancy                         : Off
D-LAG Maximum number of Ports allowed    : 8

D-LAG Neighbor Nodes Info :-
----------------------------

System MAC                 : 00:02:30:04:05:10
System priority            : 32768
Channel Group              : 1
Role Played                : Slave
Current Keep Alive Count   : 1
Speed                      : 100 Mbps
MTU                        : 1500

Remote Ports Info :-
If Index : Ex1/1, State : Up in Bundle, Sync State: In
```

```
Sync, Priority: 128
If Index : Ex1/2, State : Up in Bundle, Sync State: In
Sync, Priority: 128
```

Related Command(s)

- **channel-group –** Adds the port as a member of the specified port-channel that is already created in the switch.
- **set d-lag –** Enables or disables Distributed Link Aggregation in the port-channel.
- **d-lag redundancy** - Enables or disables D-LAG redundancy feature in port-channel.
- **d-lag -** Sets the D-LAG parameters.
- **port-channel load-balance** - Configures the load balancing policy for all port-channels created in the switch.
- **set d-lag -active -** Enables or disables Active-Active DLAG functionality in the switch.
- **d-lag -active -** Sets the D-LAG-related parameters.
- **set d-lag -for active-active -** Enables or disables Active-Active DLAG functionality in the switch.
- **d-lag - for active-active -** Sets the D-LAG-related parameters.

15.27 show d-lag - counters

Command Objective	This command displays D-LAG counters information.
Syntax	**show d-lag [<port-channel(1-65535)>] {counters}**
Parameter Description	• **<port-channel(1-65535)>** - Displays the D-LAG counters information for the specified port-channel. This is a unique value that represents the specific port-channel created. This value ranges from 1 to 65535. • **counters** - Displays the D-LAG counter information. The information contains D-LAG Distributing Port ID, Periodic Sync PDU Tx Count, Periodic Sync PDU Rx Count, Event Update PDU Tx Count, Event Update PDU Rx Count, and Port-channel Traps Tx Count.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise Metro and Metro_E
Example	**SEFOS# show d-lag counters** D-LAG Statistics : Channel Group 1 ---------- Elected As Master Count : 2 Elected As Slave Count : 0 D-LAG Distributing Port : Ex0/7 Periodic Sync PDU Tx Count : 46 Periodic Sync PDU Rx Count : 42 Event Update PDU Tx Count : 3 Event Update PDU Rx Count : 2 Port-channel Traps Tx Count : 0
Related Command(s)	• **channel-group –** Adds the port as a member of the specified port-channel that is already created in the switch. • **set d-lag –** Enables or disables Distributed Link Aggregation in the port-channel.

15.28 set d-lag -for active-active

Command Objective	This command sets the admin status of Active-Active DLAG functionality in the switch
Syntax	**`set d-lag { enable | disable }`**
Parameter Description	• **`enable`** - Enables Active-Active DLAG functionality in the switch. • **`disable`** - Disables Active-Active DLAG functionality in the switch.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Default	disable
Note:	This command executes only if D-LAG System Identifier and D-LAG distribute ports are configured.
Example	**`SEFOS(config)# set d-lag enable`**
Related Command(s)	• **`d-lag -active -`** Sets the active-active D-LAG-related parameters. • **`show d-lag - detail-`** Displays detailed D-LAG information.

15.29 d-lag - for active-active

Command Objective	This command sets the Active-Active DLAG-related parameters such as distribute-port, distribute-port list, system-identifier, system-priority, and periodic-sync-time. The no form of the command resets the DLAG parameter.
Syntax	**d-lag ([{distribute-port <iftype> <ifnum> | distribute-port-list <iftype> <0/a, 0/b, 0/c-d,...>}] [system-identifier <aa:aa:aa:aa:aa:aa>] [system-priority <0-65535>] [periodic-sync-time <time in seconds (0-90)>])** **no d-lag ([{distribute-port | distribute-port-list}] [system-identifier] [system-priority] [periodic-sync-time])**
Parameter Description	• **distribute-port** - Configures the distributing port on which D-LAG periodic-sync and D-LAG event-update messages will be sent or received for Active-Active D-LAG internal communication between the D-LAG nodes. Ports which are already part of port-channel cannot be configured as distributing port. ▪ **<iftype> -** Sets the distributing port for specified interface type. The interface can be: • **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. • **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. • **internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **<ifnum> -** Sets the distributing port for specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than Internal-lan. For example: 0/1 represents that the slot number is 0 and port number is 1. Internal-lan ID is provided, for interface type Internal-lan. For example: 1 represents Internal-lan ID. Note: Distribute port can be configured only if D-LAG status is disabled and LA status is enabled in the system. • **distribute-port-list** - Configures the distributing port list on which D-LAG periodic-sync and D-LAG event-update messages will be sent or received for D-LAG internal communication between the D-LAG nodes. Ports which are already part of port-channel cannot be configured as

distributing port list.

- **<iftype>** - Sets the distributing port for specified interface type. The interface can be:
  - **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second.
  - **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second.
  - **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second.
  - **i-lan** – Internal LAN created on a bridge per IEEE 802.1ap.
- **<0/a, 0/b, 0/c-d,...>** - Sets the list of interfaces or a specific interface identifier. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. Only i-lan or portchannel ID is provided for interface types internal-lan and port-channel. Use comma as a separator without space while configuring list of interfaces. Example: 0/1,0/3 or 1,3 or 0/1-3.

  Note: Distribute port list can be configured only if D-LAG status is disabled.

- **system-identifier <aa:aa:aa:aa:aa:aa>** - Configures the common system identifier in D-LAG nodes to be used for communicating with the peer node when D-LAG status is enabled. System identifier is a 6-octet unicast MAC address value used as a unique identifier.

  Note: System identifier can be configured only if D-LAG status is disabled. Disabling D-LAG or port-channel does not delete or reset the value.

  Note: The system-identifier identifies the D-LAG node and is used in master-slave-selection process when redundancy feature is enabled in a D-LAG node to elect master/slave.

- **system-priority <0-65535>** - Configures common system priority in D-LAG nodes (Active-Active) to be used for communicating with the peer node. This value ranges from 0 to 65535.

  Note: System priority can be configured only if D-LAG status is disabled. Disabling D-LAG does not delete or reset the value.

- **periodic-sync-time <time in seconds (0-90)>** - Configures the D-LAG periodic sync timer used in Active-Active Distributed Link Aggregation. This is used to configure the transmission interval of D-LAG periodic-sync PDUs and it is run individually in each D-LAG node. In master node, this timer is used to determine when the slave node information expires, and also for sending a periodic update message to all slaves. Inconsistency may be observed (node addition and removal) if master and slave periodic time differs by a long value. This value ranges from 0 to 90 seconds.

  Note: If this timer is configured with a value of 0, then no

	periodic-sync messages will be sent from that D-LAG node. Note: The configured value of this timer is applicable only from the next start or restart of the timer
Mode	Global Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Default	• system-priority – 32768 • periodic-sync-time – 2 seconds
Example	**SEFOS(config)# d-lag system-identifier 00:00:00:12:01:ef distribute-port extreme-ethernet 0/3 system-priority 1 periodic-sync-time 90**
Related Command(s)	• **set d-lag -active -** Set admin status of Active-Active DLAG functionality in the switch. • **show d-lag - detail-** Displays detailed D-LAG information. • **set port-channel** - Configures the admin status of LA in the switch.

15.30 set port-channel independentmode

Command Objective	This command enables or disables Independent mode when the remote partner information is not available in the system.
Syntax	**`set port-channel independentmode { enable | disable }`**
Parameter Description	• **`enable`** - Enables independent mode. When enabled, and if there is no remote partner information available in the system ,the port-channel becomes operationally down and the member ports of the port-channel operate as independent ports. These independent ports are visible to higher layers. • **`disable`** - Disables independent mode. When disabled and if there is no remote partner information available in the system, the port-channel becomes operationally up based on the default values assigned for the partner. The member ports of the port-channel become operationally up and will not be visible to higher layers.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise Metro and Metro_E
Default	disable
Note:	This command executes successfully only if the LA functionality is started and enabled in the switch.
Example	**`SEFOS(config)# set port-channel independentmode enable`**
Related Command(s)	• **`shutdown port-channel`** - Shuts down LA in the switch and releases the allocated resources to the switch. • **`show interfaces – etherchannel`** - Displays etherchannel details for all aggregated ports and port-channels. • **`show etherchannel-detail`** - Displays the etherchannel-related information. • **`show etherchannel-channel`** - Displays etherchannel information for the specified port-channel groups created in the switch. • **`set port-channel`** - Configures the admin status of LA in the switch. • **`show etherchannel`** - Displays etherchannel information for port-channels created in the switch.

CHAPTER 16

LLDP

LLDP (Link Layer Discovery Protocol) supports a set of attributes that it uses to discover the neighbor devices. These attributes contain type, length, and value descriptions and are referred to as TLVs. LLDP-supported devices can use TLVs to receive and send information to their neighbors.

The switch supports these mandatory basic management TLVs.

- Port description TLV
- System name TLV
- System description
- System capabilities TLV
- Management address TLV
- Port VLAN ID TLV ((IEEE 802.1 organizationally specific TLVs)
- MAC/PHY configuration/status TLV(IEEE 802.3 organizationally specific TLVs)

Oracle LLDP is a portable software implementation of the Link Layer Discovery Protocol (LLDP). It provides complete management capabilities using SNMP and CLI.

Oracle LLDP conforms to IEEE 802.1AB-2005 standard. The LLDP allows systems on an Ethernet LAN to advertise their key capabilities and also to learn about the key capabilities of other systems on the same Ethernet LAN. This, in turn, promotes a unified network management view of the LAN topology and connectivity to aid network administration and trouble-shooting.

Oracle LLDP provides the following features:

- Provides full conformance to the 802.1AB specification.
- Supports all mandatory TLVs (Chassis ID, Port ID, and Time To Live).
- Supports optional TLVs - Port description, System name, System description, System capabilities, and Management address.
- Supports organizationally specific optional TLVs - Port VLAN ID, Port and protocol VLAN ID, VLAN name, MAC or PHY configuration or status, Link Aggregation, and Maximum frame size.
- Provides a generic set of APIs for easy integration into different platforms.
- Supports the basic MIB as well as the extension MIBs in Appendix F and Appendix G, defined in the 802.1AB specification, and a proprietary MIB for management.

- Provides support for configuration and management by providing generic APIs usable from different management schemes like SNMP and CLI.
- Provides support for notifications through Traps.
- Conforms to Flexible Software Architecture for Portability (FSAP2), thus ensuring portable code which uses flexible buffer and timer management libraries.

16.1 shutdown lldp

Command Objective	This command shuts down all the ports in the LLDP and releases all the allocated memory. The no form of the command enables all the ports by allocating the required resources in the LLDP.
Syntax	**shutdown lldp** **no shutdown lldp**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	LLDP is not shut down in the system.
Note:	LLDP cannot be started in the switch if the base bridge mode is configured as transparent bridging.
Example	**SEFOS(config)# shutdown lldp**
Related Command(s)	• **base bridge-Mode** - Configures the base mode (either 802.1d transparent bridge mode or 802.1q VLAN-aware bridge mode) in which the VLAN feature should operate on the switch. • **set lldp** - Transmits or receives LLDP frames from the server to the LLDP module. • **lldp transmit / receive** - Transmits or receives LLDP frames from the one of the ports of the server to the LLDP module. • **lldp tlv-select basic-tlv** - Enables the basic settings while transmitting the LLDP frames on a given port. • **lldp tlv-select dot1tlv** – Configures dot1 TLV while transmitting the LLDP frames to the particular port. • **lldp tlv-select dot3tlv** - Configures dot3 TLV while transmitting the LLDP frames to the particular port. • **lldp transmit-interval** - Sets the transmission time interval in which the server sends the LLDP frames to the LLDP module. • **lldp holdtime-multiplier** - Sets the holdtime-multiplier value, which is the amount of time the server should hold the LLDP.

- **lldp reinitialization-delay** - Sets the reinitialization delay time which is the minimum time an LLDP port will wait before reinitializing LLDP transmission.
- **lldp tx-delay** - Sets the transmit delay which is the minimum amount of delay between successive LLDP PDUs.
- **lldp notification** - Controls the transmission of LLDP notifications.
- **lldp notification-interval** - Sets the notification interval which is the minimum interval to generate a notification-event about a change in local system.
- **lldp chassis-id-subtype** - Configures an ID for LLDP chassis subtype which is a unique address of any module.
- **lldp port-id-subtype** - Configures an ID for LLDP port subtype.
- **clear lldp counters** - Clears the inbuilt counter which has the total count of LLDP frames transmitted or received.
- **clear lldp table** - Clears all the LLDP information about the neighbors.
- **debug lldp** - Specifies debug level for LLDP module.
- **show lldp** - Displays the LLDP global configuration details to initialize an interface.
- **show lldp interface** - Displays the information about interfaces where LLDP is enabled.
- **show lldp neighbors** - Displays information about neighbors on an interface or all interfaces.
- **show lldp traffic** - Displays LLDP counters on all interfaces or on a specific interface.
- **show lldp local** - Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces.
- **show lldp errors** - Displays the information about the errors such as memory allocation failures, queue overflows, and table overflow.
- **show lldp statistics** - Displays the LLDP remote table statistics information.
- **lldp dest-mac** - Configures destination MAC-address to be used by the LLDP agent for transmission on this port.

- **`set lldp version`** - Enables the LLDP version to be used on the ports.
- **`lldp txtCreditMax`** - Configures the maximum number of consecutive LLDPDUs that can be transmitted any time.
- **`lldp MessageFastTx`** - Configures the interval at which LLDP frames are transmitted on behalf of this LLDP agent during fast transmission period.
- **`lldp txFastInit`** - Configures the initial value used to initialize the txFast variable which determines the number of transmissions that are made in fast transmission mode.

16.2 set lldp

Command Objective	This command transmits or receives LLDP frames from the server to the LLDP module.
Syntax	**`set lldp {enable | disable}`**
Parameter Description	• **`enable`** - Transmits or receives the LLDP packets between LLDP module and the server. • **`disable`** - Does not transmit or receive the LLDP packets between LLDP module and the server.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Disable
Note:	This command executes only if LLDP is started.
Example	**`SEFOS(config)# set lldp enable`**
Related Command(s)	• **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory. • **`show lldp -`** Displays LLDP global configuration details. • **`show lldp interface -`** Displays the information about interfaces where LLDP is enabled. • **`show lldp neighbors -`** Displays information about the neighbors on an interface or all interfaces. • **`show lldp traffic -`** Displays LLDP counters on all interfaces or on a specific interface. • **`show lldp errors -`** Displays the information about the errors such as memory allocation failures, queue overflows, and table overflow. • **`show lldp statistics -`** Displays the LLDP remote table statistics information.

16.3 lldp transmit-interval

Command Objective	This command sets the transmission interval in which the server sends the LLDP frames to the LLDP module.This value ranges from 5 to 32768 seconds. The no form of the command sets the transmission interval to the default value.
Syntax	**`lldp transmit-interval <seconds(5-32768)>`** **`no lldp transmit-interval`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	30 seconds
Note:	This command executes only if LLDP is started.
Example	**`SEFOS(config)# lldp transmit-interval 50`**
Related Command(s)	• **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory. • **`show lldp -`** Displays LLDP global configuration details.

16.4 lldp holdtime-multiplier

Command Objective		This command sets the holdtime-multiplier value, which is the amount of time the server should hold the LLDP. This value ranges from 2 to 10 seconds. The no form of the command sets the multiplier to the default value.
	Note:	TLV (Time to Live) is a value that tells the receiving agent how long the information contained in the TLV Value field is valid. `TTL = message transmission interval * hold time multiplier.` For example, if the value of LLDP transmission interval is 30 and the value of the LLDP hold multiplier is 4, then the value 120 is encoded in the TTL field in the LLDP header.
Syntax		**`lldp holdtime-multiplier <value(2-10)>`** **`no lldp holdtime-multiplier`**
Mode		Global Configuration Mode
Package		Workgroup, Enterprise, Metro and Metro_E
Default		4
	Note:	This command executes only if LLDP is started.
Example		**`SEFOS(config)# lldp holdtime-multiplier 5`**
Related Command(s)		• **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory. • **`show lldp -`** Displays LLDP global configuration details. • **`lldp tx-delay -`** Sets transmit delay which is the minimum amount of delay between successive LLDP frame transmissions.

16.5 lldp reinitialization-delay

Command Objective	This command sets the reinitialization delay time which is the minimum time an LLDP port will wait before reinitializing LLDP transmission. This value ranges from 1 to 10 seconds. The no form of the command sets the reinitialization delay time to the default value.
Syntax	**`lldp reinitialization-delay <seconds(1-10)>`** **`no lldp reinitialization-delay`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	2 seconds
Note:	This command executes only if LLDP is started.
Example	**`SEFOS(config)# lldp reinitialization-delay 4`**
Related Command(s)	• **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory. • **`show lldp -`** Displays LLDP global configuration details.

16.6 lldp tx-delay

Command Objective		This command sets the transmit delay which is the minimum amount of delay between successive LLDP frame transmissions. This value ranges from 1 to 8192 seconds. The no form of the command sets the transmit delay to the default value.
	Note:	TxDelay should be less than or equal to (`0.25 * Message Tx Interval`)
Syntax		**`lldp tx-delay <seconds(1-8192)>`** **`no lldp tx-delay`**
Mode		Global Configuration Mode
Package		Workgroup, Enterprise, Metro and Metro_E
Default		2 seconds
	Note:	This command executes only if LLDP is started.
Example		**`SEFOS(config)# lldp tx-delay 120`**
Related Command(s)		• **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory. • **`show lldp`** - Displays LLDP global configuration details. • **`lldp holdtime-multiplier –`** Sets the holdtime-multiplier value, which is the amount of time the server should hold the LLDP.

16.7 lldp notification-interval

Command Objective	This command sets the time interval in which the local system generates a notification-event. In the specific interval, generating more than one notification-event is not possible. This value ranges from 5 to 3600 seconds. The no form of the command sets the notification interval to the default value.
Syntax	**lldp notification-interval <seconds(5-3600)>** **no lldp notification-interval**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	5 seconds
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config)# lldp notification-interval 150**
Related Command(s)	• **show lldp** – Displays LLDP global configuration details. • **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

16.8 lldp chassis-id-subtype

Command Objective	This command configures an ID for LLDP chassis subtype which is a unique address of any module. Note: Chassis ID value can be set only for the chassis-component and local system subtypes. For all other subtypes, it takes the value from the system automatically.
Syntax	**lldp chassis-id-subtype { chassis-comp <string(255)> | if-alias | port-comp <string(255)> | mac-addr | nw-addr | if-name | local <string(255)> }**
Parameter Description	• **chassis-comp <string(255)>** - Represents a chassis identifier based on the value of `entPhysicalAlias` object for a chassis component • **if-alias** - Represents a chassis identifier based on the value of `ifAlias` for an interface on the containing chassis. • **port-comp <string(255)>** - Represents a chassis identifier based on the value of `entPhysicalAlias` object for a port or backplane within the chassis. • **mac-addr** - Represents a chassis identifier based on the value of a unicast source address of a port on the chassis. • **nw-addr** - Represents a chassis identifier based on a network address associated with a particular chassis. The encoded address is actually composed of two fields. The first field is a single octet, representing the IANA AddressFamilyNumbers value for the specific address type, and the second field is the network address value. • **if-name** - Represents a chassis identifier based on the value of `ifName` object for an interface on the containing chassis. • **local <string(255)>** - Represents a chassis identifier based on a locally defined value.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	mac-addr
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config)# lldp chassis-id-subtype chassis-comp Oracleswitch**

	SEFOS(config)# lldp chassis-id-subtype if-alias
Related Command(s)	• **show lldp –** Displays LLDP global configuration details. • **show lldp local –** Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces. • **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

16.9 clear lldp counters

Command Objective	This command clears the inbuilt counter which has the total count of LLDP frames that are transmitted or received. Note: This command does not clear the global statistics.
Syntax	**clear lldp counters**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config)# clear lldp counters**
Related Command(s)	• **show lldp traffic -** Displays the LLDP counters on all interfaces or on a specific interface. • **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

16.10 clear lldp table

Command Objective		This command clears all the LLDP information about the neighbors.
Syntax		**`clear lldp table`**
Mode		Global Configuration Mode
Package		Workgroup, Enterprise, Metro and Metro_E
	Note:	This command executes only if LLDP is started.
Example		**`SEFOS(config)# clear lldp table`**
Related Command(s)		• **`show lldp neighbors`** – Displays information about the neighbors on an interface or all interfaces. • **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory.

16.11 lldp transmit / receive

Command Objective	This command transmits or receives LLDP frames from one of the ports of the server to the LLDP module. The no form of the command resets LLDP admin status on an interface.
Syntax	**lldp {transmit | receive} [mac-address <mac_addr>]** **no lldp {transmit | receive} [mac-address <mac_addr>]**
Parameter Description	• **transmit** - Enables transmission of LLDPDU from one of the ports of the server to the LLDP module. • **receive** - Enables reception of LLDPDU by one of the ports of the server from the LLDP module. • **mac-address <mac_addr>** - Configures the MAC address to be used as destination MAC address by the LLDP agent on the specified port.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Transmission and Reception are enabled.
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config-if)# lldp transmit**
Related Command(s)	• **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory. • **show lldp interface –** Displays LLDP configuration details on a particular interface or all interfaces. • **show lldp statistics –** Displays the LLDP remote table statistics information.

16.12 lldp notification

Command Objective	This command controls the transmission of LLDP notifications. The no form of the command disables LLDP trap notification on an interface.
Syntax	**lldp notification [remote-table-chg][mis-configuration] [mac-address <mac_addr>]** **no lldp notification [mac-address <mac_addr>]**
Parameter Description	• **remote-table-chg** - Sends trap notification to NMS whenever remote table change occurs. • **mis-configuration** - Sends trap notification to NMS whenever misconfiguration is identified. • **mac-address <mac_addr>** - Configures the MAC address to be used as destination MAC address by the LLDP agent on the specified port.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	mis-configuration
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config-if)# lldp notification remote-table-chg**
Related Command(s)	• **show lldp interface** - Displays LLDP configuration details on a particular interface or all interfaces. • **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

16.13 lldp tlv-select basic-tlv

Command Objective	This command enables the basic settings while transmitting the LLDP frames on a given port. The no form of the command disables the basic TLV transmission on a given port.
Syntax	**lldp tlv-select basic-tlv { [port-descr] [sys-name] [sys-descr] [sys-capab] [mgmt-addr {all | ipv4 <ucast_addr> | ipv6 <ip6_addr>}]} [mac-address <mac-address>]** **no lldp tlv-select basic-tlv { [port-descr] [sys-name] [sys-descr] [sys-capab] [mgmt-addr {all | ipv4 <ucast_addr> | ipv6 <ip6_addr>}]} [mac-address <mac_addr>]**
Parameter Description	• **port-descr** - Enables the basic TLV transmission for the administratively assigned description for the port. • **sys-name** - Enables the basic TLV transmission for the administratively assigned system name. • **sys-descr** - Enables the basic TLV transmission for administratively assigned system description. The system description includes system's hardware name and type, and system's operating software and its version. • **sys-capab** - Enables the system capabilities of the basic TLV transmission. • **mgmt-addr –** Enables the basic TLV transmission to maintain the management addresses through which a management module can manage the system and allow the transmission on the current interface. ▪ **all** - Enables the transmission of all the available management addresses on the current interface. If no management address is present or configured in the system, switch MAC-address will be taken for transmission. ▪ **ipv4 <ucast addr>** - Enables the transmission of a particular ipv4 address on the current interface. ▪ **ipv6 <ip6 addr>** - Enables the transmission of a particular ipv6 address on the current interface. • **mac-address <mac_addr>** - Enables the basic TLV transmission to use the MAC address as destination MAC address by the LLDP agent on the specified port. Note: MAC Address can be configured only if LLDP version is set as v2.

Mode		Interface Configuration Mode (Physical Interfaces)
Package		Workgroup, Enterprise, Metro and Metro_E
	Note:	This command executes only if LLDP is started in the system
Example		**SEFOS(config-if)# lldp tlv-select basic-tlv port-descr sys-name sys-descr sys-capab mgmt-addr ipv4 12.0.0.6 mac-address 00:11:22:33:44:55**
Related Command(s)		• **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory. • **set lldp version** - Enables the LLDP version to be used on the system. • **show lldp local –** Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces.

16.14 lldp port-id-subtype

Command Objective	This command configures an ID for LLDP port subtype.
Syntax	**lldp port-id-subtype { if-alias | port-comp <string(255)> | mac-addr | if-name | local <string(255)> }**
Parameter Description	• **if-alias** - Represents a chassis identifier based on the value of `ifAlias` for an interface on the containing chassis. • **port-comp <string(255)>** - Represents a chassis identifier based on the value of `entPhysicalAlias` object for a port or backplane within the chassis. • **mac-addr** - Represents a chassis identifier based on the value of a unicast source address, of a port on the containing chassis. • **if-name** - Represents a chassis identifier based on the value of ifName object for an interface on the containing chassis. • **local <string(255)>** - Represents a chassis identifier based on a locally defined value.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	if-alias
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config-if)# lldp port-id-subtype mac-addr** **SEFOS(config-if)# lldp port-id-subtype local slot0/1**
Related Command(s)	• **show lldp local –** Displays the current switch information that will be used to populate the outbound LLDP advertisements for a specific interface or all interfaces. • **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

16.15 lldp tlv-select dot1tlv

Command Objective	This command performs dot1 TLV configuration while transmitting the LLDP frames to the particular port apart from the basic settings. The no form of the command disables the transmission of dot1 TLV types on a port.
Syntax	**lldp tlv-select dot1tlv {[port-vlan-id] [protocol-vlan-id {all |<vlan-id>}] [vlan-name {all | <vlan-id>}] [vid-usage-digest] [mgmt-vid] [link-aggregation]} [mac-address <mac_addr>]** **no lldp tlv-select dot1tlv {[port-vlan-id] [protocol-vlan-id {all |<vlan-id>}] [vlan-name {all | <vlan-id>}] [vid-usage-digest] [mgmt-vid] [link-aggregation]} [mac-address <mac_addr>]**
Parameter Description	• **port-vlan-id** - Specifies the VLAN ID of the port that uniquely identifies a specific VLAN. This VLAN ID is associated with a specific group of protocols for the specific port. • **protocol-vlan-id** - Specifies the protocol ID that represents a specific group of protocols that are associated together when assigning a VID to a frame. This group ID is associated with the specific port. ▪ **all** – Sets the protocol ID as `all`. ▪ **<vlan-id>** - Sets the protocol ID as the mentioned VLAN ID. This value ranges from 1 to 4094. • **vlan-name** - Specifies the administratively assigned string which is used to identify the VLAN. ▪ **all** – Sets the protocol ID as `all`. ▪ **<vlan-id>** - Sets the protocol ID as the mentioned VLAN ID. This value ranges from 1 to 4094. • **vid-usage-digest** - Performs dot1 TLV configuration while transmitting the LLDP frames to the VID usage digest TLV. Note: This parameter can be set only when LLDP version is set as v2. • **mgmt-vid** - Performs dot1 TLV configuration while transmitting the LLDP frames to the management VID TLV. Note: This parameter can be set only when LLDP version is set as v2. • **link-aggregation** - Performs dot1 TLV configuration while transmitting

	the LLDP frames to the link-aggregation TLV. Note: This parameter can be set only when LLDP version is set as v2. • **mac-address <mac_addr> -** Specifies the destination MAC of the LLDP agent. Note: This parameter can be set only when LLDP version is set as v2.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config-if)# lldp tlv-select dot1tlv port-vlan-id protocol-vlan-id all vlan-name all vid-usage-digest mgmt-vid mac-address 00:11:22:33:44:55**
Related Command(s)	• **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory. • **show lldp neighbors** - Displays information about the neighbors on an interface or all interfaces. • **show lldp local** – Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces. • **show lldp errors -** Displays the information about the errors such as memory allocation failures, queue overflows, and table overflow. • **set lldp version -** Enables the LLDP version to be used on the ports. • **lldp dest-mac** - Configures destination MAC-address to be used by the LLDP agent for transmission on this port.

16.16 lldp tlv-select dot3tlv

Command Objective	This command performs dot3 TLV configuration while transmitting the LLDP frames to the particular port apart from the basic settings. The no form of the command disables the transmission of dot3 TLV types on a port.
Syntax	**lldp tlv-select dot3tlv { [macphy-config] [link-aggregation] [max-framesize] }** **no lldp tlv-select dot3TLV { [macphy-config] [link-aggregation] [max-framesize] }**
Parameter Description	• **macphy-config** - Configures the physical MAC address of the TLV. • **link-aggregation** - Configures the link aggregation protocol statistics for each port on the device. • **max-framesize** - Configures the maximum frame size of the TLV.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config-if)# lldp tlv-select dot3tlv macphy-config**
Related Command(s)	• **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory. • **show lldp neighbors** - Displays information about the neighbors on an interface or all interfaces. • **show lldp local** – Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces. • **show lldp errors -** Displays the information about the errors such as memory allocation failures, queue overflows, and table overflow.

16.17 debug lldp

Command Objective	This command specifies debug level for LLDP module. The no form of the command disables debug option for LLDP module.
Syntax	**debug lldp [{[init-shut] [mgmt] [data-path] [ctrl] [pkt-dump] [resource] [all-fail] [buf] [neigh-add] [neigh-del] [neigh-updt] [neigh-drop] [neigh-ageout] [critical] [redundancy] [tlv {[chassis-id][port-id] [ttl] [port-descr] [sys-name] [sys-descr] [sys-capab] [mgmt-addr] [port-vlan] [ppvlan] [vlan-name] [proto-id] [mac-phy] [pwr-mdi] [lagg] [max-frame] [vid-digest] [mgmt-vid] | all}] | all}]** **no debug lldp [{all | [init-shut] [mgmt] [data-path] [ctrl] [pkt-dump] [resource] [all-fail] [buf] [neigh-add] [neigh-del] [neigh-updt] [neigh-drop] [neigh-ageout] [critical][tlv {all | [chassis-id][port-id] [ttl] [port-descr] [sys-name] [sys-descr] [sys-capab] [mgmt-addr] [port-vlan] [ppvlan] [vlan-name] [proto-id] [mac-phy] [pwr-mdi] [lagg] [max-frame] [vid digest] [management vid]}] [redundancy]}]**
Parameter Description	• **init-shut** - Generates debug statements for init and shutdown traces. This trace is generated on failed initialization and shutting down of LLDP-related entries. • **mgmt** - Generates debug statements for management traces. This trace is generated during failure in configuration of any of the LLDP features. • **data-path** - Generates debug statements for data path traces. This trace is generated during failure in packet processing. • **ctrl** - Generates debug statements for control path traces. This trace is generated during failure in modification or retrieving of LLDP entries • **pkt-dump** - Generates debug statements for packet dump traces. This trace is currently not used in LLDP module. • **resource** - Generates debug statements for OS resource-related traces. This trace is generated during failure in message queues. • **all-fail** - Generates debug statements for all failure traces of the above mentioned traces • **buf** - Generates debug statements for LLDP buffer-related traces. This trace is currently not used in LLDP module.

- **neigh-add** - Generates debug statements for add SEM.
- **neigh-del** - Generates debug statements for delete SEM.
- **neigh-updt** - Generates debug statements for update SEM.
- **neigh-drop** - Generates debug statements for drop SEM.
- **neigh-ageout** - Generates debug statements for ageout SEM.
- **critical** - Generates debug statements for critical SEM.
- **redundancy** - Generates the debug statements for the LLDP redundancy module.
- **tlv –** Generates debug statements for the following traces;
  - **all** - Generates debug statements for all TLV traces.
  - **chassis-id** - Generates debug statements for chassis-id TLV traces.
  - **port-id** - Generates debug statements for port-id TLV trace.
  - **ttl** - Generates debug statements for TTL TLV trace.
  - **port-descr** - Generates debug statements for the port description TLV traces.
  - **sys-name** - Generates debug statements for the system name TLV traces.
  - **sys-descr** - Generates debug statements for system description TLV traces.
  - **sys-capab** - Generates debug statements for system capabilities TLV traces.
  - **mgmt-addr** - Generates debug statements for management address TLV traces.
  - **port-vlan** - Generates debug statements for port-vlan TLV traces.
  - **ppvlan** - Generates debug statements for port-protocol-vlan TLV traces.
  - **vlan-name** - Generates debug statements for vlan-name TLV traces.
  - **proto-id** - Generates debug statements for protocol-id TLV traces.
  - **mac-phy** - Generates debug statements for MAC or PHY TLV traces.
  - **pwr-mdi** - Generates debug statements for power-through-MDI TLV traces.
  - **lagg** - Generates debug statements for link aggregation TLV traces.
  - **max-frame** - Generates debug statements for maximum frame size TLV traces.
  - **vid digest** - Generates debug statements for vid digest TLV traces.
  - **management vid** - Generates debug statements for management VID TLV traces.

	• **all** - Generates debug statements for all traces.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command executes only if LLDP is started.
Example	**SEFOS# debug lldp init-shut mgmt** **SEFOS# debug lldp tlv sys-descr lagg** **SEFOS# debug lldp**
Related Command(s)	• **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

16.18 show lldp

Command Objective	This command displays LLDP global configuration details to initialize an interface.
Syntax	**show lldp**
Mode	Privileged EXEC Mode
Note:	This command executes only if LLDP is started.
Example	**SEFOS# show lldp** LLDP is enabled LLDP Version : v2 Transmit Interval : 20 Holdtime Multiplier : 4 Reinitialization Delay : 2 Tx Delay : 2 Notification Interval : 30 TxCreditMax : 5 MessageFastTx : 1 TxFastInit : 4 Chassis Id SubType : Chassis Component Chassis Id : Oracleswitch
Related Command(s)	• **set lldp -** Enables or disables LLDP on the system. • **lldp transmit-interval** – Sets the transmission interval. • **lldp holdtime-multiplier** - Sets the multiplier value. • **lldp reinitialization-delay** - Sets the reinitialization delay. • **lldp tx-delay** - Sets the transmit delay. • **lldp notification-interval** - Sets the notification interval. • **lldp chassis-id-subtype** - Configures LLDP chassis ID subtype and chassis ID value. • **no shutdown lldp** – Starts all the ports in the LLDP and releases all

the allocated memory.

- **`set lldp version`** – Enables the LLDP version to be used on the system.
- **`lldptxCreditMax`** – Configures the maximum number of consecutive LLDPDUs that can be transmitted any time
- **`lldp MessageFaxtTx`** – Configures the interval at which LLDP frames are transmitted on behalf of this LLDP agent during fast transmission period.
- **`lldp txFastInit`** - Configures the value used to initialize the txFast variable which determines the number of transmissions that are made in fast transmission mode.

16.19 show lldp interface

Command Objective	This command displays the information about interfaces where LLDP is enabled.
Syntax	**show lldp interface [<interface-type> <interface-id>] [mac-address <mac_addr>]**
Parameter Description	• **<interface-type>** - Displays the information about the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **i-lan / internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. • **<interface-id>** - Displays the information about the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID. • **mac-address <mac_addr>** - Displays information about neighbors for the specified destination MAC address of the LLDP agent.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command executes only if LLDP is started.
Example	**SEFOS# show lldp interface extreme-ethernet 0/1** Ex0/1: Tx State : Enabled Rx State : Enabled Tx SEM State : INITIALIZE Rx SEM State : INITIALIZE

```
Notification Status : Disabled
Notification Type   : Mis-configuration
DestinationMacAddr : 01:80:c2:00:00:0e
```

Related Command(s)

- **`set lldp`** - Enables or disables LLDP on the system.
- **`lldp transmit / receive -`** Sets LLDP admin status on an interface to Transmit or Receive.
- **`lldp notification -`** Enables LLDP trap notification on an interface.
- **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory.
- **`lldp dest-mac`** - Configures destination MAC-address to be used by the LLDP agent for transmission on this port.

16.20 show lldp neighbors

Command Objective	This command displays information about neighbors on an interface or all interfaces.
Syntax	**show lldp neighbors [chassis-id <string(255)> port-id <string(255)>] [<interface-type> <interface-id>][detail]**
Parameter Description	• **chassis-id <string(255)>** - Displays LLDP Neighbor information for the specified chassis identifier value This value is a string value with a maximum size of 255. • **port-id <string(255)>** - Displays LLDP Neighbor information for the specified port number that represents the concerned aggregation port. This value is a string value with a maximum size of 255. • **<interface-type>** - Displays information about neighbors for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **i-lan**– Internal LAN created on a bridge per IEEE 802.1ap. • **<interface-id>** - Displays information about neighbors for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided, for interface types i-lan. For example: 1 represents i-lan ID. • **detail** - Displays the information obtained from all the received TLVs.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command can be executed only if LLDP is started.
Example	**SEFOS# show lldp neighbors** Capability Codes : (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,

```
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
Chassis ID      Local Intf  Hold-time   Capability   Port Id
----------     ----------  ---------   ----------    -------
00:01:02:03:04:01  Ex0/1      120        B,R         Slot0/1
00:02:02:03:04:01  Ex0/2      120                    Slot0/3
00:02:02:03:04:01  Ex0/3      120                    Slot0/2
00:01:02:03:04:01  Ex0/2      120                    Slot0/2
00:01:02:03:04:01  Ex0/3      120                    Slot0/2
Total Entries Displayed : 5
```

SEFOS# show lldp neighbors chassis-id 00:01:02:03:04:01 port-id Slot0/2

```
Capability Codes   :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
Chassis ID   Local Intf   Hold-time  Capability   Port Id
----------   ----------   ---------  ----------     -----
00:01:02:03:04:01  Ex0/2        120                Slot0/2
00:01:02:03:04:01  Ex0/3        120                Slot0/2
Total Entries Displayed : 2
```

SEFOS# show lldp neighbors chassis-id 00:01:02:03:04:01 port-id Slot0/2 extreme-ethernet 0/2

```
Capability Codes   :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
Chassis ID    Local Intf   Hold-time  Capability   Port Id
----------    ----------   ---------  ----------     -----
00:01:02:03:04:01  Ex0/2        120               Slot0/2
Total Entries Displayed : 1
```

SEFOS# show lldp neighbors chassis-id 00:01:02:03:04:01 port-id Slot0/2 detail

```
Capability Codes   :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
Chassis Id SubType            : Mac Address
Chassis Id                    : 00:01:02:03:04:01
```

```
Port Id SubType                : Interface Alias
Port Id                        : Slot0/2
Port Description               : Not Advertised
System Name                    : Not Advertised
System Desc                    : Not Advertised
Local Intf                     : Ex0/2
Time Remaining                 : 92 Seconds
System Capabilities Tlv        : Not Advertised
Management Addresses           : Not Advertised
Extended 802.3 TLV Info
-MAC PHY Configuration & Status
Auto Negotiation Tlv           : Not Advertised
-Link Aggregation
Link Aggregation Tlv           : Not Advertised
-Maximum Frame Size Tlv        : Not Advertised
Extended 802.1 TLV Info
-Port VLAN Id                  : 0
-Port & Protocol VLAN Id
Protocol Vlan Tlv              : Not Advertised
-Vlan Name
Vlan Id        Vlan Name
-------        ---------
------------------------------------------------------------
Chassis Id SubType             : Mac Address
Chassis Id                     : 00:01:02:03:04:01
Port Id SubType                : Interface Alias
Port Id                        : Slot0/2
Port Description               : Not Advertised
System Name                    : Not Advertised
System Desc                    : Not Advertised
Local Intf                     : Ex0/3
Time Remaining                 : 92 Seconds
System Capabilities Tlv        : Not Advertised
Management Addresses           : Not Advertised
Extended 802.3 TLV Info
-MAC PHY Configuration & Status
Auto Negotiation Tlv           : Not Advertised
```

```
-Link Aggregation
Link Aggregation Tlv          : Not Advertised
-Maximum Frame Size Tlv       : Not Advertised
Extended 802.1 TLV Info
-Port VLAN Id                 : 0
-Port & Protocol VLAN Id
Protocol Vlan Tlv             : Not Advertised
-Vlan Name
Vlan Id        Vlan Name
-------        ---------
------------------------------------------------------------
Total Entries Displayed : 2
```

SEFOS# show lldp neighbors extreme-ethernet 0/1 detail

```
Capability Codes   :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable
Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
Chassis Id SubType            : Mac Address
Chassis Id                    : 00:01:02:03:04:01
Port Id SubType               : Interface Alias
Port Id                       : Slot0/1
Port Description              : Ethernet Interface
System Name                   : Oracle Linux Router Ver 1.0
System Desc                   : SNMPV2
Local Intf                    : Ex0/1
Time Remaining                : 95 Seconds
System Capabilities Supported : B,R
System Capabilities Enabled   : B,R
Management Addresses          :
IfId SubType Address                        OID
---- ------- -------                        ---
33   IPv4    12.0.0.1                    1 3 6 1 2 1 2 2 1
1
Extended 802.3 TLV Info
-MAC PHY Configuration & Status
Auto-Neg Support & Status     : Supported, Disabled
Advertised Capability Bits    : 8000
```

```
Other
-Link Aggregation
Capability & Status           : Not Capable, Not In
Aggregation
Aggregated Port Id            : 1
-Maximum Frame Size           : 1500
Extended 802.1 TLV Info
-Port VLAN Id                 : 1
-Port & Protocol VLAN Id
Protocol Vlan Id          Support        Status
----------------          -------        ------
1                         Supported      Enabled
2                         Supported      Enabled
30                        Supported      Enabled
-Vlan Name
Vlan Id        Vlan Name
-------        ---------
1              vlan1
2              vlan2
30             vlan30
------------------------------------------------------------
Total Entries Displayed : 1
```

Related Command(s)

- **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory.
- **`set lldp`** - Enables or disables LLDP on the system.
- **`clear lldp table -`** Clears all the LLDP table of information about the neighbors.
- **`lldp tlv-select basic-tlv`** – Configures basic TLV types to be transmitted on a given port.
- **`lldp tlv-select dot1tlv`** – Configures dot1 TLV types to be transmitted on a port.
- **`lldp tlv-select dot3tlv`** - Configures dot3 TLV types to be transmitted on a port.

16.21 show lldp traffic

Command Objective	This command displays LLDP counters on all interfaces or on a specific interface. This includes the following: • Total Frames Out • Total Entries Aged • Total Frames In • Total Frames Received In Error • Total Frames Discarded • Total TLVS Unrecognized • Total TLVs Discarded
Syntax	**`show lldp traffic [<iftype> <ifnum>[mac-address <mac_addr>]]`**
Parameter Description	• **`<iftype>`** - Displays the LLDP counters for specified type of interface. The interface can be: ▪ **`fastethernet`** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **`XL-ethernet`** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **`extreme-ethernet`** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **`i-lan / internal-lan`** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **`port-channel`** – Logical interface that represents an aggregator which contains several ports aggregated together. • **`<ifnum>`** - Displays the LLDP counters for specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID. • **`mac-address <mac_addr>`** - Displays information about neighbors for the specified destination MAC address of the LLDP agent.

Mode		Privileged EXEC Mode
Package		Workgroup, Enterprise, Metro and Metro_E
	Note:	This command executes only if LLDP is started.
Example		**SEFOS# show lldp traffic** Total Frames Out : 107 Total Entries Aged : 0 Total Frames In : 159 Total Frames Received In Error : 0 Total Frames Discarded : 0 Total TLVS Unrecognized : 0 Total TLVs Discarded : 0 **SEFOS# show lldp traffic extreme-ethernet 0/1** Total Frames Out : 49 Total Entries Aged : 0 Total Frames In : 42 Total Frames Received In Error : 0 Total Frames Discarded : 0 Total TLVS Unrecognized : 0 Total TLVs Discarded : 0 Total PDU length error Drops : 0
Related Command(s)		• **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory. • **set lldp** - Enables or disables LLDP on the system. • **clear lldp counters -** Clears the entire interface-related transmit and receive counters.

16.22 show lldp local

Command Objective	This command displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces.
Syntax	**show lldp local {[<interface-type> <interface-id> [mac-address <mac_addr>]] | [mgmt-addr]}**
Parameter Description	• **<interface-type>** - Displays the current switch information for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **i-lan / internal-lan** – Internal LAN created on a bridge per IEE E 802.1ap. ▪ **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together • **<interface-id>** - Displays the current switch information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID. • **mac-address <mac_addr>** - Displays information about neighbors for the specified destination MAC address of the LLDP agent. • **mgmt-addr** - All the management addresses configured in the system and Tx-enabled ports.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command can be executed only if LLDP is started.
Example	**SEFOS# show lldp local** Capability Codes : (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,

```
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Chassis Id SubType            : Mac Address
Chassis Id                    : 00:02:02:03:04:01
System Name                   : Oracle Linux Router Ver 1.0
System Description            : SNMPV2
System Capabilities Supported : B,R
System Capabilities Enabled   : B,R

Ex0/1 :
Port Id SubType               : Interface Alias
Port Id                       : Ex0/1
Port Description              : Ethernet Interface Port 01
Enabled Tx Tlvs               : Port Description, System
Description,
                                Management Address

Extended 802.3 TLV Info
-MAC PHY Configuration & Status
Auto-Neg Support & Status     :  ,
Advertised Capability Bits    : b24e
Other
10base-T(FD)
100base-T4
100base-T2(HD)
Asym PAUSE(FD)
1000base-X, -LX, -SX, -CX(HD)
1000base-X, -LX, -SX, -CX(FD)
1000base-T(HD)
Operational MAU Type          : 0
-Link Aggregation
Capability & Status           : Not Capable, Not In
Aggregation
Aggregated Port Id            : 0
-Maximum Frame Size           : 1500

Extended 802.1 TLV Info
-Port VLAN Id                 : 1
```

```
-Port & Protocol VLAN Id
Protocol VLAN Id    Support  Protocol VLAN Status   TxStatus
----------------   -------    -----------------     --------
0                  Supported  Enabled              Disabled
1                  Supported  Enabled              Disabled
-Vlan Name
Vlan Id        Vlan Name                           TxStatus
-------        ---------                           --------
1                                                  Disabled
-VID TLV:
VID            TxStatus
-------        ---------
0              Disabled
-Management Vid TLV:
Vlan Id        TxStatus
-------        ---------
1              Disabled
------------------------------------------------------------
SEFOS# show lldp local extreme-ethernet 0/1
Port Id SubType     : Interface Alias
Port Id             : Slot0/1
Port Description    : Ethernet Interface
Enabled Tx Tlvs     : Port Description, System Name,
                      System Description, System Capability,
                      Management Address, Port Vlan, Mac
Phy,
                      Link Aggregation, Max Frame Size
Extended 802.3 TLV Info
-MAC PHY Configuration & Status
Auto-Neg Support & Status     : Supported, Disabled
Advertised Capability Bits    : 8000
Other
Operational MAU Type         : 0
-Link Aggregation
Capability & Status         : Not Capable, Not In
Aggregation
Aggregated Port Id            : 1
```

```
-Maximum Frame Size           : 1500
Extended 802.1 TLV Info
-Port VLAN Id                 : 1
-Port & Protocol VLAN Id
Protocol VLAN Id   Support    Protocol VLAN Status
TxStatus
----------------   -------    --------------------     -----
-
1                    Supported  Enabled         Enabled
2                    Supported  Enabled         Enabled
30                   Supported  Enabled         Enabled
-Vlan Name
Vlan Id        Vlan Name                          TxStatus
-------        ---------                          --------
1              vlan1                              Enabled
2              vlan2                              Enabled
30             vlan3                              Enabled
------------------------------------------------------------
```

SEFOS# show lldp local mgmt-addr

```
Management Address              TxEnabledPorts
------------------              --------------
13.0.0.1                        Ex0/1
15.0.0.1                        Ex0/1
```

Related Command(s)

- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.
- **set lldp** - Enables or disables LLDP on the system.
- **lldp chassis-id-subtype** - Configures LLDP chassis ID subtype and chassis ID value.
- **lldp port-id-subtype** - Configures LLDP port ID subtype and port ID value for a given port.
- **lldp tlv-select basic-tlv** – Configures basic TLV types to be transmitted on a given port.
- **lldp tlv-select dot1tlv** – Configures dot1 TLV types to be transmitted on a port.
- **lldp tlv-select dot3tlv** - Configures dot3 TLV types to be transmitted on a port.

16.23 show lldp errors

Command Objective	This command displays the information about the errors such as memory allocation failures, queue overflows, and table overflow.
Syntax	**show lldp errors**
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**SEFOS# show lldp errors** Total Memory Allocation Failures : 0 Total Input Queue Overflows : 0 Total Table Overflows : 0
Note:	This command can be executed only if LLDP is started.
Related Command(s)	• **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory. • **set lldp** - Enables or disables LLDP on the system. • **lldp tlv-select basic-tlv** – Configures basic TLV types to be transmitted on a given port. • **lldp tlv-select dot1tlv** – Configures dot1 TLV types to be transmitted on a port. • **lldp tlv-select dot3tlv** - Configures dot3 TLV types to be transmitted on a port.

16.24 show lldp statistics

Command Objective	This command displays the LLDP remote table statistics information.
Syntax	**show lldp statistics**
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**SEFOS# show lldp statistics** Remote Table Last Change Time : 100300 Remote Table Inserts : 5 Remote Table Deletes : 0 Remote Table Drops : 0 Remote Table Ageouts : 0 Remote Table Updates : 4
Note:	This command can be executed only if LLDP is started.
Related Command(s)	• **set lldp** - Enables or disables LLDP on the system. • **lldp transmit / receive** - Sets LLDP admin status on an interface to transmit or receive. • **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

16.25 lldp dest-mac

Command Objective	This command configures destination MAC-address to be used by the LLDP agent for transmission on this port. The no form of the command resets the destination MAC-address to LLDP multicast address.
Syntax	**lldp dest-mac <mac_addr>** **no lldp dest-mac <mac_addr>**
Mode	Interface Configuration Mode (Physical Interfaces)
Package	Workgroup, Enterprise, Metro and Metro_E
Default	The default value would the LLDP multicast MAC address.
Note:	This command can be executed only if LLDP is started.
Example	**SEFOS(config-if)# lldp dest-mac 00:11:22:33:44:55**
Related Command(s)	• **no shutdown lldp** – . Enables all the ports by allocating the required resources in the LLDP. • **show lldp interface** - Displays the information about interfaces where LLDP is enabled.

16.26 set lldp version

Command Objective	This command enables the LLDP version to be used on the system.
Syntax	**`set lldp version {v1 | v2}`**
Parameter Description	• **`v1`** - Enables LLDP 2005 version 1 on the port • **`v2`** - Enables LLDP 2009 version 2 on the port
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	v1
Note:	This command executes only if LLDP is started.
Example	**`SEFOS(config)# set lldp version v2`**
Related Command(s)	• **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory. • **`show lldp`** - Displays LLDP global configuration details to initialize an interface.

16.27 lldp txCreditMax

Command Objective	This command configures the maximum number of consecutive LLDPDUs that can be transmitted any time. This value ranges from 1 to 10.
Syntax	**lldp txCreditMax <value (1-10)>**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	5
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config)# lldp txCreditMax 3**
Related Command(s)	• **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory. • **show lldp** - Displays LLDP global configuration details to initialize an interface.

16.28 lldp MessageFastTx

Command Objective	This command configures the interval at which LLDP frames are transmitted on behalf of this LLDP agent during fast transmission period. This value ranges from 1 to 3600 seconds.
Syntax	**lldp MessageFastTx <seconds(1-3600)>**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	1
Note:	This command executes only if LLDP is started.
Example	**SEFOS(config)# lldp MessageFastTx 3500**
Related Command(s)	• **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory. • **show lldp** - Displays LLDP global configuration details to initialize an interface.

16.29 lldp txFastInit

Command Objective	This command configures the value used to initialize the txFast variable which determines the number of transmissions that are made in fast transmission mode. This value ranges from 1 to 8.
Syntax	**`lldp txFastInit <value (1-8)>`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	4
Note:	This command executes only if LLDP is started.
Example	**`SEFOS(config)# lldp txFastInit 3`**
Related Command(s)	• **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory. • **`show lldp`** - Displays LLDP global configuration details to initialize an interface.

16.30 show lldp peer

Command Objective	This command displays information about the peers on an interface or all interfaces.
Syntax	**show lldp peers [chassis-id <string(255)> port-id <string(255)>] <interface-type> <interface-id>[[mac-address <mac_addr>] [detail]]**
Parameter Description	• **chassis-id <string(255)>** - Displays the LLDP peer information for the specified chassis identifier. This value is a string of maximum size 255. • **port-id <string(255)>** - Displays the port number that represents the concerned aggregation port This value is a string of maximum size 255. • **<interface-type>** - Displays information about LLDP peers for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **i-lan**– Internal LAN created on a bridge per IEEE 802.1ap. • **<interface-id>** - Displays information about peers for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided, for interface types i-lan. For example: 1 represents i-lan ID. • **mac-address <mac_addr>** - Displays information about peers for the specified destination MAC address of the LLDP agent. • **detail** - Displays the information obtained from all the received TLVs.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	This command can be executed only if LLDP is started.
Example	**SEFOS# show lldp peers extreme-ethernet 0/1**

```
Capability Codes   :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable
Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O)
Other

Chassis ID   Local Intf    Hold-time   Capability  Port Id
----------   ----------    ---------   ---------- -------
00:01:02:03:04:01  Ex0/1      120        B,R       Slot0/1
```

Related Command(s)

- **`no shutdown lldp`** – Starts all the ports in the LLDP and releases all the allocated memory.
- **`set lldp`** - Enables or disables LLDP on the system.
- **`clear lldp table -`** Clears all the LLDP table of information about the neighbors.
- **`lldp tlv-select basic-tlv`** – Configures basic TLV types to be transmitted on a given port.
- **`lldp tlv-select dot1tlv`** – Configures dot1 TLV types to be transmitted on a port.
- **`lldp tlv-select dot3tlv`** - Configures dot3 TLV types to be transmitted on a port.

CHAPTER 17

PNAC

PNAC (Port Based Network Access Control) is a portable implementation of the IEEE Std 802.1x PNAC. It can be used in both LAN Switches and Wireless LAN Access Points for providing security services. When used in LAN Switches, it offers access control to protected resources existing in the switched network. When used in WLAN Access Points, it provides authentication of the WLAN stations, and improves the security by making use of the periodically exchanged key for encrypting the data. PNAC can be very easily ported to different RTOS environments and interfaced to different switch hardware.

17.1 aaa authentication dot1x default

Command Objective	This command enables the dot1x local authentication, RADIUS server, or TACACS PLUS server-based remote authentication method for all ports. The actual authentication of the supplicant happens at the authentication server. The no form of the command disables dot1x in the switch.
Syntax	**aaa authentication dot1x default { group {radius | tacacsplus | tacacs+} | local}** **no aaa authentication dot1x default**
Parameter Description	• **radius** - Configures RADIUS as the authentication server. RADIUS offers authentication, authorization, and accounting management for computers to access a network. • **tacacsplus** - Configures TACACS PLUS as the remote authentication server. TACACS offers authentication, authorization, and accounting management for computers to access a network. This is mainly used for backward compatibility. • **tacacs+** - Configures TACACS+ as the authentication server. This feature has been included to adhere to the industry standard CLI syntax. • **local** - Configures local authentication as the authentication mode. It provides authentication based on usernames and password using EAP-MD5 authentication mechanism.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	local
Example	**SEFOS(config)# aaa authentication dot1x default group radius**
Related Command(s)	• **radius-server host** - Specifies RADIUS query parameters. • **dot1x local-database** - Configures the dot1x authentication server database with user name and password. • **show dot1x** - Displays dot1x detailed information.

17.2 dot1x local-database

Command Objective	This command configures dot1x authentication server local database with user name and password. The no form of the command deletes an entry from the dot1x authentication server database.
Syntax	**dot1x local-database <username> password <password> permission {allow | deny} [<auth-timeout (value(1-7200))>] [interface <interface-type> <interface-list>]** **no dot1x local-database <username>**
Parameter Description	• **<username>** - Configures the user name for the new entry in the database. • **password<password>** - Configures the password for the new entry in the database. • **permission** - Configures the permission for access for the user on a set of ports. The options are: ▪ **Allow**- Provides access to the user. ▪ **Deny**- Denies access to the user. • **<auth-timeout (value(1-7200))>** - Configures the time in seconds after which the authentication allowed to the user expires. Maximum value is 7200 seconds. When the timeout value is 0, the authenticator uses the re-authentication period of the authenticator port. • **<interface-type>** - Configures the interface type for the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **i-lan / internal-lan** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **port-channel** – Logical interface that represents an aggregator which contains several ports aggregated together. • **<interface-list>** - Configures the interface list for the specified interface identifier. This is a unique value that represents the specific interface.This value is a combination of slot number and port number

	separated by a slash, for interface type other than i-lan and port-channel.For example: 0/1 represents that the slot number is 0 and port number is 1.Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	• permission - allow • interface-list - all the physical interfaces
Example	**SEFOS(config)# dot1x local-database Oracle password admin123 permission allow auth-timeout 6000**
Related Command(s)	• **aaa authentication dot1x default** - Enables the dot1x local authentication. • **show dot1x** - Displays dot1x local database information.

17.3 set nas-id

Command Objective	This command sets the dot1x network access server ID. Network Access Server Identifier is set in the RADIUS packets sent to the Remote Authentication Server. Maximum length of the string is 16.
Syntax	**`set nas-id <identifier>`**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	fsNas1
Note:	NAS ID can be configured only if the remote authentication server is RADIUS or TACACS
Example	**`SEFOS(config)#set nas-id Identifier`**
Related Command(s)	• **`show dot1x`** - Displays dot1x information.

17.4 dot1x system-auth-control

Command Objective	This command enables dot1x in the switch. The dot1x is an authentication mechanism. It acts as mediator between the authentication server and the supplicant (client). If the client accesses the protected resources, it contacts the authenticator with EAPOL frames. The no form of this command disables dot1x in the switch.
Syntax	**dot1x system-auth-control** **no dot1x system-auth-control**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	dot1x is enabled.
Example	**SEFOS(config)# dot1x system-auth-control**
Related Command(s)	• **shutdown dot1x** - Shuts down dot1x capability. • **show dot1x** - Displays dot1x information.

17.5 shutdown dot1x

Command Objective	This command shuts down dot1x feature. By shutting down the dot1x feature, the supplicant-authenticator-authentication server architecture is dissolved. The data transport and authentication are directly governed by the authentication server/server. When shut down, all resources acquired by dot1x module are released to the system. The no form of the command starts and enables dot1x.
Syntax	**shutdown dot1x** **no shutdown dot1x**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**SEFOS(config)# shutdown dot1x**
Related Command(s)	• **dot1x system-auth-control** - Enables dot1x in the switch. • **show dot1x** - Displays dot1x information. • **base bridge-Mode** - Configures the mode in which the VLAN feature should operate on the switch. • **show dot1x distributed** - Displays distributed dot1x authentication status and statistics information for the dot1x-enabled ports. • **show dot1x distributed detail** - Displays distributed dot1x general informations. • **dot1x distributed** - Configures periodic sync timer and max alive count for Distributed-PNAC. • **dot1x mode** - Sets the mode for dot1x.

17.6 dot1x init-session

Command Objective		This command initiates dot1x authentication session for the given MAC address of the supplicant. The supplicant requests for access to the protected network. It sends EAPOL(Extensible Authentication Protocol) frames to the authenticator. When the supplicant is authorized by the remote server, the session is initiated.
	Note:	This command is not supported in BCM target. For complete list of unsupported commands in BCM , refer Chapter 68, section 68.1.40, BCM Unsupported Commands.
Syntax		**dot1x init-session <supp addr - aa:aa:aa:aa:aa:aa>**
Mode		Global Configuration Mode
Package		Workgroup, Enterprise, Metro and Metro_E
	Note:	The supplicant MAC address must be authorized prior to the execution of this command.
Example		**SEFOS(config)# dot1x init-session 00:1e:58:a7:f3:93**
Related Command(s)		• **dot1x init session-reauth** - Initiates dot1x reauthentication session • **dot1x system-auth-control** - Enables dot1x in the switch • **dot1x local-database –** Configures dot1x local database with values • **dot1x port-control** - Configures the authenticator port control parameter • **show dot1x mac-info –** Displays PNAC MAC database.

17.7 dot1x init session-reauth

Command Objective	This command initiates dot1x re-authentication session for the specified MAC address. When the supplicant has exceeded the time limit for accessing the protected network, the supplicant is forced to re-authenticate. This is to ensure that the supplicant is the same entity that was initially authenticated.
Syntax	**dot1x init session-reauth <supp addr - aa:aa:aa:aa:aa:aa >**
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Note:	On execution of this command, the authenticator initiates re-authentication for the specified supplicant MAC address.
Example	**SEFOS(config dot1x init session-reauth 00:1e:58:a7:f3:93**
Related Command(s)	• **dot1x init-session –** Initiates dot1x authentication session. • **dot1x system-auth-control** - Enables dot1x in the switch. • **dot1x local-database –** Configures dot1x local database with values. • **dot1x port-control** - Configures the authenticator port control parameter. • **show dot1x mac-info –** Displays PNAC MAC database.

17.8 dot1x default

Command Objective	This command configures dot1x with default values for this port. The previous configurations on this port are reset to the default values. These details are not displayed but are the basic settings for a port.
Syntax	**`dot1x default`**
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**`SEFOS(config-if)# dot1x default`**
Related Command(s)	• **`dot1x reauthentication`** - Enables periodic re-authentication of the client. • **`dot1x port-control`** - Configures the authenticator port control parameter. • **`dot1x timeout`** - Sets the dot1x timers. • **`show dot1x`** - Displays dot1x interface information.

17.9 dot1x max-req

Command Objective	This command sets the maximum number of EAP (Extensible Authentication Protocol) retries to the client by the authenticator before restarting authentication process. The count value ranges between 1 and 10. The no form of the command sets the maximum number of EAP retries to the client to default value.
Syntax	**dot1x max-req <count(1-10)>** **no dot1x max-req**
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	count - 2
Note:	The default value of this command must be changed only to adjust for unusual circumstances such as unreliable links or specific behavioral problems with authentication server or local clients.
Example	**SEFOS(config-if)# dot1x max-req 5**
Related Command(s)	• **show dot1x** - Displays dot1x information

17.10 dot1x max-start

Command Objective	This command sets the maximum number of EAPOL retries to the authenticator. The value range is 1 to 65535. The no form of the command sets the maximum number of EAPOL retries to the authenticator to its default value.
Syntax	**dot1x max-start <count(1-65535)>** **no dot1x max-start**
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise and Metro
Default	3
Example	**SEFOS(config-if)# dot1x max-start 2**
Related Command(s)	• **show dot1x** - Displays dot1x information.

17.11 dot1x reauthentication

Command Objective	This command enables periodic re-authentication from authenticator to client. The periodic re-authentication is requested to ensure if the same supplicant is accessing the protected resources. The amount of time between periodic re-authentication attempts can be configured manually. The no form of the command disables periodic re-authentication from authenticator to client.
Syntax	**`dot1x reauthentication`** **`no dot1x reauthentication`**
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Periodic re-authentication is disabled.
Note:	This command will execute only if the authenticator port control parameter is auto.
Example	**`SEFOS(config-if)# dot1x reauthentication`**
Related Command(s)	• **`dot1x default`** - Configures dot1x with default values for this port. • **`dot1x timeout`** - Sets the dot1x timers. • **`show dot1x`** - Displays dot1x information. • **`dot1x port-control`** - Configures the authenticator port control parameter.

17.12 dot1x timeout

Command Objective	This command sets the dot1x timers. The timer module manages timers, creates memory pool for timers, creates timer list, starts, and stops timer. It provides handlers to respective expired timers. The no form of the command sets the dot1x timers to the default values.
Syntax	**dot1x timeout {quiet-period <value (0-65535)> | {reauth-period | server-timeout | supp-timeout | tx-period | start-period | held-period | auth-period }<value (1-65535)>}** **no dot1x timeout {quiet-period | reauth-period | server-timeout | supp-timeout | tx-period | start-period | held-period | auth-period}**
Parameter Description	• **quiet-period <value (0-65535)>** - Configures the quiet-period. Number of seconds that the switch remains in the quiet state following a failed authentication exchange with the client. • **reauth-period** - Configures the reauth-period. Number of seconds between re-authentication attempts. • **server-timeout** - Configures the number of seconds that the switch waits for the retransmission of packets to the authentication server. • **supp-timeout** - Configures the number of seconds that the switch waits for the retransmission of packets to the client. • **tx-period** - Configures the number of seconds that the switch waits for a response to an EAP-request/identity frame from the client before retransmitting the request • **start-period** - Configures the number of seconds that the supplicant waits between successive retries to the authenticator. • **held-period** - Configures the number of seconds that the supplicant waits before trying to acquire the authenticator. • **auth-period <value(1-65535)>** - Configures the number of seconds that the supplicant waits before timing-out the authenticator.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	• quiet-period - 60 seconds

		• reauth-period - 3600 seconds • server-timeout - 30 seconds • supp-timeout - 30 seconds • tx-period - 30 seconds • start-period - 30 seconds • held-period - 60 seconds • auth-period - 30 seconds
	Note:	Only one timer can be configured using this command, that is, the user can configure either the quiet-period or tx-period, but not both.
Example		**`SEFOS(config-if)# dot1x timeout quiet-period 30`**
Related Command(s)		• **`dot1x default`** - Configures dot1x with default values for this port. • **`dot1x max-req`** - Sets the maximum number of EAP retries to the client before restarting authentication process. • **`dot1x reauthentication`** - Enables periodic re-authentication of the client. • **`show dot1x`** - Displays dot1x information.

17.13 dot1x port-control

Command Objective	This command configures the authenticator port control parameter. The dot1x exercises port-based authentication to increase the security of the network. The different modes employed by the ports offer varied access levels. The 802.1x protocol is supported on both Layer 2 static-access ports and Layer 3 routed ports. The no form of the command sets the authenticator port control state to force authorized.
Syntax	**dot1x port-control {auto|force-authorized|force-unauthorized}** **no dot1x port-control**
Parameter Description	• **auto** - Configures the 802.1x authentication process in this port. Causes the port to begin the unauthorized state, allowing only EAPOL frames to be sent and received through the port. The authentication process begins when the link state of the port transitions from down to up or when an EAPOL-start frame is received. The switch requests the identity of the client and begins relaying authentication messages between the client and the authentication server. The switch can uniquely identify each client attempting to access the network by the client's MAC address. • **force-authorized** - Configures the port to allow all the traffic through this port. Disables 802.1x authentication and causes the port to transit to the authorized state without requiring authentication exchange. The port transmits and receives normal traffic without 802.1x-based authentication of the client. • **force-unauthorized** - Configures the port to block all the traffic through this port. Causes the port to remain in the unauthorized state, ignoring all attempts by the client to authenticate. The switch cannot provide authentication services to the client through the interface.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	force-authorized
Note:	The `auto` keyword can be used only if the port is not configured.
Example	**SEFOS(config-if)# dot1x port-control auto**
Related Command(s)	• **dot1x default** - Configures dot1x with default values for this port.

- **`switchport Mode dot1q-tunnel`** - Enables dot1q-tunneling on the specified interface.
- **`dot1x reauthentication`** - Enables periodic re-authentication of the client.
- **`show dot1x`** - Displays dot1x information.

17.14 dot1x access-control

Command Objective	This command configures the supplicant access control. This setting is for the application of the supplicant authorization state when the port is operating as both supplicant and authenticator. The no form of the command sets the access control to inactive.
Syntax	**dot1x access-control {active | inactive}** **no dot1x access-control**
Parameter Description	• **active** - Configures the port to apply both the supplicant authorization state and authenticator authorization state. • **inactive** - Configures the port to use only the authenticator authorization state to restrict access to the port and not the the supplicant authorization state.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	inactive
Example	**SEFOS(config-if)# dot1x access-control active**
Related Command(s)	• **show dot1x** - Displays dot1x information.

17.15 dot1x control-direction

Command Objective	This command configures port control direction. The switch port authenticates incoming packets and outgoing packets. The direction can be configured manually by selecting either in or both. By default the value is both. The no form of the command sets the authenticator port control direction to both.
Syntax	**dot1x control-direction {in | both}** **no dot1x control-direction**
Parameter Description	• **in** - Configures the port to authenticate only the incoming packets. • **both** - Configures the port to authenticate both incoming and outgoing packets.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	both
Example	**SEFOS(config-if)# dot1x control-direction in**
Related Command(s)	• **show dot1x** - Displays dot1x information.

17.16 dot1x auth-Mode

Command Objective	This command configures the authentication mode of a port as either port-based (which is also known as multi-host) or MAC-based (which is also known as single-host). Port-based authentication has different modes of authentication. MAC-based authentication allows secured MAC addresses to pass through the port. Non secure MAC addresses are dropped. The no form of the command configures the port authentication mode to its default values.
Syntax	**`dot1x auth-Mode {port-based | mac-based}`** **`no dot1x auth-Mode`**
Parameter Description	• **`port-based`** - Configures the port's authentication mode to port-based. The port authenticates the host to use the restricted resource. The port state is changed to authorize. The traffic flows through the port without any access restriction till an event that causes the port state to become unauthorized. • **`mac-based`** - Configures the port to MAC-based authentication. On receiving tagged, untagged data, or control frames from the CFA Module, it checks if the source MAC is present in the Authenticator Session Table and is authorized. ▪ If it is present in the table and is authorized, the result is passed to CFA, which then forwards the frame to the appropriate destination module. ▪ If it is present in the table but not authorized, the CFA Module is intimated and the frame is dropped at the CFA Module. ▪ If neither of the above occurs, the authenticator will initiate a new authentication session for that source MAC address and return the unauthorized status to the CFA Module, which then drops the frame. Note: This parameter is not supported in BCM target. For complete list of unsupported commands in BCM , refer Chapter 68, section 68.1.40, BCM Unsupported Commands.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	port-based
Note:	To configure the auth mode of a port as MAC-based, port control of the port must be set as auto.

Example	`SEFOS(config-if)# dot1x auth-Mode mac-based`
Related Command(s)	• **`dot1x port-control`** - Configures the authenticator port control parameter.

17.17 dot1x host-Mode

Command Objective	This command configures the port authentication mode of a port as either multi-host (which is also known as port-based) or single-host (which is also known as MAC-based). Multi host authentication has different modes of authentication. Single host authentication allows secured MAC addresses to pass through the port. Non secure MAC addresses are dropped. This command is a standardized implementation of the existing command; **`dot1x auth-Mode`**. It operates in a similar manner to the existing command.
Syntax	**`dot1x host-Mode {multi-host | single-host}`**
Parameter Description	• **`multi-host`** - Configures the port to multi host authentication mode and performs port-based authentication. More than one host can be connected to the port using an Ethernet hub attached to the port. • **`single-host`** - Configures the port to single host authentication mode and performs MAC-based authentication. Only one host can be connected to the port.
Mode	Interface Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	multi-host
Note:	To configure the auth mode of a port as single-host, port control of the port must be set as auto.
Example	**`SEFOS(config-if)# dot1x host-Mode single-host`**
Related Command(s)	• **`dot1x port-control`** - Configures the authenticator port control parameter.

17.18 dot1x re-authenticate

Command Objective	This command initiates re-authentication of all dot1x-enabled ports or the specified dot1x-enabled port. This initializes the state machines and sets up the environment for fresh authentication. Re-authentication is manually configured if periodic re-authentication is not enabled. Re-authentication is requested by the authentication server to the supplicant to furnish the identity without waiting for the configured number of seconds (re-authperiod). If no interface is specified, re-authentication is initiated on all dot1x ports.
Syntax	**dot1x re-authenticate [interface <interface-type><interface-id>]**
Parameter Description	• **<interface type>** -Configures the specified type of interface. The interface can be: ▪ **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **i-lan** – Internal LAN created on a bridge per IEEE 802.1ap. • **<interface id>** - Configures the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided, for interface types i-lan. For example: 1 represents i-lan ID.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**SEFOS# dot1x re-authenticate interface extreme-ethernet 0/1**
Related Command(s)	• **show dot1x** - Displays dot1x information.

17.19 dot1x initialize

Command Objective	This command initializes the state machines and sets up the environment for fresh authentication. This initiates re-authentication of all dot1x-enabled ports or the specified dot1x-enabled port. Re-authentication is manually configured if periodic re-authentication is not enabled. Re-authentication is requested by the authentication server to the supplicant to furnish the identity without waiting for the configured number of seconds (re-authperiod). If no interface is specified, re-authentication is initiated on all dot1x ports This command is a standardized implementation of the existing command; **`dot1x re-authenticate`**. It operates in a similar manner to the existing command.
Syntax	**`dot1x initialize [interface <interface-type> <interface-id>]`**
Parameter Description	• **`<interface type>`** - Configures state machines for the specified type of interface. The interface can be: ▪ **`fastethernet`** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. ▪ **`XL-ethernet`** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. ▪ **`extreme-ethernet`** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. ▪ **`i-lan`** – Internal LAN created on a bridge per IEEE 802.1ap. • **`<interface id>`** - Configures state machines for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided, for interface types i-lan. For example: 1 represents i-lan ID.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**`SEFOS# dot1x initialize interface extreme-ethernet 0/1`**
Related Command(s)	• **`show dot1x`** - Displays dot1x information.

17.20 debug dot1x

Command Objective	This command enables debugging of dot1x module. The failure messages and error information are captured by the debug traces. Different traces are enabled to capture particular performance failures. Only one trace can be enabled at a time. The no form of the command disables debugging of dot1x module.
Syntax	**debug dot1x {all | errors | events | packets | state-machine | redundancy | registry }** **no debug dot1x {all | errors | events | packets | state-machine | redundancy | registry }**
Parameter Description	• **all** - All dot1x debug messages. • **errors** - Generates debug statement for all failure traces of the traces mentioned below. • **events** - Generates debug statements for event handling traces. This trace is generated when there is a failure in state machine or event processing. • **packets** - Generates debug statements for packets handling traces. This trace is generated when there is an error condition in transmission or reception of packets. • **state-machine** - Generates debug statements for state machine handling traces. This trace is generated when there is an error condition in state machine. • **redundancy** - Generates debug statements for redundancy code flow traces. This trace is generated when there is a failure in redundancy processing. • **registry** - Generates debug statements for dot1x registry debug traces. This feature has been included to adhere to the industry standard CLI syntax. This feature is currently not supported.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	Events Debugging is enabled.
Example	**SEFOS# debug dot1x all**

Related Command(s)	• **`show dot1x`** – Displays dot1x information.

17.21 show dot1x

Command Objective	This command displays dot1x information. The configured information can be viewed by running this show command. The show command is used when there is any change in the port configuration, in order to configure the port as desired.
Syntax	**show dot1x [{ interface <interface-type> <interface-id> | statistics interface <interface-type> <interface-id> | supplicant-statistics interface <interface-type> <interface-id>|local-database | mac-info [address <aa.aa.aa.aa.aa.aa>] | mac-statistics [address <aa.aa.aa.aa.aa.aa>] | all }]**
Parameter Description	• **interface <interface-type> <interface-id>** - Displays dot1x parameters for the switch or the specified interface. ▪ **<interface type>** - Displays the dot1x information for the specified type of interface. The interface can be: • **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. • **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. • **i-lan** – Internal LAN created on a bridge per IEEE 802.1ap. ▪ **<interface id> -** Displays the dot1x information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided, for interface type i-lan. For example: 1 represents i-lan ID. • **statistics interface <interface-type> <interface-id>** - Displays dot1x authenticator port statistics parameters for the switch or the specified interface. ▪ **<interface-type>** -The interface can be: • **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second. • **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second. • **i-lan** – Internal LAN created on a bridge per IEEE 802.1ap.

- **<interface-id>** - Displays the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided, for interface type i-lan. For example: 1 represents i-lan ID.

- **supplicant-statistics interface<interface-type> <interface-id>** - Displays dot1x supplicant statistics parameters for the switch or the specified interface.
  - **<interface-type>** - The interface can be:
    - **fastethernet** – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second.
    - **XL-ethernet** – A version of LAN standard architecture that supports data transfer upto 40 Gigabits per second.
    - **extreme-ethernet** – A version of Ethernet that supports data transfer upto 10 Gigabits per second.
    - **i-lan** – Internal LAN created on a bridge per IEEE 802.1ap.
  - **<interface-id>** - Displays the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan For example: 0/1 represents that the slot number is 0 and port number is 1.Only i-lan ID is provided, for interface type i-lan. For example: 1 represents i-lan ID.

- **local-database** - Displays dot1x authentication server database with user name and password.

- **mac-info [address <aa.aa.aa.aa.aa.aa>]** - Displays dot1x information for all MAC session or the specified MAC address

  Note: This parameter is not supported in BCM target. For complete list of unsupported commands in BCM , refer Chapter 68, section 68.1.40, BCM Unsupported Commands.

- **mac-statistics [address <aa.aa.aa.aa.aa.aa>]** - Displays dot1x MAC statistics for all MAC sessions or the specified MAC address.

- **all** - Displays dot1x status for all interfaces.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise, Metro and Metro_E

Note:

- If an interface is not specified, global parameters and a summary appear.
- Expressions are case sensitive.
- If address is not specified for mac-info and mac-statistics, then this

command displays the MAC sessions and MAC statistics of all the supplicant MAC addresses.

Example

```
SEFOS# show dot1x

Sysauthcontrol                       = Enabled

Module Oper Status                   = Enabled

Dot1x Protocol Version               = 2

Dot1x Authentication Method          = Local

Nas ID                               = fsNas1

SEFOS# show dot1x local-database

Pnac Authentication Users Database

-----------------------------------

User name      : brg2

Protocol       : 4

Timeout        : 0 seconds

Ports          : Ex0/1, Ex0/2, Ex0/3, Ex0/4, Ex0/5, Ex0/6,
Ex0/7, Ex0/8, Ex0/9,

Ex0/10, Ex0/11, Ex0/12, Ex0/13, Ex0/14, Ex0/15, Ex0/16,
Ex0/17, Ex0/18, Ex0/19,

Ex0/20, Ex0/21, Ex0/22, Ex0/23, Ex0/24

Permission     : Allow

---------------------------------

SEFOS# show dot1x   all


Dot1x Info for Ex0/1

---------------------


AuthMode              = PORT-BASED

PortStatus            = UNAUTHORIZED

AccessControl         = INACTIVE


AuthSM State          = CONNECTING

SuppSM State          = CONNECTING

BendSM State          = IDLE

AuthPortStatus        = UNAUTHORIZED

SuppPortStatus        = UNAUTHORIZED

AdminControlDirection = IN

OperControlDirection  = BOTH
```

```
MaxReq                = 5
Port Control          = Auto
QuietPeriod           = 30 Seconds
Re-authentication     = Disabled
ReAuthPeriod          = 3600 Seconds
ServerTimeout         = 30 Seconds
SuppTimeout           = 30 Seconds
Tx Period             = 30 Seconds

Dot1x Info for Ex0/2
---------------------

AuthMode              = PORT-BASED
PortStatus            = AUTHORIZED
AccessControl         = INACTIVE

AuthSM State          = INITIALIZE
SuppSM State          = DISCONNECTED
BendSM State          = INITIALIZE
AuthPortStatus        = AUTHORIZED
SuppPortStatus        = UNAUTHORIZED
AdminControlDirection = BOTH
OperControlDirection  = BOTH
MaxReq                = 2
Port Control          = Force Authorized
QuietPeriod           = 60 Seconds
Re-authentication     = Disabled
ReAuthPeriod          = 3600 Seconds
ServerTimeout         = 30 Seconds
SuppTimeout           = 30 Seconds
Tx Period             = 30 Seconds

Dot1x Info for Ex0/3
---------------------

AuthMode              = PORT-BASED
PortStatus            = AUTHORIZED
```

```
AccessControl          = INACTIVE

AuthSM State           = FORCE AUTHORIZED
SuppSM State           = FORCE AUTHORIZED
BendSM State           = INITIALIZE
AuthPortStatus         = AUTHORIZED
SuppPortStatus         = AUTHORIZED
AdminControlDirection = BOTH
OperControlDirection  = BOTH
MaxReq                 = 2
Port Control           = Force Authorized
QuietPeriod            = 60 Seconds
Re-authentication      = Disabled
ReAuthPeriod           = 3600 Seconds
ServerTimeout          = 30 Seconds
SuppTimeout            = 30 Seconds
Tx Period              = 30 Seconds
```

SEFOS# show dot1x statistics interface extreme-ethernet 0/1

```
PortStatistics Parameters for Dot1x
-----------------------------------

TxReqId         = 8
TxReq           = 0
TxTotal         = 8

RxStart         = 0
RxLogoff        = 0
RxRespId        = 0
RxResp          = 0

RxInvalid       = 0
RxLenErr        = 0
RxTotal         = 0

RxVersion       = 0
```

LastRxSrcMac   = 00:00:00:00:00:00SEFOS# show dot1x

```
supplicant-statistics interface extreme-ethernet 0/1
PortStatistics Parameters for Dot1x-Supplicant
-----------------------------------------------

TxStart          = 2
TxRespId         = 0
TxResp           = 0
TxLogoff         = 0
TxTotal          = 2

RxReqId          = 0
RxReq            = 0

RxInvalid        = 0
RxLenErr         = 0
RxTotal          = 0

RxVersion        = 0
LastRxSrcMac     = 00:00:00:00:00:00
```

Related Command(s)

- **dot1x default** - Configures dot1x with default values for that port.
- **dot1x local-database –** Configures dot1x local database with values.
- **dot1x system-auth-control** – Enables dot1x in the switch
- **aaa authentication dot1x default –** Configures if the authentication is remote or local
- **set nas-id** - Configures the nas-id for the dot1x.
- **dot1x default –** Configures dot1x with default values for the port.
- **dot1x max-req –** Configures the maximum number of EAP retries to the client.
- **dot1x reauthentication –** Configures the periodic reauthentication for the client.
- **dot1x timeout -** Sets the dot1x timers
- **dot1x port-control –** Configures the dot1x port control parameters

- **`dot1x access-control –`** Configures the supplicant access control.
- **`dot1x control-direction –`** Configures the port control direction.
- **`dot1x re-authenticate –`** Initiates re-authentication of all dot1x-enabled ports.
- **`shutdown dot1x –`** Shuts down the dot1x feature.
- **`debug dot1x –`** Debugs the dot1x for specified traces.
- **`dot1x mode`** - Sets the mode for dot1x.
- **`show dot1x distributed`** - Displays distributed dot1x authentication status and statistics information for the dot1x-enabled ports.

17.22 dot1x mode

Command Objective	This command sets the PNAC mode as centralized or Distributed-PNAC. D-PNAC comprises Master and Slave functionality. It is an extension of PNAC which provides the ability to extend the access control in the system working over a single card to multiple cards with each operating in a distributed fashion.
Syntax	**dot1x mode {centralized | distributed }**
Parameter Description	• **centralized** - Enables PNAC (Port-based Network Access Control). • **distributed** - Enables Distributed-PNAC in the system.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	centralized
Note:	This command executes only if dot1x is started in the system.
Example	**SEFOS(config)# dot1x mode distributed**
Related Command(s)	• **no shutdown dot1x** - Starts dot1x in the system. • **show dot1x distributed** - Displays distributed dot1x authentication status and statistics information for the dot1x-enabled ports. • **show dot1x distributed detail** - Displays distributed dot1x general information. • **dot1x distributed** - Configures periodic sync timer and max alive count for Distributed-PNAC. • **show dot1x** - Displays dot1x information.

17.23 dot1x distributed

Command Objective	This command configures periodic sync timer and max alive count for Distributed-PNAC. The no form of the command resets periodic sync timer and max alive count for Distributed-PNAC to its default value.
Syntax	**dot1x distributed ([periodic-sync-time <short<0-300)>] [max-keep-alive-count <short(1-5)>])** **no dot1x distributed ([periodic-sync-time] [max-keep-alive-count])**
Parameter Description	• **periodic-sync-time <short<0-300)>** - Configures the D-PNAC periodic sync timer used in Distributed-PNAC.The periodic sync timer is used to configure the transmission interval of D-PNAC periodic-sync PDUs. In the master node, this timer expiry is used to identify the slave down status and remove the slave node information. This runs individually in each D-PNAC node. This value ranges from 0 to 300 seconds. Note: The configured value of this timer is applicable only from the next start or restart of the timer. Note: If the configured value is '0', then no periodic-sync messages will be sent from that D-PNAC node. • **max-keep-alive-count <short(1-5)>]** - Configures keep alive mechanism when Distributed-PNAC status is enabled. This is maintained by Master Node. This value ranges from 1 to 5. Note: The keep alive count of all remote D-PNAC nodes is incremented every time the periodic-sync timer expires. Note: The value resets to zero for a particular D-PNAC node, only on receiving periodic-sync or event-update message from that particular remote D-PNAC node. Note: If keep alive count of any of the Remote D-PNAC nodes reaches the maximum keep alive count, the Remote D-PNAC node is declared as operationally down or dead.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	• periodic-sync-time - 60 seconds • max-keep-alive-count - 3

Example	**`SEFOS(config)# dot1x distributed periodic-sync-time 300 max-keep-alive-count 2`**
Related Command(s)	• **`dot1x mode`** - Sets the mode for dot1x. • **`show dot1x distributed`** - Displays distributed dot1x authentication status and statistics information for the dot1x-enabled ports. • **`show dot1x distributed detail`** - Displays distributed dot1x general information.

17.24 show dot1x distributed

Command Objective	This command displays distributed dot1x authentication status and statistics information for the dot1x-enabled ports.
Note:	The command works with NPSIM with MBSM enabled.
Syntax	**show dot1x distributed {auth-status [slot <integer (0-2147483647)>] | statistics [slot <integer (0-2147483647)>]}**
Parameter Description	• **auth-status slot <integer (0-2147483647)>** - Displays the authentication status of each port belonging to the slot. This value ranges from 0 to 2147483647. • **statistics slot <integer (0-2147483647)>** - Displays the statistics information about eventupdate like- DPNAC Tx/Rx and periodic DPNAC Tx/Rx based on slot.This value ranges from 0 to 2147483647.
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Default	local
Example	**SEFOS# show dot1x distributed auth-status** DPNAC Authentication Information: Slot 0 ---------- Port Property Authentication Status Control Direction ---------- Ex0/1 Local Authorized BOTH DPNAC Authentication Information: Slot 1 ---------- Port Property Authentication Status Control Direction ---------- Gi1/1 Remote Authorized BOTH
Related Command(s)	• **dot1x mode** - Sets the mode for dot1x. • **dot1x distributed** - Configures periodic sync timer and max alive

count for Distributed-PNAC.

17.25 show dot1x distributed detail

Command Objective	This command displays distributed dot1x general information like PNAC status, role played, periodic synchronous time, and maximum keep alive count.
Syntax	**show dot1x distributed detail**
Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise, Metro and Metro_E
Example	**SEFOS# show dot1x distributed detail** DPNAC Detail information -------------------------- PNAC Status : Distributed Role-Played : Master Periodic Sync-Timer : 300 Seconds Maximum Keep Alive Count : 2
Related Command(s)	• **dot1x mode** - Sets the mode for dot1x. • **dot1x distributed** - Configures periodic sync timer and max alive count for Distributed-PNAC.