Oracle® Ethernet Switches

L2 and L3 Deployment Best Practices

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Contents

Using This Documention

This guide describes how to configure common usage topologies.

These instructions are for enterprise network and system administrators.

Product Notes

For late-breaking information and known issues about Oracle Ethernet switches used in this guide, refer to the product notes.

For Oracle Switch ES1-24:

`http://www.oracle.com/goto/ES1-24/docs`

For Sun Network 10GbE Switch 72p:

`http://www.oracle.com/goto/SN-10GbE-72p/docs`

For Sun Blade 6000 Ethernet Switched NEM 24p 10GbE:

`http://www.oracle.com/goto/SB6K-24p-10GbE/docs`

Related Documentation

Documentation	Links
All Oracle products	http://docs.oracle.com
Oracle Switch ES1-24	http://www.oracle.com/goto/ES1-24/docs
Sun Network 10GbE Switch 72p	http://www.oracle.com/goto/SN-10GbE-72p/docs
Sun Blade 6000 Ethernet Switched NEM 24p 10GbE	http://www.oracle.com/goto/SB6K-24p-10GbE/docs
Oracle Integrated Lights Out Manager (Oracle ILOM) 3.0	http://www.oracle.com/pls/topic/lookup?ctx=ilom30

For detailed information about the commands and options described in this document, refer to the *Sun Ethernet Fabric Operating System CLI Base Reference Manual* and the *Sun Ethernet Fabric Operating System CLI Enterprise Reference Manual*.

CLI Command Modes

The following table lists the configuration modes used in this document with their access and exit methods.

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Access SEFOS from Oracle ILOM with read-only rights (privilege level 1).	`SEFOS>`	Use the `logout` or `exit` command to return to the Oracle ILOM prompt.
Privileged EXEC	Access SEFOS from Oracle ILOM with full administrative rights (privilege level 15).	`SEFOS#`	Use the `logout` or `exit` command to return to the Oracle ILOM prompt.
Global Configuration	From User EXEC mode, use the `configure terminal` command.	`SEFOS(config)#`	Use the `end` command to return to Privileged EXEC mode.
Interface Configuration	From Global Configuration mode, use the `interface` *interface-type interface-id* command.	`SEFOS(config-if)#`	Use the `exit` command to return to Global Configuration mode, or use the `end` command to return to Privileged EXEC mode.

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http://www.oracle.com/goto/docfeedback

Support and Accessibility

Oracle customers have access to electronic support through My Oracle Support. For information visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

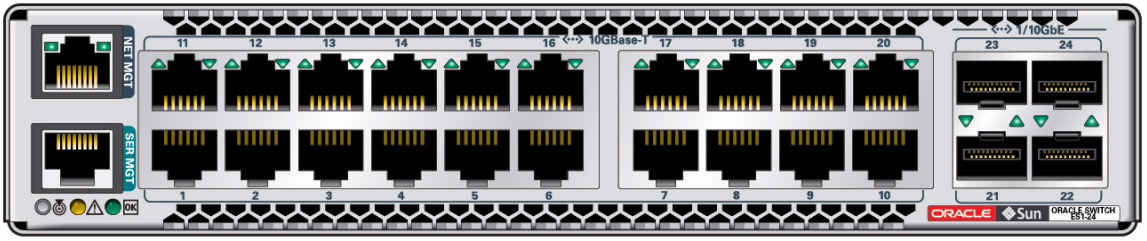
Switches Overview

These topics describe the switches used in this guide.

Related Information

Oracle Switch ES1-24

Oracle Switch ES1-24 is a standalone half-width 1U, 10GbE switch. The switch provides 20 10GBASE-T ports supporting 100M/1G/10GbE and four SFP+ ports supporting 1/10GbE. The switch rackmount kit supports either single or dual switch configurations.



For installation, configuration, and management information, refer to the documentation at: `http://www.oracle.com/goto/ES1-24/docs`

Additional L2 and L3 Configurations for Oracle Switch ES1-24

For the following configurations, refer to the *Oracle Switch ES1-24 Configuration Guide* at: `http://www.oracle.com/goto/ES1-24/docs`

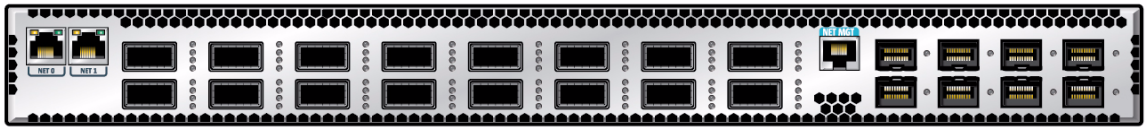
- Switching Feature
  - VLAN Forwarding
  - RSTP
  - LA
- Routing Feature
  - Static Unicast Route Entries
  - Dynamic Routing with RIP
  - Dynamic Routing with OSPF

Related Information

- "Sun Network 10GbE Switch 72p" on page 3
- "Sun Blade 6000 Ethernet Switched NEM 24p 10GbE" on page 4

Sun Network 10GbE Switch 72p

Sun Network 10GbE Switch 72p is a 1U standalone multipurpose TOR switch. The switch provides connection to external devices through 16 QSFP connectors with four 10GbE ports each and eight 10GbE SFP+ ports. The switch connects servers and storage devices in a rack environment.



For installation, configuration, and management information, refer to the documentation at: http://www.oracle.com/goto/SN-10GbE-72p/docs

Additional L2 and L3 Configurations for Sun Network 10GbE Switch 72p

For the following configurations, refer to the *Sun Network 10GbE Switch 72p Software Configuration Guide* at: http://www.oracle.com/goto/SN-10GbE-72p/docs

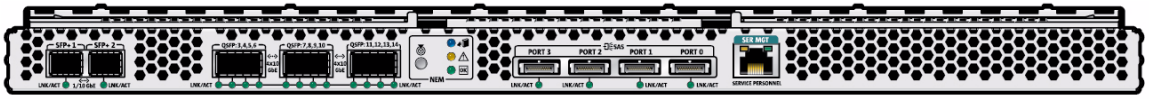
- Switching Feature
  - VLAN Forwarding
  - RSTP
  - LA
- Routing Feature
  - Static Unicast Route Entries
  - Dynamic Routing with RIP
  - Dynamic Routing with OSPF

Related Information

- "Oracle Switch ES1-24" on page 2
- "Sun Blade 6000 Ethernet Switched NEM 24p 10GbE" on page 4

Sun Blade 6000 Ethernet Switched NEM 24p 10GbE

Sun Blade 6000 Ethernet Switched NEM 24p 10GbE is a multipurpose connectivity module for the Sun Blade 6000 modular system. The NEM supports connection to external devices through 10GbE SFP+ ports and QSFP ports. The NEM connects server modules (blades) in a Sun Blade 6000 modular system chassis with disk modules in the same chassis.



For installation, configuration, and management information, refer to the documentation at: http://www.oracle.com/goto/SB6K-24p-10GbE/docs

Additional L2 and L3 Configurations for Sun Blade 6000 Ethernet Switched NEM 24p 10GbE

For the following configurations, refer to the *Sun Blade 6000 Ethernet Switched NEM 24p 10GbE Software Configuration Guide* at:
http://www.oracle.com/goto/SB6K-24p-10GbE/docs

- Switching Feature
  - VLAN Forwarding
  - RSTP
  - LA
- Routing Feature
  - Static Unicast Route Entries
  - Dynamic Routing with RIP
  - Dynamic Routing with OSPF
- Topology – SFP+ LAG and Backplane Portface Connection
- Topology – Layer 2 Switch LAG and QSFP Splitter SAN Connection
- Topology – Switched NEM High Availability Connection
  - Four NEM/Two Chassis High Availibility
- Topology – Four Switched NEMs, High Availability Connection

- Four NEM/Four Chassis High Availibility
- QSFP Ports Into a Link Aggregation

Related Information

- "Oracle Switch ES1-24" on page 2
- "Sun Network 10GbE Switch 72p" on page 3

Understanding L2 and L3 Implementations

These topics describe L2 and L3 implementations based on a common usage topology with Access and Distribution layer protocols supported by the Oracle Switch ES1-24 (`ES1-24p-`*n*) and Sun Network 10GbE Switch 72p (`ToR72p-`*n*).

Related Information

L2 and L3 Configuration Task Overview

Use these topics to configure the L2 and L3 implementations.

Goal	Links
Learn about the L2 and L3 topology.	"L2 and L3 Topology" on page 9
Learn about the L2 PVRST implementations.	"L2 Based Configuration Example Using PVRST Protocol" on page 13
Configure standard L2 PVRST.	"Configuring a Basic L2 PVRST Based Topology" on page 17
Configure L2 PVRST Active/Standby on the servers.	"Configuring an L2 PVRST Based Topology With Active/Standby Bond on the Servers" on page 45
Configure L2 PVRST LLA Active/Active on the servers.	"Configuring an L2 PVRST and LLA Based Topology With Active/Active Bond on the Servers" on page 63
Learn about the L3 RIP and OSPF implementations.	"L3 RIP and OSPF Configuration Overview" on page 95
Configure L3 RIP.	"Configuring L3 Routing Based Topology Using RIP" on page 97
Configure L3 OSPF.	"Configuring L3 Routing Based Topology Using OSPF" on page 125

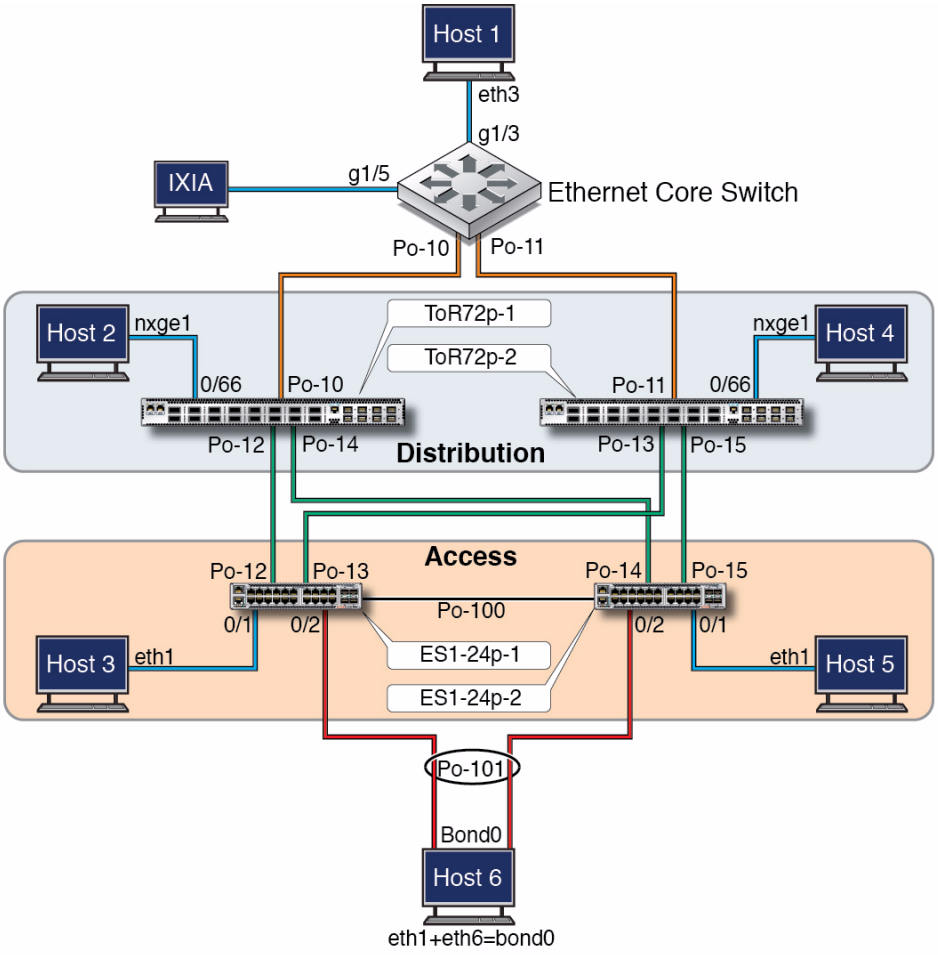
Related Information

- "L2 and L3 Topology" on page 9
- "L2 and L3 VLAN Best Practices" on page 10
- "Adding VLANs" on page 11

L2 and L3 Topology

The following topology shows the L2 and L3 based configuration examples described in this document.

Note – The Sun Blade 6000 Ethernet Switched NEM 24p 10GbE would be used at the Access layer if it is a blade server environment.



Related Information

- "L2 and L3 Configuration Task Overview" on page 8
- "L2 and L3 VLAN Best Practices" on page 10
- "Adding VLANs" on page 11

L2 and L3 VLAN Best Practices

Follow these best practices when configuring the L2 and L3 topology implementations:

- Start the configuration with all ports and the default VLAN shutdown and disable GVRP and GMRP.

Tip – Dynamic VLAN learning is not a best practice.

- Configure VLANs manually. You must add at least one port to a VLAN before you can assign a VLAN name.

Tip – In PVRST, set the port or port-channel in access or trunk mode first, then add the port or port-channel manually to assign a name to the VLAN.

- Configure the priority of the default VLAN and external VLAN to a higher value than the default priority 32768.

  Doing so makes the core switch become root even if the default and external VLANs are configured with the default priority in the core switch. Thus, only required traffic and not all core traffic reaches the `ES1-24p-1` and `ES1-24p-2` switches.

Related Information

- "L2 and L3 Configuration Task Overview" on page 8
- "L2 and L3 Topology" on page 9
- "Adding VLANs" on page 11

Adding VLANs

You can add VLANs as tagged or untagged to a port or a port-channel in different ways. The following tasks add `vlan 3` as untagged and tagged to port `0/3`:

- "Add an Untagged VLAN" on page 11
- "Add a Tagged VLAN" on page 11

▼ Add an Untagged VLAN

- **Add** `vlan 3` **as untagged to port** `0/3`**.**

```
SEFOS# configure terminal
SEFOS(config)# interface extreme-ethernet 0/3
SEFOS(config-if)# switchport access vlan 3
SEFOS(config-if)# end
```

or:

```
SEFOS# configure terminal
SEFOS(config)# vlan 3
SEFOS(config-vlan)# ports add extreme-ethernet 0/3 untagged
extreme-ethernet 0/3
SEFOS(config-vlan)# exit
SEFOS(config)# interface extreme-ethernet 0/3
SEFOS(config-if)# switchport pvid 3
SEFOS(config-if)# end
```

Related Information

- "Add a Tagged VLAN" on page 11

▼ Add a Tagged VLAN

- **Add** `vlan 3` **as tagged to port** `0/3`**.**

```
SEFOS# configure terminal
SEFOS(config)# vlan 3
SEFOS(config-vlan)# ports add extreme-ethernet 0/3
SEFOS(config-vlan)# exit
```

Related Information

- "Add an Untagged VLAN" on page 11

L2 Based Configuration Example Using PVRST Protocol

These topics provide an overview of the L2 PVRST implementations.

L2 PVRST Example Overview

PVRST is an enhancement of RSTP, which works in conjunction with VLANs to provide better control over traffic in the network. A separate spanning tree is maintained for each active VLAN in the network, providing:

- Load balancing through multiple instances of the spanning tree.
- Fault tolerance (because failure of one spanning tree instance does not affect other spanning trees).
- Rapid reconfiguration support through RSTP.

Note – PVRST is not a standards based protocol, it is a Cisco proprietory protocol. Each vendor's implementation will be different but is expected to be largely compatible.

In this fairly common PVRST based configuration, we define eight VLANs (200-203, 300-303). Four VLANs (300-303) are named `external-vlan-`*n*. The Ethernet core switch is configured as the root bridge for VLANs 300-303. The other four VLANs (200-203) are named `internal-vlan-`*n*. Switch `ToR72p-1` is configured as the root bridge for VLANs 200-203. Internal VLANs (200-203) are not configured in the core switch to avoid LAN traffic from reaching the core network. The internal VLAN traffic will not go beyond the distribution layer `ToR72p-`*n* switches because switch `ToR72p-1` is the root for the internal VLANs.

The internal VLANs normally carry traffic such as live migration, web engineering, ZFS or NFS application data, cluster heartbeat, and so on. External VLANs carry traffic that wants to reach the outside world.

The default `vlan 1` can be changed to a different VLAN if required, but you must make the change before starting a configuration and restart SEFOS for the change to take effect.

Related Information

- "L2 and L3 Topology" on page 9
- "Configuring a Basic L2 PVRST Based Topology" on page 17
- "Configuring an L2 PVRST Based Topology With Active/Standby Bond on the Servers" on page 45
- "Configuring an L2 PVRST and LLA Based Topology With Active/Active Bond on the Servers" on page 63

L2 PVRST Configuration Task Overview

Use these tasks to configure L2 PVRST implementations of the topology. See "L2 and L3 Topology" on page 9.

Goal	Links
Configure standard L2 PVRST.	"Configure Switch ToR72p-1 for L2 PVRST" on page 17 "Configure Switch ToR72p-2 for L2 PVRST" on page 23 "Configure Switch ES1-24p-1 for L2 PVRST" on page 29 "Configure Switch ES1-24p-2 for L2 PVRST" on page 34 "Verify the L2 PVRST Configuration" on page 38
Configure L2 PVRST Active/Standby on the servers.	"Prepare Switch ToR72p-1 for L2 PVRST Active/Standby on the Servers" on page 46 "Prepare Switch ToR72p-2 for L2 PVRST Active/Standby on the Servers" on page 46 "Configure Switch ES1-24p-1 for L2 PVRST Active/Standby on the Servers" on page 47 "Configure Switch ES1-24p-2 for L2 PVRST Active/Standby on the Servers" on page 52 "Verify the L2 PVRST Active/Standby Configuration on the Servers" on page 56
Configure L2 PVRST LLA Active/Active on the servers.	"Configure Switch ES1-24p-1 for L2 PVRST LLA Active/Active on the Servers" on page 64 "Configure Switch ES1-24p-2 for L2 PVRST LLA Active/Active on the Servers" on page 71 "Configure Switch ToR72p-1 for L2 PVRST LLA Active/Active on the Servers" on page 77 "Configure Switch ToR72p-2 for L2 PVRST LLA Active/Active on the Servers" on page 83 "Verify the L2 PVRST LLA Active/Active Configuration on the Servers" on page 89

Related Information

- "L2 and L3 Topology" on page 9
- "Configuring a Basic L2 PVRST Based Topology" on page 17
- "Configuring an L2 PVRST Based Topology With Active/Standby Bond on the Servers" on page 45
- "Configuring an L2 PVRST and LLA Based Topology With Active/Active Bond on the Servers" on page 63

Configuring a Basic L2 PVRST Based Topology

These tasks describe how to configure each switch for L2 PVRST.

Related Information

▼ Configure Switch `ToR72p-1` for L2 PVRST

1. Start the configuration with all ports and the default VLAN shutdown.

Tip – It is a best practice to start the configuration with all the ports and default VLAN shutdown. Disable GVRP and GMRP because dynamic VLAN learning is not suggested.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# set gvrp disable
ToR72p-1 SEFOS(config)# set gmrp disable
ToR72p-1 SEFOS(config)# set port-channel enable
ToR72p-1 SEFOS(config)# interface vlan 1
ToR72p-1 SEFOS(config-if)# shutdown
ToR72p-1 SEFOS(config-if)# no ip address
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface range extreme-ethernet 0/1-72
ToR72p-1 SEFOS(config-if-range)# shutdown
ToR72p-1 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface port-channel 10
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 12
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 14
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# vlan 300
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-1
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 301
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-2
```

```
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 302
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-3
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 303
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-4
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 200
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-1
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 201
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-2
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 202
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-3
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 203
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-4
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# end
```

4. Configure the port-channels to allow all VLANs.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface port-channel 10
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 12
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 14
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

5. **Enable the ports and add them to the appropriate port-channels.**

   Configure the host port to allow all VLANs.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/66
ToR72p-1 SEFOS(config-if)# description "connected to nxge1 Host-2"
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/67
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-1 on
port23"
ToR72p-1 SEFOS(config-if)# channel-group 12 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/71
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-1 on
port21"
ToR72p-1 SEFOS(config-if)# channel-group 12 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/68
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-2 on
port23"
ToR72p-1 SEFOS(config-if)# channel-group 14 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/72
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-2 on
port21"
ToR72p-1 SEFOS(config-if)# channel-group 14 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
```

6. **Enable the uplink interfaces to the core switch and add them to port-channel.**

```
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/69
ToR72p-1 SEFOS(config-if)# description "connected to Core switch
on g1/1"
ToR72p-1 SEFOS(config-if)# speed 1000
ToR72p-1 SEFOS(config-if)# channel-group 10 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/70
ToR72p-1 SEFOS(config-if)# description "connected to Core switch
on g1/4"
ToR72p-1 SEFOS(config-if)# speed 1000
```

```
ToR72p-1 SEFOS(config-if)# channel-group 10 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

7. Change the spanning-tree mode to PVRST and configure the bridge priority such that `ToR72p-1` is root for all internal VLANs.

Tip – It is a best practice to configure the default VLAN and external VLAN priority to a higher value than the default priority 32768. Doing so makes the core switch become the root even if the default and external VLANs are configured with default priority in the core switch. Thus, only required and not all core traffic reaches `ES1-24p-`*n*.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
 PVRST Module status is changed
ToR72p-1 SEFOS(config)# spanning-tree vlan 200 brg-priority 8192
ToR72p-1 SEFOS(config)# spanning-tree vlan 201 brg-priority 8192
ToR72p-1 SEFOS(config)# spanning-tree vlan 202 brg-priority 8192
ToR72p-1 SEFOS(config)# spanning-tree vlan 203 brg-priority 8192
ToR72p-1 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ToR72p-1 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
ToR72p-1 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ToR72p-1 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ToR72p-1 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ToR72p-1 SEFOS(config)# end
```

8. Save the configuration.

```
ToR72p-1 SEFOS# copy run start
Building configuration ...
[OK]
ToR72p-1 SEFOS#
```

9. Check the status of the interfaces.

```
ToR72p-1 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        down     down
Ex0/2        down     down
```

```
Ex0/3         down      down
...
Ex0/63        down      down
Ex0/64        down      down
Ex0/65        down      down
Ex0/66        up        up         connected to nxge1 Host-2
Ex0/67        up        up         connected to ES1-24p-1 on port23
Ex0/68        up        up         connected to ES1-24p-2 on port23
Ex0/69        up        up         connected to Core switch on g1/1
Ex0/70        up        up         connected to Core switch on g1/4
Ex0/71        up        up         connected to ES1-24p-1 on port21
Ex0/72        up        up         connected to ES1-24p-2 on port21
po10          up        up
po12          up        up
po14          up        up
vlan1         down      down
```

10. Check the spanning tree for each VLAN and the role and state of each interface.

```
ToR72p-1 SEFOS# show spanning-tree

Spanning-tree for VLAN 200

We are the root of the Spanning Tree
Root Id          Priority   8392
                 Address    00:21:28:77:d2:1d
                 Cost       0
                 Port       0
              Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id        Priority 8392
                 Address 00:21:28:77:d2:1d
              Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                 Dynamic Path Cost is Disabled
                 Dynamic Path Cost Lag-Speed Change is Disabled
Name      Role          State         Cost      Prio    Type
----      ----          -----         ----      ----    ------
Ex0/66    Designated    Forwarding    2000      128     P2P
po10      Designated    Forwarding    19900     128     P2P
po12      Designated    Forwarding    1900      128     P2P
po14      Designated    Forwarding    1900      128     P2P
...
Spanning-tree for VLAN 302
Root Id          Priority   4096
                 Address    00:17:df:18:9d:2e
                 Cost       19900
                 Port       po10
```

```
              Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 8494
                Address 00:21:28:77:d2:1d
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role          State        Cost     Prio    Type
----     ----          -----        ----     ----    ------
Ex0/66   Designated    Forwarding   2000     128     P2P
po10     Root          Forwarding   19900    128     P2P
po12     Designated    Forwarding   1900     128     P2P
po14     Designated    Forwarding   1900     128     P2P
```

Related Information

- "Configure Switch ToR72p-2 for L2 PVRST" on page 23
- "Configure Switch ES1-24p-1 for L2 PVRST" on page 29
- "Configure Switch ES1-24p-2 for L2 PVRST" on page 34
- "Verify the L2 PVRST Configuration" on page 38

▼ Configure Switch ToR72p-2 for L2 PVRST

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# set gvrp disable
ToR72p-2 SEFOS(config)# set gmrp disable
ToR72p-2 SEFOS(config)# set port-channel enable
ToR72p-2 SEFOS(config)# interface vlan 1
ToR72p-2 SEFOS(config-if)# shutdown
ToR72p-2 SEFOS(config-if)# no ip address
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface range extreme-ethernet 0/1-72
ToR72p-2 SEFOS(config-if-range)# shutdown
ToR72p-2 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# interface port-channel 11
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface port-channel 13
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface port-channel 15
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# vlan 300
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-1
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 301
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-2
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 302
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-3
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 303
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-4
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 200
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-1
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 201
```

```
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-2
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 202
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-3
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 203
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-4
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# end
```

4. Configure the port-channels to allow all VLANs.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# interface port-channel 11
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface port-channel 13
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface port-channel 15
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# end
```

5. Enable the ports and add them to the appropriate port-channels.

Configure the host port to allow all VLANs.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/66
ToR72p-2 SEFOS(config-if)# description "connected to nxge1 Host-4"
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/67
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-1 on
port24"
ToR72p-2 SEFOS(config-if)# channel-group 13 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/71
```

```
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-1 on
port22"
ToR72p-2 SEFOS(config-if)# channel-group 13 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/68
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-2 on
port24"
ToR72p-2 SEFOS(config-if)# channel-group 15 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/72
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-2 on
port22"
ToR72p-2 SEFOS(config-if)# channel-group 15 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
```

6. Enable the uplink interfaces to the core switch and add them to port-channel.

```
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/69
ToR72p-2 SEFOS(config-if)# description "connected to Core switch
on g1/2"
ToR72p-2 SEFOS(config-if)# speed 1000
ToR72p-2 SEFOS(config-if)# channel-group 11 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/70
ToR72p-2 SEFOS(config-if)# description "connected to Core switch
on g1/3"
ToR72p-2 SEFOS(config-if)# speed 1000
ToR72p-2 SEFOS(config-if)# channel-group 11 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# end
```

7. Change the spanning-tree mode to PVRST and configure the bridge priority such that `ToR72p-2` is root for all internal VLANs.

Tip – It is a best practice to configure default VLAN and external VLAN priority to a higher value than the default priority 32768. Doing so makes the core switch become the root even if the default and external VLANs are configured with default priority in the core switch. Thus, only required and not all core traffic reaches ES1-24p-*n*.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
 PVRST Module status is changed
ToR72p-2 SEFOS(config)# spanning-tree vlan 200 brg-priority 16384
ToR72p-2 SEFOS(config)# spanning-tree vlan 201 brg-priority 16384
ToR72p-2 SEFOS(config)# spanning-tree vlan 202 brg-priority 16384
ToR72p-2 SEFOS(config)# spanning-tree vlan 203 brg-priority 16384
ToR72p-2 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ToR72p-2 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
ToR72p-2 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ToR72p-2 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ToR72p-2 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ToR72p-2 SEFOS(config)# end
```

8. Save the configuration.

```
ToR72p-2 SEFOS# copy run start
Building configuration ...
[OK]
ToR72p-2 SEFOS#
```

9. Check the spanning tree for each VLAN and the role and state of each interface.

```
ToR72p-2 SEFOS# show spanning-tree

Spanning-tree for VLAN 200
Root Id         Priority   8392
                Address    00:21:28:77:d2:1d
                Cost       3800
                Port       po13
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 16584
                Address 00:21:28:56:d6:27
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
```

```
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
Ex0/66   Designated   Forwarding   2000     128    P2P
po11     Designated   Forwarding   19900    128    P2P
po13     Root         Forwarding   1900     128    P2P
po15     Designated   Forwarding   1900     128    P2P
...
Spanning-tree for VLAN 302
Root Id         Priority   4096
                Address    00:17:df:18:9d:2e
                Cost       19900
                Port       po11
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 16686
                Address 00:21:28:56:d6:27
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
Ex0/66   Designated   Forwarding   2000     128    P2P
po11     Root         Forwarding   19900    128    P2P
po13     Designated   Forwarding   1900     128    P2P
po15     Designated   Forwarding   1900     128    P2P
```

Related Information

- "Configure Switch ToR72p-1 for L2 PVRST" on page 17
- "Configure Switch ES1-24p-1 for L2 PVRST" on page 29
- "Configure Switch ES1-24p-2 for L2 PVRST" on page 34
- "Verify the L2 PVRST Configuration" on page 38

▼ Configure Switch ES1-24p-1 for L2 PVRST

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# set gvrp disable
ES1-24p-1 SEFOS(config)# set gmrp disable
ES1-24p-1 SEFOS(config)# set port-channel enable
ES1-24p-1 SEFOS(config)# interface vlan 1
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# no ip address
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-1 SEFOS(config-if-range)# shutdown
ES1-24p-1 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 12
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 13
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# vlan 300
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
external-vlan-1
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 301
```

```
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
external-vlan-2
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 302
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
external-vlan-3
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 303
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
external-vlan-4
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 200
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
internal-vlan-1
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 201
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
internal-vlan-2
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 202
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
internal-vlan-3
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 203
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
internal-vlan-4
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# end
```

4. Configure the port-channels to allow all VLANs.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 12
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 13
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

5. **Enable the ports and add them to the appropriate port-channels.**

   Configure the host port to allow all VLANs.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/1
ES1-24p-1 SEFOS(config-if)# description "connected to eth1 Host-3"
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port67"
ES1-24p-1 SEFOS(config-if)# channel-group 12 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/21
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 12 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/24
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port68"
ES1-24p-1 SEFOS(config-if)# channel-group 13 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 13 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
```

6. **Change the spanning-tree mode to PVRST and configure the bridge priority.**

   Configure the bridge priority such that `ES1-24p-1` and `ES1-24p-2` are not a root bridge for any VLANs configured.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
 PVRST Module status is changed
ES1-24p-1 SEFOS(config)# spanning-tree vlan 200 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 201 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 202 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 203 brg-priority 61440
```

```
ES1-24p-1 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ES1-24p-1 SEFOS(config)# end
```

7. Save the configuration.

```
ES1-24p-1 SEFOS# copy run start
Building configuration ...
[OK]
ES1-24p-1 SEFOS#
```

8. Check the status of the interfaces.

```
ES1-24p-1 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        down     down      connected to eth1 Host-3
Ex0/2        down     down
...
Ex0/20       down     down
Ex0/21       up       up        connected to ToR72p-1 on port71
Ex0/22       up       up        connected to ToR72p-2 on port71
Ex0/23       up       up        connected to ToR72p-1 on port67
Ex0/24       up       up        connected to ToR72p-2 on port68
po12         up       up
po13         up       up
vlan1        down     down
```

9. Check the spanning tree for each VLAN and the role and state of each interface.

```
ES1-24p-1 SEFOS# show spanning-tree

Spanning-tree for VLAN 200
Root Id         Priority   8392
                Address    00:21:28:77:d2:1d
                Cost       1900
                Port       po12
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61640
                Address 00:10:e0:2c:0f:21
```

```
              Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                 Dynamic Path Cost is Disabled
                 Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role          State         Cost     Prio    Type
----     ----          -----         ----     ----    ------
Ex0/1    Designated    Forwarding    20000    128     P2P
po12     Root          Forwarding    1900     128     P2P
po13     Designated    Forwarding    1900     128     P2P
...
Spanning-tree for VLAN 302
Root Id          Priority   4096
                 Address    00:17:df:18:9d:2e
                 Cost       21800
                 Port       po12
               Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id        Priority 61742
                 Address 00:10:e0:2c:0f:21
              Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                 Dynamic Path Cost is Disabled
                 Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role          State         Cost     Prio    Type
----     ----          -----         ----     ----    ------
Ex0/1    Designated    Forwarding    20000    128     P2P
po12     Root          Forwarding    1900     128     P2P
po13     Alternate     Discarding    1900     128     P2P
```

Related Information

- "Configure Switch ToR72p-1 for L2 PVRST" on page 17
- "Configure Switch ToR72p-2 for L2 PVRST" on page 23
- "Configure Switch ES1-24p-2 for L2 PVRST" on page 34
- "Verify the L2 PVRST Configuration" on page 38

▼ Configure Switch ES1-24p-2 for L2 PVRST

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# set gvrp disable
ES1-24p-2 SEFOS(config)# set gmrp disable
ES1-24p-2 SEFOS(config)# set port-channel enable
ES1-24p-2 SEFOS(config)# interface vlan 1
ES1-24p-2 SEFOS(config-if)# shutdown
ES1-24p-2 SEFOS(config-if)# no ip address
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-2 SEFOS(config-if-range)# shutdown
ES1-24p-2 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 14
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 15
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# vlan 300
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
external-vlan-1
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 301
```

```
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
external-vlan-2
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 302
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
external-vlan-3
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 303
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
external-vlan-4
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 200
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
internal-vlan-1
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 201
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
internal-vlan-2
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 202
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
internal-vlan-3
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 203
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
internal-vlan-4
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# end
```

4. Configure the port-channels to allow all VLANs.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 14
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 15
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

5. **Enable the ports and add them to the appropriate port-channels.**

   Configure the host port to allow all VLANs.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/1
ES1-24p-2 SEFOS(config-if)# description "connected to eth1 Host-5"
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port68"
ES1-24p-2 SEFOS(config-if)# channel-group 14 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/21
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 14 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/24
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port67"
ES1-24p-2 SEFOS(config-if)# channel-group 15 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 15 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
```

6. **Change the spanning-tree mode to PVRST and configure the bridge priority.**

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
 PVRST Module status is changed
ES1-24p-2 SEFOS(config)# spanning-tree vlan 200 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 201 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 202 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 203 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
```

```
ES1-24p-2 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ES1-24p-2 SEFOS(config)# end
```

7. Save the configuration.

```
ES1-24p-2 SEFOS# copy run start
Building configuration ...
[OK]
ES1-24p-2 SEFOS#
```

8. Check the spanning tree for each VLAN and the role and state of each interface.

VLANs 200, 201, 302, and 303 should display the role of root.

```
ES1-24p-2 SEFOS# show spanning-tree

Spanning-tree for VLAN 200
Root Id         Priority   8392
                Address    00:21:28:77:d2:1d
                Cost       1900
                Port       po14
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61640
                Address 00:10:e0:2a:fd:41
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
Ex0/1    Designated   Forwarding   20000    128    P2P
po14     Root         Forwarding   1900     128    P2P
po15     Designated   Forwarding   1900     128    P2P
...
Spanning-tree for VLAN 302
Root Id         Priority   4096
                Address    00:17:df:18:9d:2e
                Cost       21800
                Port       po14
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61742
                Address 00:10:e0:2a:fd:41
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
```

```
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
Ex0/1    Designated   Forwarding   20000    128    P2P
po14     Root         Forwarding   1900     128    P2P
po15     Alternate    Discarding   1900     128    P2P
```

Related Information

- "Configure Switch ToR72p-1 for L2 PVRST" on page 17
- "Configure Switch ToR72p-2 for L2 PVRST" on page 23
- "Configure Switch ES1-24p-1 for L2 PVRST" on page 29
- "Verify the L2 PVRST Configuration" on page 38

▼ Verify the L2 PVRST Configuration

1. Check the configuration on host 3.

```
[Host-3 ~]# ifconfig
eth1      Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.99.20  Bcast:192.168.99.255
          Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:240929812 errors:0 dropped:515783109 overruns:0
frame:0
          TX packets:13447023 errors:0 dropped:0 overruns:0
          carrier:0
          collisions:0 txqueuelen:1000
         RX bytes:727198024 (693.5 MiB)  TX bytes:564849861 (538.6
MiB)
eth1.200  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.20.20  Bcast:192.168.20.255
          Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:37 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:6081 (5.9 KiB)
```

```
eth1.201  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.21.20  Bcast:192.168.21.255
          Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:33 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:5647 (5.5 KiB)
eth1.202  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.22.20  Bcast:192.168.22.255
          Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:43 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:11095 (10.8 KiB)
eth1.203  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.23.20  Bcast:192.168.23.255
          Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:66 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:8361 (8.1 KiB)
eth1.300  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.30.20  Bcast:192.168.30.255
          Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:59 errors:0 dropped:1 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:10798 (10.5 KiB)
```

```
eth1.301  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.31.20  Bcast:192.168.31.255
          Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:62 errors:0 dropped:1 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:15637 (15.2 KiB)
eth1.302  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.32.20  Bcast:192.168.32.255
          Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:13446348 errors:0 dropped:1 overruns:0
          carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:564754642 (538.5 MiB)
eth1.303  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.33.20  Bcast:192.168.33.255
          Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:129 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:15434 (15.0 KiB)
```

2. Check the configuration on host 1.

```
[Host-1 ~]# ifconfig
eth3      Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.99.10  Bcast:192.168.99.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:734693703 errors:0 dropped:229967577 overruns:0
frame:0
          TX packets:408889245 errors:0 dropped:0 overruns:0
          carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:48601398195 (45.2 GiB)  TX bytes:17173379205
         (15.9 GiB)
```

```
eth3.300  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.30.10  Bcast:192.168.30.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:45 errors:0 dropped:0 overruns:0 frame:0
          TX packets:34 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:5751 (5.6 KiB)  TX bytes:5377 (5.2 KiB)
eth3.301  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.31.10  Bcast:192.168.31.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:17 errors:0 dropped:0 overruns:0 frame:0
          TX packets:24 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:4227 (4.1 KiB)  TX bytes:4496 (4.3 KiB)
eth3.302  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.32.10  Bcast:192.168.32.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:718368994 errors:0 dropped:0 overruns:0 frame:0
          TX packets:408888572 errors:0 dropped:0 overruns:0
          carrier:0
          collisions:0 txqueuelen:0
          RX bytes:33045029404 (30.7 GiB)  TX bytes:17173325476
          (15.9 GiB)
eth3.303  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.33.10  Bcast:192.168.33.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:188 errors:0 dropped:0 overruns:0 frame:0
          TX packets:151 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:26525 (25.9 KiB)  TX bytes:12210 (11.9 KiB)
```

3. Check the configuration on host 2.

```
[Host-2 ~]# ifconfig
nxge1: flags=
1001000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,FIXEDMTU> mtu 9000
index 4
       inet 192.168.99.15 netmask ffffff00 broadcast 192.168.99.255
         ether 0:14:4f:6c:43:9
nxge200001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
6
       inet 192.168.20.10 netmask ffffff00 broadcast 192.168.20.255
         ether 0:14:4f:6c:43:9
nxge201001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
7
       inet 192.168.21.10 netmask ffffff00 broadcast 192.168.21.255
         ether 0:14:4f:6c:43:9
nxge202001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
8
       inet 192.168.22.10 netmask ffffff00 broadcast 192.168.22.255
         ether 0:14:4f:6c:43:9
nxge203001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
9
       inet 192.168.23.10 netmask ffffff00 broadcast 192.168.23.255
         ether 0:14:4f:6c:43:9
nxge300001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
10
       inet 192.168.30.15 netmask ffffff00 broadcast 192.168.30.255
         ether 0:14:4f:6c:43:9
nxge301001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
11
       inet 192.168.31.15 netmask ffffff00 broadcast 192.168.31.255
         ether 0:14:4f:6c:43:9
nxge302001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
12
       inet 192.168.32.15 netmask ffffff00 broadcast 192.168.32.255
         ether 0:14:4f:6c:43:9
nxge303001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
13
       inet 192.168.33.15 netmask ffffff00 broadcast 192.168.33.255
         ether 0:14:4f:6c:43:9
```

4. **Ping from host 3 to a tagged interface on host 1 of the core switch.**
   The pings should go through.

```
[Host-3 ~]# ping 192.168.30.10
[Host-3 ~]# ping 192.168.32.10
```

5. **Ping from host 3 to an untagged interface on host 1 of the core switch.**

```
[Host-3 ~]# ping 192.168.99.10
```

6. **Ping from host 3 to a tagged interface on host 2 of the `ToR72p-1` switch.**
   The pings should go through.

```
[Host-3 ~]# ping 192.168.20.10
[Host-3 ~]# ping 192.168.23.10
```

7. **Ping from host 1 to a tagged interface on host 2 of `ToR72p-1` switch.**
   The ping should go through.

```
[Host-1 ~]# ping 192.168.33.20
```

Related Information

- "Configure Switch ToR72p-1 for L2 PVRST" on page 17
- "Configure Switch ToR72p-2 for L2 PVRST" on page 23
- "Configure Switch ES1-24p-1 for L2 PVRST" on page 29
- "Configure Switch ES1-24p-2 for L2 PVRST" on page 34

Configuring an L2 PVRST Based Topology With Active/Standby Bond on the Servers

These tasks describe how to configure each switch for L2 PVRST Active/Standby on the servers.

Related Information

▼ Prepare Switch ToR72p-1 for L2 PVRST Active/Standby on the Servers

Note – The procedure for configuring `ToR72p-1` for L2 PVRST Active/Standby and standard L2 PVRST is the same.

- **Perform the steps for configuring `ToR72p-1` for standard L2 PVRST.**

  Go to "Configure Switch ToR72p-1 for L2 PVRST" on page 17.

Related Information

- "Prepare Switch ToR72p-2 for L2 PVRST Active/Standby on the Servers" on page 46
- "Configure Switch ES1-24p-1 for L2 PVRST Active/Standby on the Servers" on page 47
- "Configure Switch ES1-24p-2 for L2 PVRST Active/Standby on the Servers" on page 52
- "Verify the L2 PVRST Active/Standby Configuration on the Servers" on page 56

▼ Prepare Switch ToR72p-2 for L2 PVRST Active/Standby on the Servers

Note – The procedure for configuring `ToR72p-2` for L2 PVRST Active/Standby and standard L2 PVRST is the same.

- **Perform the steps for configuring `ToR72p-2` for standard L2 PVRST.**

  Go to "Configure Switch ToR72p-1 for L2 PVRST" on page 17.

Related Information

- "Prepare Switch ToR72p-1 for L2 PVRST Active/Standby on the Servers" on page 46
- "Configure Switch ES1-24p-1 for L2 PVRST Active/Standby on the Servers" on page 47

▼ Configure Switch ES1-24p-1 for L2 PVRST Active/Standby on the Servers

1. Start the configuration with all ports and the default VLAN shutdown.

Tip – It is a best practice to start the configuration with all the ports and default VLAN shutdown. Disable GVRP and GMRP because dynamic VLAN learning is not suggested.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# set gvrp disable
ES1-24p-1 SEFOS(config)# set gmrp disable
ES1-24p-1 SEFOS(config)# set port-channel enable
ES1-24p-1 SEFOS(config)# interface vlan 1
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# no ip address
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-1 SEFOS(config-if-range)# shutdown
ES1-24p-1 SEFOS(config-if-range)# end
```

2. Create and enable port-channels between switches per the topology.

See "L2 and L3 Topology" on page 9.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 12
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 13
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 100
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# vlan 300
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
external-vlan-1
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 301
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
external-vlan-2
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 302
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
external-vlan-3
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 303
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
external-vlan-4
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 200
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
internal-vlan-1
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 201
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
internal-vlan-2
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 202
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
internal-vlan-3
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 203
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
internal-vlan-4
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# end
```

4. **Configure the port-channels to allow all VLANs.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 12
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 13
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 100
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

5. **Enable the ports and add them to the appropriate port-channels.**

   Configure the host port to allow all VLANs.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/2
ES1-24p-1 SEFOS(config-if)# description "connected to eth1 Host-6,
bond0"
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface range extreme-ethernet 0/19-20
ES1-24p-1 SEFOS(config-if)# description "connected to ES1-24p-2 on
ports 19-20"
ES1-24p-1 SEFOS(config-if)# channel-group 100 mode on
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port67"
ES1-24p-1 SEFOS(config-if)# channel-group 12 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/21
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 12 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/24
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port68"
ES1-24p-1 SEFOS(config-if)# channel-group 13 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
```

```
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 13 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

6. Change the spanning-tree mode to PVRST and configure the bridge priority.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
 PVRST Module status is changed
ES1-24p-1 SEFOS(config)# spanning-tree vlan 200 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 201 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 202 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 203 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ES1-24p-1 SEFOS(config)# end
```

7. Save the configuration.

```
ES1-24p-1 SEFOS# copy run start
Building configuration ...
[OK]
ES1-24p-1 SEFOS#
```

8. Check the spanning tree for each VLAN and the role and state of each interface.

```
ES1-24p-1 SEFOS# show spanning-tree

Spanning-tree for VLAN 200
Root Id         Priority   8392
                Address    00:21:28:77:d2:1d
                Cost       1900
                Port       po12
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
```

```
Bridge Id       Priority 61640
                Address 00:10:e0:2c:0f:21
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role          State        Cost     Prio    Type
----     ----          -----        ----     ----    ------
Ex0/2    Designated    Forwarding   2000     128     P2P
po12     Root          Forwarding   1900     128     P2P
po13     Designated    Forwarding   1900     128     P2P
po100    Alternate     Discarding   1900     128     P2P
...
Spanning-tree for VLAN 302
Root Id         Priority   4096
                Address    00:17:df:18:9d:2e
                Cost       21800
                Port       po12
              Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61742
                Address 00:10:e0:2c:0f:21
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role          State        Cost     Prio    Type
----     ----          -----        ----     ----    ------
Ex0/2    Designated    Forwarding   2000     128     P2P
po12     Root          Forwarding   1900     128     P2P
po13     Alternate     Discarding   1900     128     P2P
po100    Alternate     Discarding   1900     128     P2P
```

Related Information

- "Prepare Switch ToR72p-1 for L2 PVRST Active/Standby on the Servers" on page 46
- "Prepare Switch ToR72p-2 for L2 PVRST Active/Standby on the Servers" on page 46
- "Configure Switch ES1-24p-2 for L2 PVRST Active/Standby on the Servers" on page 52
- "Verify the L2 PVRST Active/Standby Configuration on the Servers" on page 56

▼ Configure Switch ES1-24p-2 for L2 PVRST Active/Standby on the Servers

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# set gvrp disable
ES1-24p-2 SEFOS(config)# set gmrp disable
ES1-24p-2 SEFOS(config)# set port-channel enable
ES1-24p-2 SEFOS(config)# interface vlan 1
ES1-24p-2 SEFOS(config-if)# shutdown
ES1-24p-2 SEFOS(config-if)# no ip address
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-2 SEFOS(config-if-range)# shutdown
ES1-24p-2 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 14
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 15
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 100
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# vlan 300
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
external-vlan-1
```

```
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 301
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
external-vlan-2
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 302
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
external-vlan-3
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 303
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
external-vlan-4
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 200
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
internal-vlan-1
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 201
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
internal-vlan-2
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 202
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
internal-vlan-3
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 203
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/2 name
internal-vlan-4
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# end
```

4. Configure the port-channels to allow all VLANs.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 14
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 15
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# exit
```

```
ES1-24p-2 SEFOS(config)# interface port-channel 100
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

5. **Enable the ports and add them to the appropriate port-channels.**

   Configure the host port to allow all VLANs.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/2
ES1-24p-2 SEFOS(config-if)# description "connected to eth2 Host-6,
bond0"
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface range extreme-ethernet 0/19-20
ES1-24p-2 SEFOS(config-if)# description "connected to ES1-24p-2 on
ports 19-20"
ES1-24p-2 SEFOS(config-if)# channel-group 100 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port68"
ES1-24p-2 SEFOS(config-if)# channel-group 14 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/21
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 14 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/24
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port67"
ES1-24p-2 SEFOS(config-if)# channel-group 15 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 15 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

6. Change the spanning-tree mode to PVRST and configure the bridge priority.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
 PVRST Module status is changed
ES1-24p-2 SEFOS(config)# spanning-tree vlan 200 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 201 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 202 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 203 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ES1-24p-2 SEFOS(config)# end
```

7. Save the configuration.

```
ES1-24p-2 SEFOS# copy run start
Building configuration ...
[OK]
ES1-24p-2 SEFOS#
```

8. Check the spanning tree for each VLAN and the role and state of each interface.

```
ES1-24p-1 SEFOS# show spanning-tree

Spanning-tree for VLAN 200
Root Id         Priority   8392
                Address    00:21:28:77:d2:1d
                Cost       1900
                Port       po14
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61640
                Address 00:10:e0:2a:fd:41
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
Ex0/2    Designated   Forwarding   2000     128    P2P
po14     Root         Forwarding   1900     128    P2P
po15     Designated   Forwarding   1900     128    P2P
```

```
po100    Designated   Forwarding   1900     128    P2P
...
Spanning-tree for VLAN 302
Root Id         Priority   4096
                Address    00:17:df:18:9d:2e
                Cost       21800
                Port       po14
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61742
                Address 00:10:e0:2a:fd:41
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role          State        Cost     Prio   Type
----     ----          -----        ----     ----   ------
Ex0/2    Designated    Forwarding   2000     128    P2P
po14     Root          Forwarding   1900     128    P2P
po15     Alternate     Discarding   1900     128    P2P
po100    Designated    Forwarding   1900     128    P2P
```

Related Information

- "Prepare Switch ToR72p-1 for L2 PVRST Active/Standby on the Servers" on page 46
- "Prepare Switch ToR72p-2 for L2 PVRST Active/Standby on the Servers" on page 46
- "Configure Switch ES1-24p-1 for L2 PVRST Active/Standby on the Servers" on page 47
- "Verify the L2 PVRST Active/Standby Configuration on the Servers" on page 56

▼ Verify the L2 PVRST Active/Standby Configuration on the Servers

Note – All pings should be successful.

1. **Check the configuration on** `Host-6`**.**

   `Host-6` has a bond to test the Active/Standby configuration.

```
[Host-6 ~]# ifconfig
bond0     Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.99.25  Bcast:192.168.99.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
         UP BROADCAST RUNNING MASTER MULTICAST  MTU:1500  Metric:1
          RX packets:73 errors:0 dropped:0 overruns:0 frame:0
          TX packets:151 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:9490 (9.2 KiB)  TX bytes:18909 (18.4 KiB)
bond0.200 Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.20.25  Bcast:192.168.20.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
...
bond0.201 Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.21.25  Bcast:192.168.21.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
...
bond0.202 Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.22.25  Bcast:192.168.22.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
...
bond0.203 Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.23.25  Bcast:192.168.23.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
...
bond0.300 Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.30.25  Bcast:192.168.30.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
...
bond0.301 Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.31.25  Bcast:192.168.31.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
...
bond0.302 Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.32.25  Bcast:192.168.32.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
...
```

```
bond0.303 Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.33.25  Bcast:192.168.33.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
...
eth1      Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
...
eth6      Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
...
```

2. Check the configuration on `Host-2`**.**

```
[Host-2 ~]# ifconfig -a
nxge1: flags=
1001000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,FIXEDMTU> mtu 9000
index 4
       inet 192.168.99.15 netmask ffffff00 broadcast 192.168.99.255
         ether 0:14:4f:6c:43:9
nxge200001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
6
       inet 192.168.20.15 netmask ffffff00 broadcast 192.168.20.255
         ether 0:14:4f:6c:43:9
nxge201001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
7
       inet 192.168.21.15 netmask ffffff00 broadcast 192.168.21.255
         ether 0:14:4f:6c:43:9
nxge202001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
8
       inet 192.168.22.15 netmask ffffff00 broadcast 192.168.22.255
         ether 0:14:4f:6c:43:9
nxge203001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
9
       inet 192.168.23.15 netmask ffffff00 broadcast 192.168.23.255
         ether 0:14:4f:6c:43:9
nxge300001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
10
       inet 192.168.30.15 netmask ffffff00 broadcast 192.168.30.255
         ether 0:14:4f:6c:43:9
```

```
nxge301001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
11
      inet 192.168.31.15 netmask ffffff00 broadcast 192.168.31.255
        ether 0:14:4f:6c:43:9
nxge302001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
12
      inet 192.168.32.15 netmask ffffff00 broadcast 192.168.32.255
        ether 0:14:4f:6c:43:9
nxge303001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
13
      inet 192.168.33.15 netmask ffffff00 broadcast 192.168.33.255
        ether 0:14:4f:6c:43:9
```

3. Check the configuration on `Host-1`**.**

```
[Host-1 ~]# ifconfig
eth3      Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.99.10  Bcast:192.168.99.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:734694172 errors:0 dropped:229967577 overruns:0
frame:0
          TX packets:408889295 errors:0 dropped:0 overruns:0
          carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:48601478150 (45.2 GiB)  TX bytes:17173383292
          (15.9 GiB)
eth3.300  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.30.10  Bcast:192.168.30.255
           Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
...
```

```
eth3.301  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.31.10  Bcast:192.168.31.255
           Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
...
eth3.302  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.32.10  Bcast:192.168.32.255
           Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
...
eth3.303  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.33.10  Bcast:192.168.33.255
           Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
...
```

4. Check the Active and Standby links of the bond on `Host-6`**.**

```
[Host-6 ~]# cat /proc/net/bonding/bond0
Ethernet Channel Bonding Driver: v3.6.0 (September 26, 2009)
Bonding Mode: fault-tolerance (active-backup)
Primary Slave: eth1 (primary_reselect always)
Currently Active Slave: eth1
MII Status: up
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 0
Slave Interface: eth1
MII Status: up
Link Failure Count: 1
Permanent HW addr: 00:10:e0:22:0f:d9
Slave queue ID: 0
Slave Interface: eth6
MII Status: up
Link Failure Count: 1
Permanent HW addr: 00:10:e0:22:0f:da
Slave queue ID: 0
```

5. Ping from `Host-6` **to an untagged interface on** `Host-1`**,** `Host-2` **of the core switch, and** `ToR72p-1`**.**

```
[Host-6 ~]# ping 192.168.99.10
```

6. **Ping from** `Host-6` **to a tagged interface on** `Host-1`, `Host-2` **of the core switch, and** `ToR72p-1`.

```
[Host-6 ~]# ping 192.168.33.10
[Host-6 ~]# ping 192.168.30.10
```

7. **Ping from** `Host-1` **and** `Host-2` **to a tagged interface on** `Host-6` **of** `ES1-24p-1`.

```
[Host-1 ~]# ping 192.168.33.25
[Host-2 ~]# ping -s 192.168.20.25
```

Related Information

- "Prepare Switch ToR72p-1 for L2 PVRST Active/Standby on the Servers" on page 46
- "Prepare Switch ToR72p-2 for L2 PVRST Active/Standby on the Servers" on page 46
- "Configure Switch ES1-24p-1 for L2 PVRST Active/Standby on the Servers" on page 47
- "Configure Switch ES1-24p-2 for L2 PVRST Active/Standby on the Servers" on page 52

Configuring an L2 PVRST and LLA Based Topology With Active/Active Bond on the Servers

L2 PVRST LLA Active/Active is supported on `ES1-24p-1` and `ES1-24p-2`. Because this is a PVRST based implementation, LLA requires the port-channel between the `ES1-24p-`*n* to be in the forwarding state for each VLAN.

Note – The `ES1-24p-`*n* when configured with LLA Active/Active should use regular port-channels numbering in the range of 131-142 only. For this specific configuration, port-channels 12,13,14,15 are assumed to be 131,132,133,134 respectively.

These tasks describe how to configure each switch for L2 PVRST LLA Active/Active.

- "Configure Switch ES1-24p-1 for L2 PVRST LLA Active/Active on the Servers" on page 64
- "Configure Switch ES1-24p-2 for L2 PVRST LLA Active/Active on the Servers" on page 71
- "Configure Switch ToR72p-1 for L2 PVRST LLA Active/Active on the Servers" on page 77
- "Configure Switch ToR72p-2 for L2 PVRST LLA Active/Active on the Servers" on page 83
- "Verify the L2 PVRST LLA Active/Active Configuration on the Servers" on page 89

Related Information

- "Switches Overview" on page 1
- "Understanding L2 and L3 Implementations" on page 7
- "L2 Based Configuration Example Using PVRST Protocol" on page 13
- "Configuring a Basic L2 PVRST Based Topology" on page 17

- "Configuring an L2 PVRST Based Topology With Active/Standby Bond on the Servers" on page 45
- "L3 RIP and OSPF Configuration Overview" on page 95
- "Configuring L3 Routing Based Topology Using RIP" on page 97
- "Configuring L3 Routing Based Topology Using OSPF" on page 125

▼ Configure Switch ES1-24p-1 for L2 PVRST LLA Active/Active on the Servers

1. Start the configuration with all ports and the default VLAN shutdown.

Tip – It is a best practice to start the configuration with all the ports and default VLAN shutdown. Disable GVRP and GMRP because dynamic VLAN learning is not suggested.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# set gvrp disable
ES1-24p-1 SEFOS(config)# set gmrp disable
ES1-24p-1 SEFOS(config)# interface vlan 1
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# no ip address
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-1 SEFOS(config-if-range)# shutdown
ES1-24p-1 SEFOS(config-if-range)# end
```

2. Create and enable port-channels between switches per the topology.

See "L2 and L3 Topology" on page 9.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 131
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 132
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
```

```
ES1-24p-1 SEFOS(config)# interface port-channel 100
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 101
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

3. Configure VLANs manually.

You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# vlan 300
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 131 name
external-vlan-1
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 301
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 131 name
external-vlan-2
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 302
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 131 name
external-vlan-3
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 303
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 131 name
external-vlan-4
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 200
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 131  name
internal-vlan-1
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 201
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 131  name
internal-vlan-2
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 202
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 131  name
internal-vlan-3
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
```

```
ES1-24p-1 SEFOS(config)# vlan 203
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 131  name
internal-vlan-4
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# end
```

4. Configure the port-channels to allow all VLANs.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 131
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 132
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 100
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 101
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

5. Enable the ports and add them to the appropriate port-channels.

Configure the host port to allow all VLANs.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/2
ES1-24p-1 SEFOS(config-if)# description "connected to eth1 Host-6,
LLA po101"
ES1-24p-1 SEFOS(config-if)# channel-group 101 mode on
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface range extreme-ethernet 0/19-20
ES1-24p-1 SEFOS(config-if-range)# description "connected to
ES1-24p-2 on ports 19-20"
ES1-24p-1 SEFOS(config-if-range)# channel-group 100 mode on
ES1-24p-1 SEFOS(config-if-range)# no shutdown
ES1-24p-1 SEFOS(config-if-range)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port67"
ES1-24p-1 SEFOS(config-if)# channel-group 131 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/21
```

```
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 12 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/24
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port68"
ES1-24p-1 SEFOS(config-if)# channel-group 132 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 13 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

6. Configure the LLA role.

Specify the inter-switch link and port-channel connecting to host to be part of LLA.

Note – These settings take effect after saving the configuration and resetting SEFOS.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# lla
ES1-24p-1 SEFOS(config-lla)# role primary
ES1-24p-1 SEFOS(config-lla)# isl port-channel 100
ES1-24p-1 SEFOS(config-lla)# lla port-channel 101
ES1-24p-1 SEFOS(config-lla)# exit
ES1-24p-1 SEFOS(config)# end
```

7. Enable the configured LLA and port-channels.

Note – These settings take effect after saving the configuration and resetting SEFOS.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# set port-channel enable
ES1-24p-1 SEFOS(config)# set lla enable
ES1-24p-1 SEFOS(config)# end
```

8. **Change the spanning-tree mode to PVRST and configure the bridge priority such that `ToR72p-1` is root for all internal VLANs.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
 PVRST Module status is changed
ES1-24p-1 SEFOS(config)# spanning-tree vlan 200 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 201 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 202 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 203 brg-priority 61440
ES1-24p-1 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ES1-24p-1 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ES1-24p-1 SEFOS(config)# end
```

9. **Modify the spanning-tree cost on all VLANs for port-channels configured in the switch.**

   With this setting, the spanning-tree makes port-channel 100 a designated port connecting `ES1-24p-1` and `ES1-24p-2`. This port is in the forwarding state.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 131
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 200 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 201 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 202 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 203 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 300 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 301 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 302 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 303 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 1 cost 1000
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 100
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 200 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 201 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 202 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 203 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 300 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 301 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 302 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 303 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 1 cost 1000
ES1-24p-1 SEFOS(config-if)# exit
```

```
ES1-24p-1 SEFOS(config)# interface port-channel 132
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 200 cost 1500
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 201 cost 1500
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 202 cost 1500
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 203 cost 1500
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 300 cost 1500
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 301 cost 1500
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 302 cost 1500
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 303 cost 1500
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 1 cost 1500
ES1-24p-1 SEFOS(config-if)# end
```

10. Save the configuration.

```
ES1-24p-1 SEFOS# copy run start
Building configuration ...
[OK]
ES1-24p-1 SEFOS#
```

11. Check the status of the interfaces.

```
ES1-24p-1 SEFOS# show interface description
Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        down     down
Ex0/2        up       up        connected to eth1 Host-6, LLA po 101
Ex0/3        down     down
Ex0/4        down     down
...
Ex0/18       down     down
Ex0/19       up       up        connected to ES1-24p-2 on ports 19-20
Ex0/20       up       up        connected to ES1-24p-2 on ports 19-20
Ex0/21       up       up           connected to ToR72p-1 on port71
Ex0/22       up       up           connected to ToR72p-2 on port71
Ex0/23       up       up           connected to ToR72p-1 on port67
Ex0/24       up       up           connected to ToR72p-2 on port68
po131        up       up
po132        up       up
po100        up       up
po101        up       up
vlan1        down     down
```

12. **Check the spanning tree for each VLAN and the role and state of each interface.**

```
ES1-24p-1 SEFOS# show spanning-tree

Spanning-tree for VLAN 200
Root Id         Priority   8392
                Address    00:21:28:77:d2:1d
                Cost       100
                Port       po131
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61640
                Address 00:10:e0:2c:0f:21
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
po131    Root         Forwarding   100      128    P2P
po132    Designated   Forwarding   1900     128    P2P
po100    Designated   Forwarding   100      128    P2P
po101    Designated   Forwarding   1900     128    P2P
...
Spanning-tree for VLAN 302
Root Id         Priority   4096
                Address    00:17:df:18:9d:2e
                Cost       20100
                Port       po100
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61742
                Address 00:10:e0:2c:0f:21
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
po131    Alternate    Discarding   1900     128    P2P
po132    Alternate    Discarding   1900     128    P2P
po100    Root         Forwarding   100      128    P2P
po101    Designated   Forwarding   1900     128    P2P
```

Related Information

- "Configure Switch ES1-24p-2 for L2 PVRST LLA Active/Active on the Servers" on page 71

- "Configure Switch ToR72p-1 for L2 PVRST LLA Active/Active on the Servers" on page 77
- "Configure Switch ToR72p-2 for L2 PVRST LLA Active/Active on the Servers" on page 83
- "Verify the L2 PVRST LLA Active/Active Configuration on the Servers" on page 89

▼ Configure Switch ES1-24p-2 for L2 PVRST LLA Active/Active on the Servers

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# set gvrp disable
ES1-24p-2 SEFOS(config)# set gmrp disable
ES1-24p-2 SEFOS(config)# interface vlan 1
ES1-24p-2 SEFOS(config-if)# shutdown
ES1-24p-2 SEFOS(config-if)# no ip address
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-2 SEFOS(config-if-range)# shutdown
ES1-24p-2 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 133
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 134
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 100
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 101
```

```
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

3. Configure VLANs manually.

You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# vlan 300
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 133 name
external-vlan-1
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 301
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 133 name
external-vlan-2
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 302
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 133 name
external-vlan-3
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 303
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 133 name
external-vlan-4
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 200
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 133 name
internal-vlan-1
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 201
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 133 name
internal-vlan-2
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 202
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 133 name
internal-vlan-3
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 203
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 133 name
internal-vlan-4
```

```
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# end
```

4. Configure the port-channels to allow all VLANs.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 133
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 134
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 100
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 101
ES1-24p-2 SEFOS(config-if)# switchport mode trunk
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

5. Enable the ports and add them to the appropriate port-channels.

Configure the host port to allow all VLANs.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/2
ES1-24p-2 SEFOS(config-if)# description "connected to eth2 Host-6,
LLA po101"
ES1-24p-2 SEFOS(config-if)# channel-group 101 mode on
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface range extreme-ethernet 0/19-20
ES1-24p-2 SEFOS(config-if-range)# description "connected to
ES1-24p-2 on ports 19-20"
ES1-24p-2 SEFOS(config-if-range)# channel-group 100 mode on
ES1-24p-2 SEFOS(config-if-range)# no shutdown
ES1-24p-2 SEFOS(config-if-range)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port68"
ES1-24p-2 SEFOS(config-if)# channel-group 133 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/21
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 133 mode active
```

```
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/24
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port67"
ES1-24p-2 SEFOS(config-if)# channel-group 134 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 134 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

6. Configure the LLA role and enable the configured port channels.

Specify the inter-switch link and port-channel connecting to host to be part of LLA.

Note – These settings take effect after saving the configuration and resetting SEFOS.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# lla
ES1-24p-2 SEFOS(config-lla)# role secondary
ES1-24p-2 SEFOS(config-lla)# isl port-channel 100
ES1-24p-2 SEFOS(config-lla)# lla port-channel 101
ES1-24p-2 SEFOS(config-lla)# exit
ES1-24p-2 SEFOS(config)# end
```

7. Enable LLA and port-channel.

Note – These settings take effect after saving the configuration and resetting SEFOS.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# set lla enable
ES1-24p-2 SEFOS(config)# set port-channel enable
ES1-24p-2 SEFOS(config)# end
```

8. **Change the spanning-tree mode to PVRST and configure the bridge priority.**

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
 PVRST Module status is changed
ES1-24p-2 SEFOS(config)# spanning-tree vlan 200 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 201 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 202 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 203 brg-priority 61440
ES1-24p-2 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ES1-24p-2 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ES1-24p-2 SEFOS(config)# end
```

9. **Modify the spanning-tree cost on all VLANs for port-channels configured in the switch.**

   With this setting, the spanning-tree makes port-channel 100 a designated port connecting `ES1-24p-1` and `ES1-24p-2`. This port is in forwarding state.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 134
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 200 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 201 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 202 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 203 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 300 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 301 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 302 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 303 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 1 cost 3000
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 100
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 200 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 201 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 202 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 203 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 300 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 301 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 302 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 303 cost 1000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 1 cost 1000
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 133
```

```
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 200 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 201 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 202 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 203 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 300 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 301 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 302 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 303 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 1 cost 3000
ES1-24p-1 SEFOS(config-if)# end
```

10. Save the configuration.

```
ES1-24p-2 SEFOS# write start
Building configuration ...
[OK]
ES1-24p-2 SEFOS#
```

11. Check the spanning tree for each VLAN and the role and state of each interface.

```
ES1-24p-1 SEFOS# show spanning-tree

Spanning-tree for VLAN 200
Root Id         Priority   8392
                Address    00:21:28:77:d2:1d
                Cost       200
                Port       po100
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61640
                Address 00:10:e0:2a:fd:41
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
po133    Alternate    Discarding   1900     128    P2P
po134    Designated   Forwarding   1900     128    P2P
po100    Root         Forwarding   100      128    P2P
po101    Designated   Forwarding   1900     128    P2P
...
Spanning-tree for VLAN 302
Root Id         Priority   4096
                Address    00:17:df:18:9d:2e
                Cost       20000
                Port       po134
```

```
              Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 61742
                Address 00:10:e0:2a:fd:41
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role          State        Cost     Prio    Type
----     ----          -----        ----     ----    ------
po133    Alternate     Discarding   1900     128     P2P
po134    Root          Forwarding   100      128     P2P
po100    Designated    Forwarding   100      128     P2P
po101    Designated    Forwarding   1900     128     P2P
```

Related Information

- "Configure Switch ES1-24p-1 for L2 PVRST LLA Active/Active on the Servers" on page 64
- "Configure Switch ToR72p-1 for L2 PVRST LLA Active/Active on the Servers" on page 77
- "Configure Switch ToR72p-2 for L2 PVRST LLA Active/Active on the Servers" on page 83
- "Verify the L2 PVRST LLA Active/Active Configuration on the Servers" on page 89

▼ Configure Switch ToR72p-1 for L2 PVRST LLA Active/Active on the Servers

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# set gvrp disable
ToR72p-1 SEFOS(config)# set gmrp disable
ToR72p-1 SEFOS(config)# set port-channel enable
ToR72p-1 SEFOS(config)# interface vlan 1
ToR72p-1 SEFOS(config-if)# shutdown
ToR72p-1 SEFOS(config-if)# no ip address
```

```
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface range extreme-ethernet 0/1-72
ToR72p-1 SEFOS(config-if-range)# shutdown
ToR72p-1 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface port-channel 10
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 131
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 133
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# vlan 300
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-1
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 301
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-2
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 302
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-3
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 303
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-4
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 200
```

```
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-1
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 201
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-2
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 202
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-3
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 203
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-4
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# end
```

4. Configure the port-channels to allow all VLANs.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface port-channel 10
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 131
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 133
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

5. Enable the ports and add them to the appropriate port-channels.

Configure the host port to allow all VLANs

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/66
ToR72p-1 SEFOS(config-if)# description "connected to nxge1 Host-2"
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/67
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-1 on
port23"
```

```
ToR72p-1 SEFOS(config-if)# channel-group 131 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/71
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-1 on
port21"
ToR72p-1 SEFOS(config-if)# channel-group 131 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/68
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-2 on
port23"
ToR72p-1 SEFOS(config-if)# channel-group 133 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/72
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-2 on
port21"
ToR72p-1 SEFOS(config-if)# channel-group 14 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
```

6. Enable the uplink interfaces to the core switch and add them to port-channel.

```
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/69
ToR72p-1 SEFOS(config-if)# description "connected to Core switch
on g1/1"
ToR72p-1 SEFOS(config-if)# speed 1000
ToR72p-1 SEFOS(config-if)# channel-group 10 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/70
ToR72p-1 SEFOS(config-if)# description "connected to Core switch
on g1/4"
ToR72p-1 SEFOS(config-if)# speed 1000
ToR72p-1 SEFOS(config-if)# channel-group 10 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

7. Change the spanning-tree mode to PVRST and configure the bridge priority such that `ToR72p-1` **is root for all internal VLANs.**

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
```

```
 PVRST Module status is changed
ToR72p-1 SEFOS(config)# spanning-tree vlan 200 brg-priority 8192
ToR72p-1 SEFOS(config)# spanning-tree vlan 201 brg-priority 8192
ToR72p-1 SEFOS(config)# spanning-tree vlan 202 brg-priority 8192
ToR72p-1 SEFOS(config)# spanning-tree vlan 203 brg-priority 8192
ToR72p-1 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ToR72p-1 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
ToR72p-1 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ToR72p-1 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ToR72p-1 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ToR72p-1 SEFOS(config)# end
ToR72p-1 SEFOS(config)# interface port-channel 12
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 200 cost 1000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 201 cost 1000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 202 cost 1000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 203 cost 1000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 300 cost 1000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 301 cost 1000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 302 cost 1000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 303 cost 1000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 1 cost 1000
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 14
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 200 cost 3000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 201 cost 3000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 202 cost 3000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 203 cost 3000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 300 cost 3000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 301 cost 3000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 302 cost 3000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 303 cost 3000
ToR72p-1 SEFOS(config-if)# spanning-tree vlan 1 cost 3000
ToR72p-1 SEFOS(config-if)# end
```

8. Save the configuration.

```
ToR72p-1 SEFOS# copy run start
Building configuration ...
[OK]
ToR72p-1 SEFOS#
```

9. Check the status of the interfaces.

```
ToR72p-1 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
```

```
Ex0/1         down      down
Ex0/2         down      down
Ex0/3         down      down
...
Ex0/63        down      down
Ex0/64        down      down
Ex0/65        down      down
Ex0/66        up        up         connected to nxge1 Host-2
Ex0/67        up        up         connected to ES1-24p-1 on port23
Ex0/68        up        up         connected to ES1-24p-2 on port23
Ex0/69        up        up         connected to Core switch on g1/1
Ex0/70        up        up         connected to Core switch on g1/4
Ex0/71        up        up         connected to ES1-24p-1 on port21
Ex0/72        up        up         connected to ES1-24p-2 on port21
po10          up        up
po131         up        up
po133         up        up
vlan1         down      down
```

10. Check the spanning tree for each VLAN and the role and state of each interface.

```
ToR72p-1 SEFOS# show spanning-tree
Spanning-tree for VLAN 200

We are the root of the Spanning Tree
Root Id          Priority   8392
                 Address    00:21:28:77:d2:1d
                 Cost       0
                 Port       0
              Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id        Priority 8392
                 Address 00:21:28:77:d2:1d
              Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                 Dynamic Path Cost is Disabled
                 Dynamic Path Cost Lag-Speed Change is Disabled
Name      Role          State         Cost      Prio    Type
----      ----          -----         ----      ----    ------
Ex0/66    Designated    Forwarding    2000      128     P2P
po10      Designated    Forwarding    19900     128     P2P
po131     Designated    Forwarding    100       128     P2P
po133     Designated    Forwarding    1900      128     P2P
...
Spanning-tree for VLAN 302
Root Id          Priority   4096
                 Address    00:17:df:18:9d:2e
                 Cost       19900
```

```
                Port       po10
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 8494
                Address 00:21:28:77:d2:1d
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role          State        Cost     Prio    Type
----     ----          -----        ----     ----    ------
Ex0/66   Designated    Forwarding   2000     128     P2P
po10     Root          Forwarding   19900    128     P2P
po131    Designated    Forwarding   1900     128     P2P
po133    Designated    Forwarding   1900     128     P2P
```

Related Information

- "Configure Switch ES1-24p-1 for L2 PVRST LLA Active/Active on the Servers" on page 64
- "Configure Switch ES1-24p-2 for L2 PVRST LLA Active/Active on the Servers" on page 71
- "Configure Switch ToR72p-2 for L2 PVRST LLA Active/Active on the Servers" on page 83
- "Verify the L2 PVRST LLA Active/Active Configuration on the Servers" on page 89

▼ Configure Switch ToR72p-2 for L2 PVRST LLA Active/Active on the Servers

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# set gvrp disable
ToR72p-2 SEFOS(config)# set gmrp disable
ToR72p-2 SEFOS(config)# set port-channel enable
ToR72p-2 SEFOS(config)# interface vlan 1
ToR72p-2 SEFOS(config-if)# shutdown
```

```
ToR72p-2 SEFOS(config-if)# no ip address
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface range extreme-ethernet 0/1-72
ToR72p-2 SEFOS(config-if-range)# shutdown
ToR72p-2 SEFOS(config-if-range)# end
```

2. Create and enable port-channels between switches per the topology.

See "L2 and L3 Topology" on page 9.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# interface port-channel 11
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface port-channel 132
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface port-channel 134
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# end
```

3. Configure VLANs manually.

You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# vlan 300
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-1
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 301
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-2
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 302
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-3
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 303
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
external-vlan-4
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
```

```
ToR72p-2 SEFOS(config)# vlan 200
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-1
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 201
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-2
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 202
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-3
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# vlan 203
ToR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66 name
internal-vlan-4
ToR72p-2 SEFOS(config-vlan)# vlan active
ToR72p-2 SEFOS(config-vlan)# exit
ToR72p-2 SEFOS(config)# end
```

4. Configure the port-channels to allow all VLANs.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# interface port-channel 11
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface port-channel 132
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface port-channel 134
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# end
```

5. Enable the ports and add them to the appropriate port-channels.

Configure the host port to allow all VLANs.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/66
ToR72p-2 SEFOS(config-if)# description "connected to nxge1 Host-4"
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/67
```

```
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-1 on
port24"
ToR72p-2 SEFOS(config-if)# channel-group 132 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/71
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-1 on
port22"
ToR72p-2 SEFOS(config-if)# channel-group 132 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/68
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-2 on
port24"
ToR72p-2 SEFOS(config-if)# channel-group 134 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/72
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-2 on
port22"
ToR72p-2 SEFOS(config-if)# channel-group 134 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
```

6. Enable the uplink interfaces to the core switch and add them to port-channel.

```
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/69
ToR72p-2 SEFOS(config-if)# description "connected to Core switch
on g1/2"
ToR72p-2 SEFOS(config-if)# speed 1000
ToR72p-2 SEFOS(config-if)# channel-group 11 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/70
ToR72p-2 SEFOS(config-if)# description "connected to Core switch
on g1/3"
ToR72p-2 SEFOS(config-if)# speed 1000
ToR72p-2 SEFOS(config-if)# channel-group 11 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# end
```

7. Change the spanning-tree mode to PVRST and configure the bridge priority.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# spanning-tree mode pvrst
Spanning Tree enabled protocol is MSTP, now MSTP is being shutdown
PVRST is started.
 PVRST Module status is changed
ToR72p-2 SEFOS(config)# spanning-tree vlan 200 brg-priority 16384
ToR72p-2 SEFOS(config)# spanning-tree vlan 201 brg-priority 16384
ToR72p-2 SEFOS(config)# spanning-tree vlan 202 brg-priority 16384
ToR72p-2 SEFOS(config)# spanning-tree vlan 203 brg-priority 16384
ToR72p-2 SEFOS(config)# spanning-tree vlan 300 brg-priority 40960
ToR72p-2 SEFOS(config)# spanning-tree vlan 301 brg-priority 40960
ToR72p-2 SEFOS(config)# spanning-tree vlan 302 brg-priority 40960
ToR72p-2 SEFOS(config)# spanning-tree vlan 303 brg-priority 40960
ToR72p-2 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
ToR72p-2 SEFOS(config)# interface port-channel 15
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 200 cost 3000
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 201 cost 3000
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 202 cost 3000
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 203 cost 3000
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 300 cost 3000
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 301 cost 3000
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 302 cost 3000
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 303 cost 3000
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 1 cost 3000
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface port-channel 13
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 200 cost 1500
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 201 cost 1500
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 202 cost 1500
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 203 cost 1500
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 300 cost 1500
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 301 cost 1500
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 302 cost 1500
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 303 cost 1500
ToR72p-2 SEFOS(config-if)# spanning-tree vlan 1 cost 1500
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# end
```

8. Save the configuration.

```
ToR72p-2 SEFOS# copy run start
Building configuration ...
[OK]
ToR72p-2 SEFOS#
```

9. **Check the spanning tree for each VLAN and the role and state of each interface.**
   VLANs 200, 201, 302, and 303 should display the role of root.

```
ToR72p-2 SEFOS# show spanning-tree

Spanning-tree for VLAN 200
Root Id         Priority   8392
                Address    00:21:28:77:d2:1d
                Cost       2000
                Port       po134
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 16584
                Address 00:21:28:56:d6:27
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
Ex0/66   Designated   Forwarding   2000     128    P2P
po11     Designated   Forwarding   19900    128    P2P
po132    Alternate    Discarding   1900     128    P2P
po134    Root         Forwarding   1900     128    P2P
...
Spanning-tree for VLAN 302
Root Id         Priority   4096
                Address    00:17:df:18:9d:2e
                Cost       19900
                Port       po11
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay 15 Sec

Spanning Tree Enabled Protocol PVRST
Bridge Id       Priority 16686
                Address 00:21:28:56:d6:27
             Hello Time 2 sec, Max Age 20 sec, Forward Delay 15 sec
                Dynamic Path Cost is Disabled
                Dynamic Path Cost Lag-Speed Change is Disabled
Name     Role         State        Cost     Prio   Type
----     ----         -----        ----     ----   ------
Ex0/66   Designated   Forwarding   2000     128    P2P
po11     Root         Forwarding   19900    128    P2P
po132    Designated   Forwarding   1900     128    P2P
po134    Designated   Forwarding   100      128    P2P
```

Related Information

- "Configure Switch ES1-24p-1 for L2 PVRST LLA Active/Active on the Servers" on page 64
- "Configure Switch ES1-24p-2 for L2 PVRST LLA Active/Active on the Servers" on page 71
- "Configure Switch ToR72p-1 for L2 PVRST LLA Active/Active on the Servers" on page 77
- "Verify the L2 PVRST LLA Active/Active Configuration on the Servers" on page 89

▼ Verify the L2 PVRST LLA Active/Active Configuration on the Servers

Note – All pings should be successful.

1. **Check the configuration on** `Host-6`**.**

   `Host-6` has a bond to test the Active/Active configuration.

```
[Host-6 ~]# ifconfig
bond0     Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
          inet addr:192.168.99.25  Bcast:192.168.99.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link
         UP BROADCAST RUNNING MASTER MULTICAST  MTU:1500  Metric:1
          RX packets:437588211 errors:0 dropped:2320386094
          overruns:0 frame:0
          TX packets:12455843 errors:0 dropped:0 overruns:0
          carrier:0
          collisions:0 txqueuelen:0
         RX bytes:68901926926 (64.1 GiB)  TX bytes:523164595 (498.9
          MiB)
bond0.200 Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
         inet addr:192.168.20.25  Bcast:192.168.20.255
          Mask:255.255.255.0
         inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link
...
```

```
bond0.201 Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
          inet addr:192.168.21.25  Bcast:192.168.21.255
           Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link
...
bond0.202 Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
          inet addr:192.168.22.25  Bcast:192.168.22.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link
...
bond0.203 Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
          inet addr:192.168.23.25  Bcast:192.168.23.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link
...
bond0.300 Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
          inet addr:192.168.30.25  Bcast:192.168.30.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link
...
bond0.301 Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
          inet addr:192.168.31.25  Bcast:192.168.31.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link
...
bond0.302 Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
          inet addr:192.168.32.25  Bcast:192.168.32.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link
...
bond0.303 Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
          inet addr:192.168.33.25  Bcast:192.168.33.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link
...
eth1      Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
...
eth6      Link encap:Ethernet  HWaddr 00:10:E0:21:EE:07
...
```

2. Check the configuration on `Host-1`**.**

```
[Host-1 ~]# ifconfig -a
eth3      Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.99.10  Bcast:192.168.99.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
         RX packets:880287915 errors:0 dropped:257423842
          overruns:0 frame:0
         TX packets:443506697 errors:0 dropped:0 overruns:0
          carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:70568649692 (65.7 GiB)  TX bytes:18627318985
          (17.3 GiB)
eth3.300  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.30.10  Bcast:192.168.30.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
...
eth3.301  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.31.10  Bcast:192.168.31.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
...
eth3.302  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.32.10  Bcast:192.168.32.255
          Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
...
eth3.303  Link encap:Ethernet  HWaddr 00:10:E0:1F:BD:E3
          inet addr:192.168.33.10  Bcast:192.168.33.255
           Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link
...
```

3. **Check the configuration on** `Host-2`**.**

```
[Host-2 ~]# ifconfig
nxge1: flags=
1001000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,FIXEDMTU> mtu 9000
index 4
       inet 192.168.99.15 netmask ffffff00 broadcast 192.168.99.255
         ether 0:14:4f:6c:43:9
nxge200001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
6
       inet 192.168.20.15 netmask ffffff00 broadcast 192.168.20.255
         ether 0:14:4f:6c:43:9
nxge201001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
7
       inet 192.168.21.15 netmask ffffff00 broadcast 192.168.21.255
         ether 0:14:4f:6c:43:9
nxge202001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
8
       inet 192.168.22.15 netmask ffffff00 broadcast 192.168.22.255
         ether 0:14:4f:6c:43:9
nxge203001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
9
       inet 192.168.23.15 netmask ffffff00 broadcast 192.168.23.255
         ether 0:14:4f:6c:43:9
nxge300001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
10
       inet 192.168.30.15 netmask ffffff00 broadcast 192.168.30.255
         ether 0:14:4f:6c:43:9
nxge301001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
11
       inet 192.168.31.15 netmask ffffff00 broadcast 192.168.31.255
         ether 0:14:4f:6c:43:9
nxge302001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
12
       inet 192.168.32.15 netmask ffffff00 broadcast 192.168.32.255
         ether 0:14:4f:6c:43:9
nxge303001: flags=
201000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,CoS> mtu 9194 index
13
       inet 192.168.33.15 netmask ffffff00 broadcast 192.168.33.255
         ether 0:14:4f:6c:43:9
```

4. **Ping from `Host-6` to a tagged and untagged interface on `Host-1` of the core switch.**

```
[Host-6 ~]# ping 192.168.33.10
[Host-6 ~]# ping 192.168.99.10
```

5. **Ping from `Host-6` to a tagged and untagged interface on `Host-1` of `ToR72p-1`.**

```
[Host-6 ~]# ping 192.168.23.15
[Host-6 ~]# ping 192.168.30.15
[Host-6 ~]# ping 192.168.99.15
```

6. **Ping from `Host-2` to a tagged and untagged interface on `Host-6` of `ES1-24p-1`.**

```
[Host-2 ~]# ping -s 192.168.21.25
[Host-2 ~]# ping -s 192.168.99.25
```

7. **Ping from `Host-2` to a tagged and untagged interface on `Host-1` of the core switch.**

```
[Host-2 ~]# ping -s 192.168.32.10
[Host-2 ~]# ping -s 192.168.99.10
```

8. **Ping from `Host-1` to a tagged and untagged interface on `Host-6` of `ES1-24p-1`.**

```
[Host-1 ~]# ping -s 192.168.32.10
[Host-1 ~]# ping -s 192.168.99.10
```

Related Information

- "Configure Switch ES1-24p-1 for L2 PVRST LLA Active/Active on the Servers" on page 64
- "Configure Switch ES1-24p-2 for L2 PVRST LLA Active/Active on the Servers" on page 71
- "Configure Switch ToR72p-1 for L2 PVRST LLA Active/Active on the Servers" on page 77
- "Configure Switch ToR72p-2 for L2 PVRST LLA Active/Active on the Servers" on page 83

L3 RIP and OSPF Configuration Overview

These topics provide an overview of the L3 RIP and OSPF implementations.

L3 Implementations Overview

The L3 implementations showcase RIP and OSPF protocol configurations on `ToR72p-`*n* and `ES1-24p-`*n*. The links between all the switches are configured as access links. Two VLANs are configured as tagged on the port connecting to `host-1` and `host-3`. VLANs 150, 151 are on the core switch and VLANs 100, 101 are on `ES1-24p-`*n* switches.

Once the routing protocol is enabled, all routes advertised from neighboring switches are learned dynamically. Switches will have a similar routing table with potentially different paths to reach different networks. Although VLANs 150, 151, 100, and 101 are not defined on `ToR72p-`*n* switches, these switches learn the information to reach these VLANs as soon as the neighboring switches advertise them.

In the L3 examples, an IXIA traffic generator connected to the core switch is used to send 500 routes. All the switches in the topology learn these routes dynamically through RIP or OSPF depending on the configuration. Ping tests are used to test the reachability of different networks.

Related Information

- "L2 and L3 Topology" on page 9
- "Configuring L3 Routing Based Topology Using RIP" on page 97
- "Configuring L3 Routing Based Topology Using OSPF" on page 125

L3 RIP and OSPF Configuration Task Overview

Use these tasks to configure L3 RIP and OSPF implementations of the topology. See "L2 and L3 Topology" on page 9.

Goal	Links
Configure L3 routing using RIP.	"Configure Switch TOR72p-1 for L3 Routing Using RIP" on page 98 "Configure Switch TOR72p-2 for L3 Routing Using RIP" on page 105 "Configure Switch ES1-24p-1 for L3 Routing Using RIP" on page 111 "Configure Switch ES1-24p-2 for L3 Routing Using RIP" on page 117 "Verify the L3 RIP Configuration" on page 122
Configure L3 routing using OSPF.	"Configure Switch TOR72p-1 for L3 Routing Using OSPF" on page 126 "Configure Switch TOR72p-2 for L3 Routing Using OSPF" on page 133 "Configure Switch ES1-24p-1 for L3 Routing Using OSPF" on page 140 "Configure Switch ES1-24p-2 for L3 Routing Using OSPF" on page 146 "Verify the L3 OSPF Configuration" on page 153

Related Information

- "L2 and L3 Topology" on page 9
- "Configuring L3 Routing Based Topology Using RIP" on page 97
- "Configuring L3 Routing Based Topology Using OSPF" on page 125

Configuring L3 Routing Based Topology Using RIP

These tasks describe how to configure each switch to learn routes through L3 RIP.

Related Information

▼ Configure Switch TOR72p-1 for L3 Routing Using RIP

1. Start the configuration with all ports and the default VLAN shutdown.

Tip – It is a best practice to start the configuration with all the ports and default VLAN shutdown. Disable GVRP and GMRP because dynamic VLAN learning is not suggested.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# set gvrp disable
ToR72p-1 SEFOS(config)# set gmrp disable
ToR72p-1 SEFOS(config)# set port-channel enable
ToR72p-1 SEFOS(config)# interface vlan 1
ToR72p-1 SEFOS(config-if)# shutdown
ToR72p-1 SEFOS(config-if)# no ip address
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface range extreme-ethernet 0/1-72
ToR72p-1 SEFOS(config-if-range)# shutdown
ToR72p-1 SEFOS(config-if-range)# end
```

2. Create and enable port-channels between switches per the topology.

See "L2 and L3 Topology" on page 9.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface port-channel 10
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 12
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 14
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# vlan 2001
ToR72p-1 SEFOS(config-vlan)# ports add port-channel 10 untagged
port-channel 10 name 192_168_201_0_RIP_P2P
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 2003
ToR72p-1 SEFOS(config-vlan)# ports add port-channel 12 untagged
port-channel 12 name 192_168_203_0_RIP_P2P
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 2005
ToR72p-1 SEFOS(config-vlan)# ports add port-channel 14 untagged
port-channel 14 name 192_168_205_0_RIP_P2P
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 30
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66
untagged extreme-ethernet 0/66 name 192_168_30_0_HOST_P2P
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# end
```

Note – You can add VLANs as tagged or untagged to a port or a port-channel in three different ways. See "Adding VLANs" on page 11.

4. **Configure the port-channels as access links by setting the pvid and adding port-channels to VLANs.**

   Also, disable spanning-tree on all uplinks.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface port-channel 10
ToR72p-1 SEFOS(config-if)# switchport pvid 2001
ToR72p-1 SEFOS(config-if)# spanning-tree disable
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 12
ToR72p-1 SEFOS(config-if)# switchport pvid 2003
ToR72p-1 SEFOS(config-if)# spanning-tree disable
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 14
ToR72p-1 SEFOS(config-if)# switchport pvid 2005
```

```
ToR72p-1 SEFOS(config-if)# spanning-tree disable
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

5. Enable the ports and add them to the appropriate port-channels.

Configure the host port as an access link with a different VLAN.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/66
ToR72p-1 SEFOS(config-if)# description "connected to nxge1 Host-2"
ToR72p-1 SEFOS(config-if)# switchport pvid 30
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/67
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-1 on
port23"
ToR72p-1 SEFOS(config-if)# channel-group 12 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/71
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-1 on
port21"
ToR72p-1 SEFOS(config-if)# channel-group 12 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/68
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-2 on
port23"
ToR72p-1 SEFOS(config-if)# channel-group 14 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/72
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-2 on
port21"
ToR72p-1 SEFOS(config-if)# channel-group 14 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
```

6. Enable the uplink interfaces to the core switch and add them to the port-channel.

```
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/69
ToR72p-1 SEFOS(config-if)# description "connected to Core switch
on g1/1"
ToR72p-1 SEFOS(config-if)# speed 1000
ToR72p-1 SEFOS(config-if)# channel-group 10 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
```

```
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/70
ToR72p-1 SEFOS(config-if)# description "connected to Core switch
on g1/4"
ToR72p-1 SEFOS(config-if)# speed 1000
ToR72p-1 SEFOS(config-if)# channel-group 10 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

7. Configure the L3 interface for all VLANs defined previously.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface vlan 2001
ToR72p-1 SEFOS(config-if)# ip address 192.168.201.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 2003
ToR72p-1 SEFOS(config-if)# ip address 192.168.203.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 2005
ToR72p-1 SEFOS(config-if)# ip address 192.168.205.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 30
ToR72p-1 SEFOS(config-if)# ip address 192.168.30.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

8. Enable RIP and advertise the networks that are reachable through this switch.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# router rip
ToR72p-1 SEFOS(config-router)# version 2
ToR72p-1 SEFOS(config-router)# auto-summary disable
ToR72p-1 SEFOS(config-router)# redistribute connected
ToR72p-1 SEFOS(config-router)# network 192.168.201.10
ToR72p-1 SEFOS(config-router)# network 192.168.203.10
ToR72p-1 SEFOS(config-router)# network 192.168.205.10
ToR72p-1 SEFOS(config-router)# network 192.168.30.10
ToR72p-1 SEFOS(config-router)# end
```

9. **Enable the VLANs to send and receive RIP version 2 updates.**

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface vlan 2001
ToR72p-1 SEFOS(config-if)# ip rip send version 2
ToR72p-1 SEFOS(config-if)# ip rip receive version 2
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 2003
ToR72p-1 SEFOS(config-if)# ip rip send version 2
ToR72p-1 SEFOS(config-if)# ip rip receive version 2
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 2005
ToR72p-1 SEFOS(config-if)# ip rip send version 2
ToR72p-1 SEFOS(config-if)# ip rip receive version 2
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 30
ToR72p-1 SEFOS(config-if)# ip rip send version 2
ToR72p-1 SEFOS(config-if)# ip rip receive version 2
ToR72p-1 SEFOS(config-if)# end
```

10. **Save the configuration.**

```
ToR72p-1 SEFOS# copy run start
Building configuration ...
[OK]
```

11. **Verify the status of the interfaces.**

```
ToR72p-1 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        down     down
Ex0/2        down     down
...
Ex0/64       down     down
Ex0/65       down     down
Ex0/66       up       up        connected to nxge1 Host-2
Ex0/67       up       up        connected to ES1-24p-1 on port23
Ex0/68       up       up        connected to ES1-24p-2 on port23
Ex0/69       up       up        connected to Core switch on g1/1
Ex0/70       up       up        connected to Core switch on g1/4
Ex0/71       up       up        connected to ES1-24p-1 on port21
Ex0/72       up       up        connected to ES1-24p-2 on port21
po10         up       up
po12         up       up
po14         up       up
```

```
vlan1         down      down
vlan2001      up        up
vlan2003      up        up
vlan2005      up        up
vlan30        up        up
```

12. Verify the routes learned.

```
ToR72p-1 SEFOS# show ip route

Codes: C - connected, S - static, R - rip, B - bgp, O - ospf

R 192.168.9.0/24 [2] via 192.168.201.20
R 192.168.20.0/24 [2] via 192.168.201.20
C 192.168.30.0/24 is directly connected, vlan30
R 192.168.40.0/24 [3] via 192.168.201.20
R 192.168.50.0/24 [2] via 192.168.203.20
R 192.168.60.0/24 [2] via 192.168.205.20
R 192.168.100.0/24 [2] via 192.168.203.20
R 192.168.101.0/24 [2] via 192.168.203.20
R 192.168.150.0/24 [2] via 192.168.201.20
R 192.168.151.0/24 [2] via 192.168.201.20
C 192.168.201.0/24 is directly connected, vlan2001
R 192.168.202.0/24 [2] via 192.168.201.20
C 192.168.203.0/24 is directly connected, vlan2003
R 192.168.204.0/24 [2] via 192.168.203.20
C 192.168.205.0/24 is directly connected, vlan2005
R 192.168.206.0/24 [2] via 192.168.205.20
```

13. Verify the number of routes.

After IXIA sends 500 routes to the core switch, those routes are learned on this switch.

```
ToR72p-1 SEFOS# show ip route summary

Route Source    Routes
connected         4
static            0
rip               512
bgp               0
ospf              0
Total             516
```

14. Double check the routes learned.

```
ToR72p-1 SEFOS# show ip route

Codes: C - connected, S - static, R - rip, B - bgp, O - ospf

R 192.168.9.0/24 [2] via 192.168.201.20
R 192.168.20.0/24 [2] via 192.168.201.20
C 192.168.30.0/24 is directly connected, vlan30
R 192.168.40.0/24 [3] via 192.168.201.20
R 192.168.50.0/24 [2] via 192.168.203.20
R 192.168.60.0/24 [2] via 192.168.205.20
R 192.168.100.0/24 [2] via 192.168.203.20
R 192.168.101.0/24 [2] via 192.168.203.20
R 192.168.150.0/24 [2] via 192.168.201.20
R 192.168.151.0/24 [2] via 192.168.201.20
C 192.168.201.0/24 is directly connected, vlan2001
R 192.168.202.0/24 [2] via 192.168.201.20
C 192.168.203.0/24 is directly connected, vlan2003
R 192.168.204.0/24 [2] via 192.168.203.20
C 192.168.205.0/24 is directly connected, vlan2005
R 192.168.206.0/24 [2] via 192.168.205.20
R 45.45.45.0/24 [3] via 192.168.201.20
R 45.45.46.0/24 [3] via 192.168.201.20
R 45.45.47.0/24 [3] via 192.168.201.20
R 45.45.48.0/24 [3] via 192.168.201.20
R 45.45.49.0/24 [3] via 192.168.201.20
R 45.45.50.0/24 [3] via 192.168.201.20
R 45.45.51.0/24 [3] via 192.168.201.20
...
```

Related Information

- "Configure Switch TOR72p-2 for L3 Routing Using RIP" on page 105
- "Configure Switch ES1-24p-1 for L3 Routing Using RIP" on page 111
- "Configure Switch ES1-24p-2 for L3 Routing Using RIP" on page 117
- "Verify the L3 RIP Configuration" on page 122

▼ Configure Switch TOR72p-2 for L3 Routing Using RIP

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# set gvrp disable
TOR72p-2 SEFOS(config)# set gmrp disable
TOR72p-2 SEFOS(config)# set port-channel enable
TOR72p-2 SEFOS(config)# interface vlan 1
TOR72p-2 SEFOS(config-if)# shutdown
TOR72p-2 SEFOS(config-if)# no ip address
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface range extreme-ethernet 0/1-72
TOR72p-2 SEFOS(config-if-range)# shutdown
TOR72p-2 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# interface port-channel 11
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface port-channel 13
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface port-channel 15
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# vlan 2002
TOR72p-2 SEFOS(config-vlan)# ports add port-channel 11 untagged
port-channel 10 name 192_168_202_0_RIP_P2P
```

```
TOR72p-2 SEFOS(config-vlan)# vlan active
TOR72p-2 SEFOS(config-vlan)# exit
TOR72p-2 SEFOS(config)# vlan 2004
TOR72p-2 SEFOS(config-vlan)# ports add port-channel 13 untagged
port-channel 12 name 192_168_204_0_RIP_P2P
TOR72p-2 SEFOS(config-vlan)# vlan active
TOR72p-2 SEFOS(config-vlan)# exit
TOR72p-2 SEFOS(config)# vlan 2006
TOR72p-2 SEFOS(config-vlan)# ports add port-channel 15 untagged
port-channel 14 name 192_168_206_0_RIP_P2P
TOR72p-2 SEFOS(config-vlan)# vlan active
TOR72p-2 SEFOS(config-vlan)# exit
TOR72p-2 SEFOS(config)# vlan 30
TOR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66
untagged extreme-ethernet 0/66 name 192_168_40_0_HOST_P2P
TOR72p-2 SEFOS(config-vlan)# vlan active
TOR72p-2 SEFOS(config-vlan)# exit
TOR72p-2 SEFOS(config)# end
```

Note – You can add VLANs as tagged or untagged to a port or a port-channel in three different ways. See "Adding VLANs" on page 11.

4. **Configure the port-channels as access links by setting the pvid and adding port-channels to VLANs.**

   Also, disable spanning-tree on all uplinks.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# interface port-channel 11
TOR72p-2 SEFOS(config-if)# switchport pvid 2002
TOR72p-2 SEFOS(config-if)# spanning-tree disable
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface port-channel 13
TOR72p-2 SEFOS(config-if)# switchport pvid 2004
TOR72p-2 SEFOS(config-if)# spanning-tree disable
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface port-channel 15
TOR72p-2 SEFOS(config-if)# switchport pvid 2006
TOR72p-2 SEFOS(config-if)# spanning-tree disable
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# end
```

5. **Enable the ports and add them to the appropriate port-channels.**

   Configure the host port as an access link with a different VLAN.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# interface extreme-ethernet 0/66
TOR72p-2 SEFOS(config-if)# description "connected to nxge1 Host-4"
TOR72p-2 SEFOS(config-if)# switchport pvid 40
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface extreme-ethernet 0/67
TOR72p-2 SEFOS(config-if)# description "connected to ES1-24p-1 on
port24"
TOR72p-2 SEFOS(config-if)# channel-group 13 mode active
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface extreme-ethernet 0/71
TOR72p-2 SEFOS(config-if)# description "connected to ES1-24p-1 on
port22"
TOR72p-2 SEFOS(config-if)# channel-group 13 mode active
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface extreme-ethernet 0/68
TOR72p-2 SEFOS(config-if)# description "connected to ES1-24p-2 on
port24"
TOR72p-2 SEFOS(config-if)# channel-group 15 mode active
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface extreme-ethernet 0/72
TOR72p-2 SEFOS(config-if)# description "connected to ES1-24p-2 on
port22"
TOR72p-2 SEFOS(config-if)# channel-group 15 mode active
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
```

6. **Enable the uplink interfaces to the core switch and add them to the port-channel.**

```
TOR72p-2 SEFOS(config)# interface extreme-ethernet 0/69
TOR72p-2 SEFOS(config-if)# description "connected to Core switch
on g1/2"
TOR72p-2 SEFOS(config-if)# speed 1000
TOR72p-2 SEFOS(config-if)# channel-group 11 mode active
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface extreme-ethernet 0/70
TOR72p-2 SEFOS(config-if)# description "connected to Core switch
on g1/3"
```

```
TOR72p-2 SEFOS(config-if)# speed 1000
TOR72p-2 SEFOS(config-if)# channel-group 11 mode active
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# end
```

7. Configure the L3 interface for all VLANs defined previously.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# interface vlan 2002
TOR72p-2 SEFOS(config-if)# ip address 192.168.202.10 255.255.255.0
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface vlan 2004
TOR72p-2 SEFOS(config-if)# ip address 192.168.204.10 255.255.255.0
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface vlan 2006
TOR72p-2 SEFOS(config-if)# ip address 192.168.206.10 255.255.255.0
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface vlan 40
TOR72p-2 SEFOS(config-if)# ip address 192.168.40.10 255.255.255.0
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# end
```

8. Enable RIP and advertise the networks that are reachable through this switch.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# router rip
TOR72p-2 SEFOS(config-router)# version 2
TOR72p-2 SEFOS(config-router)# auto-summary disable
TOR72p-2 SEFOS(config-router)# redistribute connected
TOR72p-2 SEFOS(config-router)# network 192.168.202.10
TOR72p-2 SEFOS(config-router)# network 192.168.204.10
TOR72p-2 SEFOS(config-router)# network 192.168.206.10
TOR72p-2 SEFOS(config-router)# network 192.168.40.10
TOR72p-2 SEFOS(config-router)# end
```

9. Enable the VLANs to send and receive RIP version 2 updates.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# interface vlan 2002
TOR72p-2 SEFOS(config-if)# ip rip send version 2
TOR72p-2 SEFOS(config-if)# ip rip receive version 2
```

```
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface vlan 2004
TOR72p-2 SEFOS(config-if)# ip rip send version 2
TOR72p-2 SEFOS(config-if)# ip rip receive version 2
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface vlan 2006
TOR72p-2 SEFOS(config-if)# ip rip send version 2
TOR72p-2 SEFOS(config-if)# ip rip receive version 2
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface vlan 40
TOR72p-2 SEFOS(config-if)# ip rip send version 2
TOR72p-2 SEFOS(config-if)# ip rip receive version 2
TOR72p-2 SEFOS(config-if)# end
```

10. Save the configuration.

```
TOR72p-2 SEFOS# copy run start
Building configuration ...
[OK]
```

11. Verify the status of the interfaces.

```
TOR72p-2 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        down     down
...
Ex0/63       down     down
Ex0/64       down     down
Ex0/65       down     down
Ex0/66       up       up        connected to nxge1 Host-4
Ex0/67       up       up        connected to ES1-24p-1 on port24
Ex0/68       up       up        connected to ES1-24p-2 on port24
Ex0/69       up       up        connected to Core switch on g1/2
Ex0/70       up       up        connected to Core switch on g1/3
Ex0/71       up       up        connected to ES1-24p-1 on port22
Ex0/72       up       up        connected to ES1-24p-2 on port22
po11         up       up
po13         up       up
po15         up       up
vlan1        down     down
vlan2002     up       up
vlan2004     up       up
vlan2006     up       up
vlan40       up       up
```

12. **Verify the routes learned.**

```
ToR72p-2 SEFOS# show ip route

Codes: C - connected, S - static, R - rip, B - bgp, O - ospf

R 192.168.9.0/24 [2] via 192.168.202.20
R 192.168.20.0/24 [2] via 192.168.202.20
R 192.168.30.0/24 [3] via 192.168.202.20
C 192.168.40.0/24 is directly connected, vlan40
R 192.168.50.0/24 [4] via 192.168.202.20
R 192.168.60.0/24 [4] via 192.168.202.20
R 192.168.100.0/24 [4] via 192.168.202.20
R 192.168.101.0/24 [4] via 192.168.202.20
R 192.168.150.0/24 [2] via 192.168.202.20
R 192.168.151.0/24 [2] via 192.168.202.20
R 192.168.201.0/24 [2] via 192.168.202.20
C 192.168.202.0/24 is directly connected, vlan2002
R 192.168.203.0/24 [3] via 192.168.202.20
C 192.168.204.0/24 is directly connected, vlan2004
R 192.168.205.0/24 [3] via 192.168.202.20
C 192.168.206.0/24 is directly connected, vlan2006
R 45.45.45.0/24 [3] via 192.168.202.20
R 45.45.46.0/24 [3] via 192.168.202.20
R 45.45.47.0/24 [3] via 192.168.202.20
R 45.45.48.0/24 [3] via 192.168.202.20
R 45.45.49.0/24 [3] via 192.168.202.20
R 45.45.50.0/24 [3] via 192.168.202.20
R 45.45.51.0/24 [3] via 192.168.202.20
...
```

13. **Verify the number of routes.**

    After IXIA sends 500 routes to the core switch, those routes are learned on this switch.

```
TOR72p-2 SEFOS# show ip route summary

Route Source    Routes
connected         4
static            0
rip               512
bgp               0
ospf              0
Total             516
```

Related Information

- "Configure Switch TOR72p-1 for L3 Routing Using RIP" on page 98
- "Configure Switch ES1-24p-1 for L3 Routing Using RIP" on page 111
- "Configure Switch ES1-24p-2 for L3 Routing Using RIP" on page 117
- "Verify the L3 RIP Configuration" on page 122

▼ Configure Switch ES1-24p-1 for L3 Routing Using RIP

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# set gvrp disable
ES1-24p-1 SEFOS(config)# set gmrp disable
ES1-24p-1 SEFOS(config)# set port-channel enable
ES1-24p-1 SEFOS(config)# interface vlan 1
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# no ip address
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-1 SEFOS(config-if-range)# shutdown
ES1-24p-1 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 12
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 13
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# vlan 2003
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 12 untagged
port-channel 12 name 192_168_203_0_RIP_P2P
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 2004
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 13 untagged
port-channel 13 name 192_168_204_0_RIP_P2P
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 50
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1
untagged extreme-ethernet 0/1 name 192_168_50_0_HOST_P2P
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 100
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
access-layer-vlan-1
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 101
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
access-layer-vlan-2
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# end
```

4. **Configure the port-channels as access links by setting the pvid and adding port-channels to VLANs.**

   Also, disable spanning-tree on all uplinks.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 12
ES1-24p-1 SEFOS(config-if)# switchport pvid 2003
ES1-24p-1 SEFOS(config-if)# spanning-tree disable
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 13
ES1-24p-1 SEFOS(config-if)# switchport pvid 2004
ES1-24p-1 SEFOS(config-if)# spanning-tree disable
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

5. **Add the ports to the appropriate port-channels and enable the uplink interfaces to the aggregation switches.**

   Configure the host port as an access link with a different VLAN.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/1
ES1-24p-1 SEFOS(config-if)# description "connected to eth1 Host-1"
ES1-24p-1 SEFOS(config-if)# switchport pvid 50
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port67"
ES1-24p-1 SEFOS(config-if)# channel-group 12 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/21
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 12 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/24
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port68"
ES1-24p-1 SEFOS(config-if)# channel-group 13 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 13 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

6. **Configure the L3 interface for all VLANs defined previously.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 2003
ES1-24p-1 SEFOS(config-if)# ip address 192.168.203.20
255.255.255.0
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 2004
ES1-24p-1 SEFOS(config-if)# ip address 192.168.204.20
255.255.255.0
```

```
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 50
ES1-24p-1 SEFOS(config-if)# ip address 192.168.50.10 255.255.255.0
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 100
ES1-24p-1 SEFOS(config-if)# ip address 192.168.100.10
255.255.255.0
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 101
ES1-24p-1 SEFOS(config-if)# ip address 192.168.101.10
255.255.255.0
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

7. Enable RIP, and advertise the networks that are reachable through this switch.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# router rip
ES1-24p-1 SEFOS(config-router)# version 2
ES1-24p-1 SEFOS(config-router)# auto-summary disable
ES1-24p-1 SEFOS(config-router)# redistribute connected
ES1-24p-1 SEFOS(config-router)# network 192.168.203.20
ES1-24p-1 SEFOS(config-router)# network 192.168.204.20
ES1-24p-1 SEFOS(config-router)# network 192.168.50.10
ES1-24p-1 SEFOS(config-router)# network 192.168.100.10
ES1-24p-1 SEFOS(config-router)# network 192.168.101.10
ES1-24p-1 SEFOS(config-router)# end
```

8. Enable the VLANs to send and receive RIP version 2 updates.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 2003
ES1-24p-1 SEFOS(config-if)# ip rip send version 2
ES1-24p-1 SEFOS(config-if)# ip rip receive version 2
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 2004
ES1-24p-1 SEFOS(config-if)# ip rip send version 2
ES1-24p-1 SEFOS(config-if)# ip rip receive version 2
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 50
ES1-24p-1 SEFOS(config-if)# ip rip send version 2
ES1-24p-1 SEFOS(config-if)# ip rip receive version 2
ES1-24p-1 SEFOS(config-if)# exit
```

```
ES1-24p-1 SEFOS(config)# interface vlan 100
ES1-24p-1 SEFOS(config-if)# ip rip send version 2
ES1-24p-1 SEFOS(config-if)# ip rip receive version 2
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 101
ES1-24p-1 SEFOS(config-if)# ip rip send version 2
ES1-24p-1 SEFOS(config-if)# ip rip receive version 2
ES1-24p-1 SEFOS(config-if)# end
```

9. Save the configuration.

```
ES1-24p-1 SEFOS# copy run start
Building configuration ...
[OK]
ES1-24p-1 SEFOS#
```

10. Verify the status of the interfaces.

```
ES1-24p-1 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        up       up        connected to eth1 Host-1
Ex0/2        down     down
:
:
Ex0/20       down     down
Ex0/21       up       up        connected to ToR72p-1 on port71
Ex0/22       up       up        connected to ToR72p-2 on port71
Ex0/23       up       up        connected to ToR72p-1 on port67
Ex0/24       up       up        connected to ToR72p-2 on port68
po12         up       up
po13         up       up
vlan1        down     down
vlan2003     up       up
vlan2004     up       up
vlan50       up       up
vlan100      up       up
vlan101      up       up
```

11. Verify the routes learned.

```
ES1-24p-1 SEFOS# show ip route

Codes: C - connected, S - static, R - rip, B - bgp, O - ospf
```

```
R 192.168.9.0/24 [3] via 192.168.203.10
R 192.168.20.0/24 [3] via 192.168.203.10
R 192.168.30.0/24 [2] via 192.168.203.10
R 192.168.40.0/24 [4] via 192.168.203.10
C 192.168.50.0/24 is directly connected, vlan50
R 192.168.60.0/24 [3] via 192.168.203.10
C 192.168.100.0/24 is directly connected, vlan100
C 192.168.101.0/24 is directly connected, vlan101
R 192.168.150.0/24 [3] via 192.168.203.10
R 192.168.151.0/24 [3] via 192.168.203.10
R 192.168.201.0/24 [2] via 192.168.203.10
R 192.168.202.0/24 [3] via 192.168.203.10
C 192.168.203.0/24 is directly connected, vlan2003
C 192.168.204.0/24 is directly connected, vlan2004
R 192.168.205.0/24 [2] via 192.168.203.10
R 192.168.206.0/24 [3] via 192.168.203.10
R 45.45.45.0/24 [3] via 192.168.203.10
R 45.45.46.0/24 [3] via 192.168.203.10
R 45.45.47.0/24 [3] via 192.168.203.10
R 45.45.48.0/24 [3] via 192.168.203.10
R 45.45.49.0/24 [3] via 192.168.203.10
R 45.45.50.0/24 [3] via 192.168.203.10
R 45.45.51.0/24 [3] via 192.168.203.10
...
```

12. Verify the number of routes.

After IXIA sends 500 routes to the core switch, those routes are learned on this switch.

```
ES1-24p-1 SEFOS# show ip route summary

Route Source    Routes
connected         5
static            0
rip               511
bgp               0
ospf              0
Total             516
```

Related Information

- "Configure Switch TOR72p-1 for L3 Routing Using RIP" on page 98
- "Configure Switch TOR72p-2 for L3 Routing Using RIP" on page 105
- "Configure Switch ES1-24p-2 for L3 Routing Using RIP" on page 117
- "Verify the L3 RIP Configuration" on page 122

▼ Configure Switch ES1-24p-2 for L3 Routing Using RIP

1. **Start the configuration with all ports and the default VLAN shutdown.**

   Disable GVRP and GMRP.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# set gvrp disable
ES1-24p-2 SEFOS(config)# set gmrp disable
ES1-24p-2 SEFOS(config)# set port-channel enable
ES1-24p-2 SEFOS(config)# interface vlan 1
ES1-24p-2 SEFOS(config-if)# shutdown
ES1-24p-2 SEFOS(config-if)# no ip address
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-2 SEFOS(config-if-range)# shutdown
ES1-24p-2 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 14
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 15
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

Note – You can add VLANs as tagged or untagged to a port or a port-channel in three different ways. See "Adding VLANs" on page 11.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# vlan 2005
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 14 untagged
port-channel 14 name 192_168_205_0_RIP_P2P
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 2006
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 15 untagged
port channel 15 name 192_168_206_0_RIP_P2P
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 60
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1
untagged extreme-ethernet 0/1 name 192_168_60_0_HOST_P2P
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# end
```

4. **Configure the port-channels as access links by setting the pvid and adding port-channels to VLANs.**

   Also, disable spanning-tree on all uplinks.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 14
ES1-24p-2 SEFOS(config-if)# switchport pvid 2005
ES1-24p-2 SEFOS(config-if)# spanning-tree disable
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 15
ES1-24p-2 SEFOS(config-if)# switchport pvid 2006
ES1-24p-2 SEFOS(config-if)# spanning-tree disable
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

5. **Add the ports to the appropriate port-channels and enable the uplink interfaces to the aggregation switches.**

   Configure the host port as an access link with a different VLAN.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/1
ES1-24p-2 SEFOS(config-if)# description "connected to eth1
nsn172-76"
```

```
ES1-24p-2 SEFOS(config-if)# switchport pvid 60
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port68"
ES1-24p-2 SEFOS(config-if)# channel-group 14 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/21
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 14 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/24
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port67"
ES1-24p-2 SEFOS(config-if)# channel-group 15 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 15 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

6. Configure the L3 interface for all VLANs defined previously.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface vlan 2005
ES1-24p-2 SEFOS(config-if)# ip address 192.168.205.20
255.255.255.0
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface vlan 2006
ES1-24p-2 SEFOS(config-if)# ip address 192.168.206.20
255.255.255.0
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface vlan 60
ES1-24p-2 SEFOS(config-if)# ip address 192.168.60.10 255.255.255.0
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

7. Enable RIP, and advertise the networks that are reachable through this switch.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# router rip
ES1-24p-2 SEFOS(config-router)# version 2
ES1-24p-2 SEFOS(config-router)# auto-summary disable
ES1-24p-2 SEFOS(config-router)# redistribute connected
ES1-24p-2 SEFOS(config-router)# network 192.168.205.20
ES1-24p-2 SEFOS(config-router)# network 192.168.206.20
ES1-24p-2 SEFOS(config-router)# network 192.168.60.10
ES1-24p-2 SEFOS(config-router)# end
```

8. Enable the VLANs to send and receive RIP version 2 updates.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface vlan 2005
ES1-24p-2 SEFOS(config-if)# ip rip send version 2
ES1-24p-2 SEFOS(config-if)# ip rip receive version 2
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface vlan 2006
ES1-24p-2 SEFOS(config-if)# ip rip send version 2
ES1-24p-2 SEFOS(config-if)# ip rip receive version 2
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface vlan 60
ES1-24p-2 SEFOS(config-if)# ip rip send version 2
ES1-24p-2 SEFOS(config-if)# ip rip receive version 2
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

9. Save the configuration.

```
ES1-24p-2 SEFOS# copy run start
Building configuration ...
[OK]
ES1-24p-2 SEFOS#
```

10. Verify the status of the interfaces.

```
ES1-24p-2 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        up       up        connected to eth1 nsn172-76
Ex0/2        down     down
:
```

```
:
Ex0/20        down      down
Ex0/21        up        up         connected to ToR72p-1 on port72
Ex0/22        up        up         connected to ToR72p-2 on port72
Ex0/23        up        up         connected to ToR72p-1 on port68
Ex0/24        up        up         connected to ToR72p-2 on port67
po14          up        up
po15          up        up
vlan1         down      down
vlan2005      up        up
vlan2006      up        up
vlan60        up        up
```

11. Verify the routes learned.

```
ES1-24p-2 SEFOS# show ip route

Codes: C - connected, S - static, R - rip, B - bgp, O - ospf

R 192.168.9.0/24 [3] via 192.168.205.10
R 192.168.20.0/24 [3] via 192.168.205.10
R 192.168.30.0/24 [2] via 192.168.205.10
R 192.168.40.0/24 [4] via 192.168.205.10
R 192.168.50.0/24 [3] via 192.168.205.10
C 192.168.60.0/24 is directly connected, vlan60
R 192.168.100.0/24 [3] via 192.168.205.10
R 192.168.101.0/24 [3] via 192.168.205.10
R 192.168.150.0/24 [3] via 192.168.205.10
R 192.168.151.0/24 [3] via 192.168.205.10
R 192.168.201.0/24 [2] via 192.168.205.10
R 192.168.202.0/24 [3] via 192.168.205.10
R 192.168.203.0/24 [2] via 192.168.205.10
R 192.168.204.0/24 [3] via 192.168.205.10
C 192.168.205.0/24 is directly connected, vlan2005
C 192.168.206.0/24 is directly connected, vlan2006
R 192.168.205.0/24 [2] via 192.168.203.10
R 192.168.206.0/24 [3] via 192.168.203.10
R 45.45.45.0/24 [3] via 192.168.205.10
R 45.45.46.0/24 [3] via 192.168.205.10
R 45.45.47.0/24 [3] via 192.168.205.10
R 45.45.48.0/24 [3] via 192.168.205.10
R 45.45.49.0/24 [3] via 192.168.205.10
R 45.45.50.0/24 [3] via 192.168.205.10
R 45.45.51.0/24 [3] via 192.168.205.10
...
```

12. **Verify the number of routes.**

    After IXIA sends 500 routes to the core switch, those routes are learned on this switch.

```
ES1-24p-2 SEFOS# show ip route summary

Route Source    Routes
connected         3
static            0
rip               513
bgp               0
ospf              0
Total             516
```

Related Information

- "Configure Switch TOR72p-1 for L3 Routing Using RIP" on page 98
- "Configure Switch TOR72p-2 for L3 Routing Using RIP" on page 105
- "Configure Switch ES1-24p-1 for L3 Routing Using RIP" on page 111
- "Verify the L3 RIP Configuration" on page 122

▼ Verify the L3 RIP Configuration

Note – All pings should be successful. Each switch has learned all routes to different networks in the topology through RIP.

1. **Verify the configuration on** `Host-1`**.**

```
[Host-1 ~]# ifconfig
eth1      Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.20.20  Bcast:192.168.20.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:107 errors:0 dropped:0 overruns:0 frame:0
          TX packets:357 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:9530 (9.3 KiB)  TX bytes:41674 (40.6 KiB)

eth1.150  Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
```

```
          inet addr:192.168.150.20  Bcast:192.168.150.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:63 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:8046 (7.8 KiB)

eth1.151  Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.151.20  Bcast:192.168.151.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:48 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:6760 (6.6 KiB)
```

2. Verify the configuration on `Host-2`**.**

```
Host-2# ifconfig nxge1
nxge1: flags=
1001000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,FIXEDMTU>
mtu 9000 index 4
      inet 192.168.30.20 netmask ffffff00 broadcast 192.168.30.255
        ether 0:14:4f:6c:43:9
```

3. Verify the configuration on `Host-3`**.**

```
[Host-3 ~]# ifconfig
eth1      Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.50.20  Bcast:192.168.50.255
Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:240930477 errors:0 dropped:515783109
overruns:0frame:0
          TX packets:13447642 errors:0 dropped:0 overruns:0
carrier:0
          collisions:0 txqueuelen:1000
         RX bytes:727267562 (693.5 MiB)  TX bytes:564925930 (538.7
MiB)

eth1.100  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.100.20  Bcast:192.168.100.255
Mask:255.255.255.0
```

```
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:66 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:13336 (13.0 KiB)

eth1.101  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
          inet addr:192.168.101.20  Bcast:192.168.101.255
Mask:255.255.255.0
          inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:36 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:5966 (5.8 KiB)
```

4. **Ping from** `Host-3` **to untagged and tagged interfaces on** `Host-1` **of the core switch.**

```
[Host-3 ~]# ping 192.168.20.20
[Host-3 ~]# ping 192.168.150.20
[Host-3 ~]# ping 192.168.151.20
```

5. **Ping from** `Host-1` **to untagged and tagged interfaces on** `Host-3` **of** `ES1-24p-1`**.**

```
[Host-1 ~]# ping 192.168.50.20
[Host-1 ~]# ping 192.168.100.20
[Host-1 ~]# ping 192.168.101.20
```

6. **Ping from** `Host-1` **to an untagged interface on** `Host-2` **of** `ToR72p-1`**.**

```
[Host-3 ~]# ping 192.168.30.20
```

7. **Ping from** `Host-2` **to an untagged interface on** `Host-1` **of the core switch.**

```
Host-2# ping -s 192.168.20.20
```

Related Information

- "Configure Switch TOR72p-1 for L3 Routing Using RIP" on page 98
- "Configure Switch TOR72p-2 for L3 Routing Using RIP" on page 105
- "Configure Switch ES1-24p-1 for L3 Routing Using RIP" on page 111
- "Configure Switch ES1-24p-2 for L3 Routing Using RIP" on page 117

Configuring L3 Routing Based Topology Using OSPF

These tasks describe how to configure each switch to learn routes through L3 OSPF.

Related Information

▼ Configure Switch TOR72p-1 for L3 Routing Using OSPF

1. Start the configuration with all ports and the default VLAN shutdown.

Tip – It is a best practice to start the configuration with all the ports and default VLAN shutdown. Disable GVRP and GMRP because dynamic VLAN learning is not suggested.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# set gvrp disable
ToR72p-1 SEFOS(config)# set gmrp disable
ToR72p-1 SEFOS(config)# set port-channel enable
ToR72p-1 SEFOS(config)# interface vlan 1
ToR72p-1 SEFOS(config-if)# shutdown
ToR72p-1 SEFOS(config-if)# no ip address
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface range extreme-ethernet 0/1-72
ToR72p-1 SEFOS(config-if-range)# shutdown
ToR72p-1 SEFOS(config-if-range)# end
```

2. Create and enable port-channels between switches per the topology.

See "L2 and L3 Topology" on page 9.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface port-channel 10
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 12
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 14
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# vlan 2001
ToR72p-1 SEFOS(config-vlan)# ports add port-channel 10 untagged
port-channel 10 name 192_168_201_0_OSPF_P2P
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 2003
ToR72p-1 SEFOS(config-vlan)# ports add port-channel 12 untagged
port-channel 12 name 192_168_203_0_OSPF_P2P
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 2005
ToR72p-1 SEFOS(config-vlan)# ports add port-channel 14 untagged
port-channel 14 name 192_168_205_0_OSPF_P2P
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# vlan 30
ToR72p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/66
untagged extreme-ethernet 0/66 name 192_168_30_0_HOST_P2P
ToR72p-1 SEFOS(config-vlan)# vlan active
ToR72p-1 SEFOS(config-vlan)# exit
ToR72p-1 SEFOS(config)# end
```

Note – You can add VLANs as tagged or untagged to a port or a port-channel in three different ways. See "Adding VLANs" on page 11.

4. **Configure the port-channels as access links by setting the pvid and adding port-channels to VLANs.**

   Also, disable spanning-tree on all uplinks.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface port-channel 10
ToR72p-1 SEFOS(config-if)# switchport pvid 2001
ToR72p-1 SEFOS(config-if)# spanning-tree disable
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 12
ToR72p-1 SEFOS(config-if)# switchport pvid 2003
ToR72p-1 SEFOS(config-if)# spanning-tree disable
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface port-channel 14
ToR72p-1 SEFOS(config-if)# switchport pvid 2005
```

```
ToR72p-1 SEFOS(config-if)# spanning-tree disable
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

5. Enable the ports and add them to the appropriate port-channels.

Configure the host port as an access link in a different VLAN by setting the pvid.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/66
ToR72p-1 SEFOS(config-if)# description "connected to nxge1 Host-2"
ToR72p-1 SEFOS(config-if)# switchport pvid 30
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/67
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-1 on
port23"
ToR72p-1 SEFOS(config-if)# channel-group 12 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/71
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-1 on
port21"
ToR72p-1 SEFOS(config-if)# channel-group 12 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/68
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-2 on
port23"
ToR72p-1 SEFOS(config-if)# channel-group 14 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/72
ToR72p-1 SEFOS(config-if)# description "connected to ES1-24p-2 on
port21"
ToR72p-1 SEFOS(config-if)# channel-group 14 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
```

6. Enable the uplink interfaces to the core switch and add them to the port-channel.

```
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/69
ToR72p-1 SEFOS(config-if)# description "connected to Core switch
on g1/1"
ToR72p-1 SEFOS(config-if)# speed 1000
ToR72p-1 SEFOS(config-if)# channel-group 10 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
```

```
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface extreme-ethernet 0/70
ToR72p-1 SEFOS(config-if)# description "connected to Core switch
on g1/4"
ToR72p-1 SEFOS(config-if)# speed 1000
ToR72p-1 SEFOS(config-if)# channel-group 10 mode active
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

7. Configure the L3 interface for all VLANs defined previously.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface vlan 2001
ToR72p-1 SEFOS(config-if)# ip address 192.168.201.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 2003
ToR72p-1 SEFOS(config-if)# ip address 192.168.203.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 2005
ToR72p-1 SEFOS(config-if)# ip address 192.168.205.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 30
ToR72p-1 SEFOS(config-if)# ip address 192.168.30.10 255.255.255.0
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# end
```

8. Enable OSPF and advertise the networks that are reachable through this switch.

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# router ospf
ToR72p-1 SEFOS(config-router)# asbr router
ToR72p-1 SEFOS(config-router)# router-id 12.0.0.1
ToR72p-1 SEFOS(config-router)# redistribute connected
ToR72p-1 SEFOS(config-router)# network 192.168.201.10 area 0.0.0.0
ToR72p-1 SEFOS(config-router)# network 192.168.203.10 area 0.0.0.0
ToR72p-1 SEFOS(config-router)# network 192.168.205.10 area 0.0.0.0
ToR72p-1 SEFOS(config-router)# network 192.168.30.10 area 0.0.0.0
ToR72p-1 SEFOS(config-router)# end
```

9. **Configure the VLAN interface with hello, dead intervals, authentication, and network type.**

```
ToR72p-1 SEFOS# configure terminal
ToR72p-1 SEFOS(config)# interface vlan 2001
ToR72p-1 SEFOS(config-if)# ip ospf hello-interval 3
ToR72p-1 SEFOS(config-if)# ip ospf dead-interval 12
ToR72p-1 SEFOS(config-if)# ip ospf message-digest-key 1 md5 oracle
ToR72p-1 SEFOS(config-if)# ip ospf authentication message-digest
ToR72p-1 SEFOS(config-if)# ip ospf network point-to-point
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 2003
ToR72p-1 SEFOS(config-if)# ip ospf hello-interval 3
ToR72p-1 SEFOS(config-if)# ip ospf dead-interval 12
ToR72p-1 SEFOS(config-if)# ip ospf message-digest-key 1 md5 oracle
ToR72p-1 SEFOS(config-if)# ip ospf authentication message-digest
ToR72p-1 SEFOS(config-if)# ip ospf network point-to-point
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 2005
ToR72p-1 SEFOS(config-if)# ip ospf hello-interval 3
ToR72p-1 SEFOS(config-if)# ip ospf dead-interval 12
ToR72p-1 SEFOS(config-if)# ip ospf message-digest-key 1 md5 oracle
ToR72p-1 SEFOS(config-if)# ip ospf authentication message-digest
ToR72p-1 SEFOS(config-if)# ip ospf network point-to-point
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config)# interface vlan 30
ToR72p-1 SEFOS(config-if)# ip ospf hello-interval 3
ToR72p-1 SEFOS(config-if)# ip ospf dead-interval 12
ToR72p-1 SEFOS(config-if)# ip ospf message-digest-key 1 md5 oracle
ToR72p-1 SEFOS(config-if)# ip ospf authentication message-digest
ToR72p-1 SEFOS(config-if)# ip ospf network point-to-point
ToR72p-1 SEFOS(config-if)# end
```

10. **Save the configuration.**

```
ToR72p-1 SEFOS# copy run start
Building configuration ...
[OK]
```

11. **Verify the status of the interfaces.**

```
ToR72p-1 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        down     down
...
```

```
Ex0/65        down      down
Ex0/66        up        up         connected to nxge1 Host-2
Ex0/67        up        up         connected to ES1-24p-1 on port23
Ex0/68        up        up         connected to ES1-24p-2 on port23
Ex0/69        up        up         connected to Core switch on g1/1
Ex0/70        up        up         connected to Core switch on g1/4
Ex0/71        up        up         connected to ES1-24p-1 on port21
Ex0/72        up        up         connected to ES1-24p-2 on port21
po10          up        up
po12          up        up
po14          up        up
vlan1         down      down
vlan2001      up        up
vlan2003      up        up
vlan2005      up        up
vlan30        up        up
```

12. Verify the OSPF neighbors.

```
ToR72p-1 SEFOS# show ip ospf neighbor

 Vrf  default
Neighbor-ID  Pri  State       DeadTime  Address          Interface
-----------  ---  -----       --------  -------          ---------
12.0.0.5     1    FULL/PTOP   35        192.168.201.20   vlan2001
12.0.0.3     1    FULL/PTOP   38        192.168.203.20   vlan2003
12.0.0.4     1    FULL/PTOP   38        192.168.205.20   vlan2005
```

13. After IXIA sends 500 routes to the core switch, verify the number of routes on this `ToR72p-1` switch.

Some switches display OSPF routes learned as 1000 because they have multiple paths to reach a particular destination.

```
ToR72p-1 SEFOS# show ip route summary

Route Source    Routes
connected         4
static            0
rip               0
bgp               0
ospf              514
Total             518
```

14. **Verify the routes learned.**

```
ToR72p-1 SEFOS# show ip route

Codes: C - connected, S - static, R - rip, B - bgp, O - ospf

O 192.168.20.0/24 [2] via 192.168.201.20
C 192.168.30.0/24 is directly connected, vlan30
O 192.168.40.0/24 [3] via 192.168.203.20
              [3] via 192.168.205.20
              [3] via 192.168.201.20
O 192.168.50.0/24 [2] via 192.168.203.20
O 192.168.60.0/24 [2] via 192.168.205.20
O 192.168.100.0/24 [2] via 192.168.203.20
O 192.168.101.0/24 [2] via 192.168.203.20
O 192.168.150.0/24 [2] via 192.168.201.20
O 192.168.151.0/24 [2] via 192.168.201.20
C 192.168.201.0/24 is directly connected, vlan2001
O 192.168.202.0/24 [2] via 192.168.201.20
C 192.168.203.0/24 is directly connected, vlan2003
O 192.168.204.0/24 [2] via 192.168.203.20
C 192.168.205.0/24 is directly connected, vlan2005
O 192.168.206.0/24 [2] via 192.168.205.20
O 45.45.45.0/24 [2] via 192.168.201.20
O 45.45.46.0/24 [2] via 192.168.201.20
O 45.45.47.0/24 [2] via 192.168.201.20
O 45.45.48.0/24 [2] via 192.168.201.20
O 45.45.49.0/24 [2] via 192.168.201.20
O 45.45.50.0/24 [2] via 192.168.201.20
O 45.45.51.0/24 [2] via 192.168.201.20
O 45.45.52.0/24 [2] via 192.168.201.20
O 45.45.53.0/24 [2] via 192.168.201.20
O 45.45.54.0/24 [2] via 192.168.201.20
...
```

Related Information

- "Configure Switch TOR72p-2 for L3 Routing Using OSPF" on page 133
- "Configure Switch ES1-24p-1 for L3 Routing Using OSPF" on page 140
- "Configure Switch ES1-24p-2 for L3 Routing Using OSPF" on page 146
- "Verify the L3 OSPF Configuration" on page 153

▼ Configure Switch TOR72p-2 for L3 Routing Using OSPF

1. Start the configuration with all ports and the default VLAN shutdown.

Tip – It is a best practice to start the configuration with all the ports and default VLAN shutdown. Also, disable GVRP and GMRP because dynamic VLAN learning is not suggested.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# set gvrp disable
TOR72p-2 SEFOS(config)# set gmrp disable
TOR72p-2 SEFOS(config)# set port-channel enable
TOR72p-2 SEFOS(config)# interface vlan 1
TOR72p-2 SEFOS(config-if)# shutdown
TOR72p-2 SEFOS(config-if)# no ip address
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface range extreme-ethernet 0/1-72
TOR72p-2 SEFOS(config-if-range)# shutdown
TOR72p-2 SEFOS(config-if-range)# end
```

2. Create and enable port-channels between switches per the topology.

See "L2 and L3 Topology" on page 9.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# interface port-channel 11
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface port-channel 13
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface port-channel 15
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# vlan 2002
TOR72p-2 SEFOS(config-vlan)# ports add port-channel 11 untagged
port-channel 10 name 192_168_202_0_OSPF_P2P
TOR72p-2 SEFOS(config-vlan)# vlan active
TOR72p-2 SEFOS(config-vlan)# exit
TOR72p-2 SEFOS(config)# vlan 2004
TOR72p-2 SEFOS(config-vlan)# ports add port-channel 13 untagged
port-channel 12 name 192_168_204_0_OSPF_P2P
TOR72p-2 SEFOS(config-vlan)# vlan active
TOR72p-2 SEFOS(config-vlan)# exit
TOR72p-2 SEFOS(config)# vlan 2006
TOR72p-2 SEFOS(config-vlan)# ports add port-channel 15 untagged
port-channel 14 name 192_168_206_0_OSPF_P2P
TOR72p-2 SEFOS(config-vlan)# vlan active
TOR72p-2 SEFOS(config-vlan)# exit
TOR72p-2 SEFOS(config)# vlan 40
TOR72p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/66
untagged extreme-ethernet 0/66 name 192_168_40_0_HOST_P2P
TOR72p-2 SEFOS(config-vlan)# vlan active
TOR72p-2 SEFOS(config-vlan)# exit
TOR72p-2 SEFOS(config)# end
```

Note – You can add VLANs as tagged or untagged to a port or a port-channel in three different ways. See "Adding VLANs" on page 11.

4. **Configure the port-channels as access links by setting the pvid and adding port-channels to VLANs.**

   Also, disable spanning-tree on all uplinks.

```
TOR72p-2 SEFOS# configure terminal
TOR72p-2 SEFOS(config)# interface port-channel 11
TOR72p-2 SEFOS(config-if)# switchport pvid 2002
TOR72p-2 SEFOS(config-if)# spanning-tree disable
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface port-channel 13
TOR72p-2 SEFOS(config-if)# switchport pvid 2004
TOR72p-2 SEFOS(config-if)# spanning-tree disable
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# interface port-channel 15
TOR72p-2 SEFOS(config-if)# switchport pvid 2006
```

```
TOR72p-2 SEFOS(config-if)# spanning-tree disable
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config)# end
```

5. Enable the ports and add them to the appropriate port-channels.

Configure the host port as an access link in a different VLAN by setting the pvid.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/66
ToR72p-2 SEFOS(config-if)# description "connected to nxge1
nsn171-170"
ToR72p-2 SEFOS(config-if)# switchport pvid 40
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/67
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-1 on
port24"
ToR72p-2 SEFOS(config-if)# channel-group 13 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/71
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-1 on
port22"
ToR72p-2 SEFOS(config-if)# channel-group 13 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/68
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-2 on
port24"
ToR72p-2 SEFOS(config-if)# channel-group 15 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/72
ToR72p-2 SEFOS(config-if)# description "connected to ES1-24p-2 on
port22"
ToR72p-2 SEFOS(config-if)# channel-group 15 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
```

6. Enable the uplink interfaces to the core switch and add them to the port-channel.

```
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/69
ToR72p-2 SEFOS(config-if)# description "connected to Core switch
on g1/2"
ToR72p-2 SEFOS(config-if)# speed 1000
ToR72p-2 SEFOS(config-if)# channel-group 11 mode active
```

```
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface extreme-ethernet 0/70
ToR72p-2 SEFOS(config-if)# description "connected to Core switch
on g1/3"
ToR72p-2 SEFOS(config-if)# speed 1000
ToR72p-2 SEFOS(config-if)# channel-group 11 mode active
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# end
```

7. Configure the L3 interface for all VLANs defined previously.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# interface vlan 2002
ToR72p-2 SEFOS(config-if)# ip address 192.168.202.10 255.255.255.0
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface vlan 2004
ToR72p-2 SEFOS(config-if)# ip address 192.168.204.10 255.255.255.0
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface vlan 2006
ToR72p-2 SEFOS(config-if)# ip address 192.168.206.10 255.255.255.0
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface vlan 40
ToR72p-2 SEFOS(config-if)# ip address 192.168.40.10 255.255.255.0
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# end
```

8. Enable OSPF and advertise the networks that are reachable through this switch.

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# router ospf
ToR72p-2 SEFOS(config-router)# asbr router
ToR72p-2 SEFOS(config-router)# router-id 12.0.0.2
ToR72p-2 SEFOS(config-router)# redistribute connected
ToR72p-2 SEFOS(config-router)# network 192.168.202.10 area 0.0.0.0
ToR72p-2 SEFOS(config-router)# network 192.168.204.10 area 0.0.0.0
ToR72p-2 SEFOS(config-router)# network 192.168.206.10 area 0.0.0.0
ToR72p-2 SEFOS(config-router)# network 192.168.40.10 area 0.0.0.0
ToR72p-2 SEFOS(config-router)# end
```

9. **Configure the VLAN interface with hello, dead intervals, authentication, and network type.**

```
ToR72p-2 SEFOS# configure terminal
ToR72p-2 SEFOS(config)# interface vlan 2001
ToR72p-2 SEFOS(config-if)# ip ospf hello-interval 3
ToR72p-2 SEFOS(config-if)# ip ospf dead-interval 12
ToR72p-2 SEFOS(config-if)# ip ospf message-digest-key 1 md5 oracle
ToR72p-2 SEFOS(config-if)# ip ospf authentication message-digest
ToR72p-2 SEFOS(config-if)# ip ospf network point-to-point
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface vlan 2003
ToR72p-2 SEFOS(config-if)# ip ospf hello-interval 3
ToR72p-2 SEFOS(config-if)# ip ospf dead-interval 12
ToR72p-2 SEFOS(config-if)# ip ospf message-digest-key 1 md5 oracle
ToR72p-2 SEFOS(config-if)# ip ospf authentication message-digest
ToR72p-2 SEFOS(config-if)# ip ospf network point-to-point
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface vlan 2005
ToR72p-2 SEFOS(config-if)# ip ospf hello-interval 3
ToR72p-2 SEFOS(config-if)# ip ospf dead-interval 12
ToR72p-2 SEFOS(config-if)# ip ospf message-digest-key 1 md5 oracle
ToR72p-2 SEFOS(config-if)# ip ospf authentication message-digest
ToR72p-2 SEFOS(config-if)# ip ospf network point-to-point
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config)# interface vlan 30
ToR72p-2 SEFOS(config-if)# ip ospf hello-interval 3
ToR72p-2 SEFOS(config-if)# ip ospf dead-interval 12
ToR72p-2 SEFOS(config-if)# ip ospf message-digest-key 1 md5 oracle
ToR72p-2 SEFOS(config-if)# ip ospf authentication message-digest
ToR72p-2 SEFOS(config-if)# ip ospf network point-to-point
ToR72p-2 SEFOS(config-if)# end
```

10. **Save the configuration.**

```
ToR72p-2 SEFOS# copy run start
Building configuration ...
[OK]
```

11. **Verify the status of the interfaces.**

```
ToR72p-2 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        down     down
...
```

```
Ex0/64        down     down
Ex0/65        down     down
Ex0/66        up       up        connected to nxge1 nsn171-170
Ex0/67        up       up        connected to ES1-24p-1 on port24
Ex0/68        up       up        connected to ES1-24p-2 on port24
Ex0/69        up       up        connected to Core switch on g1/2
Ex0/70        up       up        connected to Core switch on g1/3
Ex0/71        up       up        connected to ES1-24p-1 on port22
Ex0/72        up       up        connected to ES1-24p-2 on port22
po11          up       up
po13          up       up
po15          up       up
vlan1         down     down
vlan2002      up       up
vlan2004      up       up
vlan2006      up       up
vlan40        up       up
```

12. Verify the OSPF neighbors.

```
ToR72p-2 SEFOS# show ip ospf neighbor

 Vrf  default
Neighbor-ID  Pri  State       DeadTime  Address          Interface
-----------  ---  -----       --------  -------          ---------
12.0.0.5     1    FULL/PTOP   32        192.168.202.20   vlan2002
12.0.0.3     1    FULL/PTOP   36        192.168.204.20   vlan2006
12.0.0.4     1    FULL/PTOP   38        192.168.206.20   vlan2004
```

13. After IXIA sends 500 routes to the core switch, verify the number of routes on this `ToR72p-2` **switch.**

Some switches display OSPF routes learned as 1000 because they have multiple paths to reach a particular destination.

```
ToR72p-2 SEFOS# show ip route summary

Route Source    Routes
connected         4
static            0
rip               0
bgp               0
ospf              514
Total             518
```

14. **Verify the routes learned.**

```
ToR72p-2 SEFOS# show ip route

Codes: C - connected, S - static, R - rip, B - bgp, O - ospf

O 192.168.20.0/24 [2] via 192.168.202.20
O 192.168.30.0/24 [3] via 192.168.204.20
              [3] via 192.168.206.20
              [3] via 192.168.202.20
C 192.168.40.0/24 is directly connected, vlan40
O 192.168.50.0/24 [2] via 192.168.204.20
O 192.168.60.0/24 [2] via 192.168.206.20
O 192.168.100.0/24 [2] via 192.168.204.20
O 192.168.101.0/24 [2] via 192.168.204.20
O 192.168.150.0/24 [2] via 192.168.202.20
O 192.168.151.0/24 [2] via 192.168.202.20
O 192.168.201.0/24 [2] via 192.168.202.20
C 192.168.202.0/24 is directly connected, vlan2002
O 192.168.203.0/24 [2] via 192.168.204.20
C 192.168.204.0/24 is directly connected, vlan2004
O 192.168.205.0/24 [2] via 192.168.206.20
C 192.168.206.0/24 is directly connected, vlan2006
O 45.45.45.0/24 [2] via 192.168.202.20
O 45.45.46.0/24 [2] via 192.168.202.20
O 45.45.47.0/24 [2] via 192.168.202.20
O 45.45.48.0/24 [2] via 192.168.202.20
O 45.45.49.0/24 [2] via 192.168.202.20
O 45.45.50.0/24 [2] via 192.168.202.20
O 45.45.51.0/24 [2] via 192.168.202.20
O 45.45.52.0/24 [2] via 192.168.202.20
O 45.45.53.0/24 [2] via 192.168.202.20
O 45.45.54.0/24 [2] via 192.168.202.20
O 45.45.55.0/24 [2] via 192.168.202.20
...
```

Related Information

- "Configure Switch TOR72p-1 for L3 Routing Using OSPF" on page 126
- "Configure Switch ES1-24p-1 for L3 Routing Using OSPF" on page 140
- "Configure Switch ES1-24p-2 for L3 Routing Using OSPF" on page 146
- "Verify the L3 OSPF Configuration" on page 153

▼ Configure Switch ES1-24p-1 for L3 Routing Using OSPF

1. Start the configuration with all ports and the default VLAN shutdown.

Tip – It is a best practice to start the configuration with all the ports and default VLAN shutdown. Also, disable GVRP and GMRP because dynamic VLAN learning is not suggested.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# set gvrp disable
ES1-24p-1 SEFOS(config)# set gmrp disable
ES1-24p-1 SEFOS(config)# set port-channel enable
ES1-24p-1 SEFOS(config)# interface vlan 1
ES1-24p-1 SEFOS(config-if)# shutdown
ES1-24p-1 SEFOS(config-if)# no ip address
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-1 SEFOS(config-if-range)# shutdown
ES1-24p-1 SEFOS(config-if-range)# end
```

2. Create and enable port-channels between switches per the topology.

See "L2 and L3 Topology" on page 9.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 12
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 13
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# vlan 2003
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 12 untagged
port-channel 12 name 192_168_203_0_OSPF_P2P
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 2004
ES1-24p-1 SEFOS(config-vlan)# ports add port-channel 13 untagged
port-channel 13 name 192_168_204_0_OSPF_P2P
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 50
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1
untagged extreme-ethernet 0/1 name 192_168_50_0_HOST_P2P
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 100
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
access-layer-vlan-1
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# exit
ES1-24p-1 SEFOS(config)# vlan 101
ES1-24p-1 SEFOS(config-vlan)# ports add extreme-ethernet 0/1 name
access-layer-vlan-2
ES1-24p-1 SEFOS(config-vlan)# vlan active
ES1-24p-1 SEFOS(config-vlan)# end
```

4. **Configure the port-channels as access links by setting the pvid and adding port-channels to VLANs.**

   Also, disable spanning-tree on all uplinks.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface port-channel 12
ES1-24p-1 SEFOS(config-if)# switchport pvid 2003
ES1-24p-1 SEFOS(config-if)# spanning-tree disable
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface port-channel 13
ES1-24p-1 SEFOS(config-if)# switchport pvid 2004
ES1-24p-1 SEFOS(config-if)# spanning-tree disable
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

5. **Add the ports to the appropriate port-channels and enable the uplink interfaces to the aggregation switches.**

   Configure the host port as an access link with a different VLAN.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/1
ES1-24p-1 SEFOS(config-if)# description "connected to eth1
nsn172-178"
ES1-24p-1 SEFOS(config-if)# switchport pvid 50
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port67"
ES1-24p-1 SEFOS(config-if)# channel-group 12 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/21
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-1 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 12 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/24
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port68"
ES1-24p-1 SEFOS(config-if)# channel-group 13 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-1 SEFOS(config-if)# description "connected to ToR72p-2 on
port71"
ES1-24p-1 SEFOS(config-if)# channel-group 13 mode active
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

6. **Configure the L3 interface for all VLANs defined previously.**

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 2003
ES1-24p-1 SEFOS(config-if)# ip address 192.168.203.20
255.255.255.0
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 2004
```

```
ES1-24p-1 SEFOS(config-if)# ip address 192.168.204.20
255.255.255.0
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 50
ES1-24p-1 SEFOS(config-if)# ip address 192.168.50.10 255.255.255.0
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 100
ES1-24p-1 SEFOS(config-if)# ip address 192.168.100.10
255.255.255.0
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 101
ES1-24p-1 SEFOS(config-if)# ip address 192.168.101.10
255.255.255.0
ES1-24p-1 SEFOS(config-if)# no shutdown
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# end
```

7. Enable OSPF, and advertise the networks that are reachable through this switch.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# router ospf
ES1-24p-1 SEFOS(config-router)# asbr router
ES1-24p-1 SEFOS(config-router)# router-id 12.0.0.3
ES1-24p-1 SEFOS(config-router)# redistribute connected
ES1-24p-1 SEFOS(config-router)# network 192.168.203.20
ES1-24p-1 SEFOS(config-router)# network 192.168.204.20
ES1-24p-1 SEFOS(config-router)# network 192.168.50.10
ES1-24p-1 SEFOS(config-router)# network 192.168.100.10
ES1-24p-1 SEFOS(config-router)# network 192.168.101.10
ES1-24p-1 SEFOS(config-router)# end
```

8. Configure the VLAN interface with hello, dead intervals, authentication, and network type.

```
ES1-24p-1 SEFOS# configure terminal
ES1-24p-1 SEFOS(config)# interface vlan 2003
ES1-24p-1 SEFOS(config-if)# ip ospf hello-interval 3
ES1-24p-1 SEFOS(config-if)# ip ospf dead-interval 12
ES1-24p-1 SEFOS(config-if)# ip ospf message-digest-key 1 md5
oracle
ES1-24p-1 SEFOS(config-if)# ip ospf authentication message-digest
ES1-24p-1 SEFOS(config-if)# ip ospf network point-to-point
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 2004
```

```
ES1-24p-1 SEFOS(config-if)# ip ospf hello-interval 3
ES1-24p-1 SEFOS(config-if)# ip ospf dead-interval 12
ES1-24p-1 SEFOS(config-if)# ip ospf message-digest-key 1 md5
oracle
ES1-24p-1 SEFOS(config-if)# ip ospf authentication message-digest
ES1-24p-1 SEFOS(config-if)# ip ospf network point-to-point
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 50
ES1-24p-1 SEFOS(config-if)# ip ospf hello-interval 3
ES1-24p-1 SEFOS(config-if)# ip ospf dead-interval 12
ES1-24p-1 SEFOS(config-if)# ip ospf message-digest-key 1 md5
oracle
ES1-24p-1 SEFOS(config-if)# ip ospf authentication message-digest
ES1-24p-1 SEFOS(config-if)# ip ospf network point-to-point
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 100
ES1-24p-1 SEFOS(config-if)# ip ospf hello-interval 3
ES1-24p-1 SEFOS(config-if)# ip ospf dead-interval 12
ES1-24p-1 SEFOS(config-if)# ip ospf message-digest-key 1 md5
oracle
ES1-24p-1 SEFOS(config-if)# ip ospf authentication message-digest
ES1-24p-1 SEFOS(config-if)# ip ospf network point-to-point
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config)# interface vlan 101
ES1-24p-1 SEFOS(config-if)# ip ospf hello-interval 3
ES1-24p-1 SEFOS(config-if)# ip ospf dead-interval 12
ES1-24p-1 SEFOS(config-if)# ip ospf message-digest-key 1 md5
oracle
ES1-24p-1 SEFOS(config-if)# ip ospf authentication message-digest
ES1-24p-1 SEFOS(config-if)# ip ospf network point-to-point
ES1-24p-1 SEFOS(config-if)# end
```

9. Save the configuration.

```
ES1-24p-1 SEFOS# copy run start
Building configuration ...
[OK]
```

10. Verify the status of the interfaces.

```
ES1-24p-1 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        up       up        connected to eth1 nsn172-178
...
Ex0/19       down     down
```

```
Ex0/20        down      down
Ex0/21        up        up         connected to ToR72p-1 on port71
Ex0/22        up        up         connected to ToR72p-2 on port71
Ex0/23        up        up         connected to ToR72p-1 on port67
Ex0/24        up        up         connected to ToR72p-2 on port68
po12          up        up
po13          up        up
vlan1         down      down
vlan2003      up        up
vlan2004      up        up
vlan50        up        up
vlan100       up        up
vlan101       up        up
```

11. Verify the OSPF neighbors.

```
ES1-24p-1 SEFOS# show ip ospf neighbor
  Vrf  default
Neighbor-ID  Pri   State       DeadTime   Address         Interface
-----------  ---   -----       --------   -------         ---------
12.0.0.1     1     FULL/PTOP     35       192.168.203.10   vlan2003
```

12. After IXIA sends 500 routes to the core switch, verify the number of routes on this `ToR72p-2` **switch.**

Some switches display OSPF routes learned as 1000 because they have multiple paths to reach a particular destination.

```
ES1-24p-1 SEFOS# show ip route summary

Route Source    Routes
connected         5
static            0
rip               0
bgp               0
ospf              1016
Total             1021
```

13. Verify the routes learned.

```
ES1-24p-1 SEFOS# show ip route

Codes: C - connected, S - static, R - rip, B - bgp, O - ospf
O 192.168.20.0/24 [3] via 192.168.203.10
              [3] via 192.168.206.10
O 192.168.30.0/24 [2] via 192.168.203.10
O 192.168.40.0/24 [2] via 192.168.206.10
```

```
C 192.168.50.0/24 is directly connected, vlan50
O 192.168.60.0/24 [3] via 192.168.203.10
                  [3] via 192.168.206.10
C 192.168.100.0/24 is directly connected, vlan100
C 192.168.101.0/24 is directly connected, vlan101
O 192.168.150.0/24 [3] via 192.168.203.10
                  [3] via 192.168.206.10
O 192.168.151.0/24 [3] via 192.168.203.10
                  [3] via 192.168.206.10
O 192.168.201.0/24 [2] via 192.168.203.10
O 192.168.202.0/24 [2] via 192.168.206.10
C 192.168.203.0/24 is directly connected, vlan2003
C 192.168.204.0/24 is directly connected, vlan2004
O 192.168.205.0/24 [2] via 192.168.203.10
O 192.168.206.0/24 [2] via 192.168.206.10
O 45.45.45.0/24 [3] via 192.168.203.10
                  [3] via 192.168.206.10
O 45.45.46.0/24 [3] via 192.168.203.10
                  [3] via 192.168.206.10
O 45.45.47.0/24 [3] via 192.168.203.10
                  [3] via 192.168.206.10
O 45.45.48.0/24 [3] via 192.168.203.10
                  [3] via 192.168.206.10
O 45.45.49.0/24 [3] via 192.168.203.10
                  [3] via 192.168.206.10
O 45.45.50.0/24 [3] via 192.168.203.10
...
```

Related Information

- "Configure Switch TOR72p-1 for L3 Routing Using OSPF" on page 126
- "Configure Switch TOR72p-2 for L3 Routing Using OSPF" on page 133
- "Configure Switch ES1-24p-2 for L3 Routing Using OSPF" on page 146
- "Verify the L3 OSPF Configuration" on page 153

▼ Configure Switch ES1-24p-2 for L3 Routing Using OSPF

1. Start the configuration with all ports and the default VLAN shutdown.

Tip – It is a best practice to start the configuration with all the ports and default VLAN shutdown. Also, disable GVRP and GMRP because dynamic VLAN learning is not suggested.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# set gvrp disable
ES1-24p-2 SEFOS(config)# set gmrp disable
ES1-24p-2 SEFOS(config)# set port-channel enable
ES1-24p-2 SEFOS(config)# interface vlan 1
ES1-24p-2 SEFOS(config-if)# shutdown
ES1-24p-2 SEFOS(config-if)# no ip address
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface range extreme-ethernet 0/1-24
ES1-24p-2 SEFOS(config-if-range)# shutdown
ES1-24p-2 SEFOS(config-if-range)# end
```

2. **Create and enable port-channels between switches per the topology.**

   See "L2 and L3 Topology" on page 9.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 14
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 15
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

3. **Configure VLANs manually.**

   You must add at least one port to the VLAN before you can assign the VLAN a name.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# vlan 2005
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 14 untagged
port-channel 14 name 192_168_205_0_OSPF_P2P
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 2006
ES1-24p-2 SEFOS(config-vlan)# ports add port-channel 15 untagged
port-channel 15 name 192_168_206_0_OSPF_P2P
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# vlan 60
```

```
ES1-24p-2 SEFOS(config-vlan)# ports add extreme-ethernet 0/1
untagged extreme-ethernet 0/1 name 192_168_60_0_HOST_P2P
ES1-24p-2 SEFOS(config-vlan)# vlan active
ES1-24p-2 SEFOS(config-vlan)# exit
ES1-24p-2 SEFOS(config)# end
```

4. **Configure the port-channels as access links by setting the pvid and adding port-channels to VLANs.**

   Also, disable spanning-tree on all uplinks.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface port-channel 14
ES1-24p-2 SEFOS(config-if)# switchport pvid 2005
ES1-24p-2 SEFOS(config-if)# spanning-tree disable
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface port-channel 15
ES1-24p-2 SEFOS(config-if)# switchport pvid 2006
ES1-24p-2 SEFOS(config-if)# spanning-tree disable
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

5. **Add the ports to the appropriate port-channels and enable the uplink interfaces to the aggregation switches.**

   Configure the host port as an access link with a different VLAN.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/1
ES1-24p-2 SEFOS(config-if)# description "connected to eth1
nsn172-76"
ES1-24p-2 SEFOS(config-if)# switchport pvid 60
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/23
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port68"
ES1-24p-2 SEFOS(config-if)# channel-group 14 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/21
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-1 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 14 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/24
```

```
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port67"
ES1-24p-2 SEFOS(config-if)# channel-group 15 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface extreme-ethernet 0/22
ES1-24p-2 SEFOS(config-if)# description "connected to ToR72p-2 on
port72"
ES1-24p-2 SEFOS(config-if)# channel-group 15 mode active
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

6. Configure the L3 interface for all VLANs defined previously.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface vlan 2005
ES1-24p-2 SEFOS(config-if)# ip address 192.168.205.20
255.255.255.0
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface vlan 2006
ES1-24p-2 SEFOS(config-if)# ip address 192.168.206.20
255.255.255.0
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface vlan 60
ES1-24p-2 SEFOS(config-if)# ip address 192.168.60.10 255.255.255.0
ES1-24p-2 SEFOS(config-if)# no shutdown
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

7. Enable OSPF, and advertise the networks that are reachable through this switch.

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# router ospf
ES1-24p-2 SEFOS(config-router)# asbr router
ES1-24p-2 SEFOS(config-router)# router-id 12.0.0.4
ES1-24p-2 SEFOS(config-router)# redistribute connected
ES1-24p-2 SEFOS(config-router)# network 192.168.205.20 area
0.0.0.0
ES1-24p-2 SEFOS(config-router)# network 192.168.206.20 area
0.0.0.0
ES1-24p-2 SEFOS(config-router)# network 192.168.60.10 area 0.0.0.0
ES1-24p-2 SEFOS(config-router)# end
```

8. **Configure the VLAN interface with hello, dead intervals, authentication, and network type.**

```
ES1-24p-2 SEFOS# configure terminal
ES1-24p-2 SEFOS(config)# interface vlan 2005
ES1-24p-2 SEFOS(config-if)# ip ospf hello-interval 3
ES1-24p-2 SEFOS(config-if)# ip ospf dead-interval 12
ES1-24p-2 SEFOS(config-if)# ip ospf message-digest-key 1 md5
oracle
ES1-24p-2 SEFOS(config-if)# ip ospf authentication message-digest
ES1-24p-2 SEFOS(config-if)# ip ospf network point-to-point
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface vlan 2006
ES1-24p-2 SEFOS(config-if)# ip ospf hello-interval 3
ES1-24p-2 SEFOS(config-if)# ip ospf dead-interval 12
ES1-24p-2 SEFOS(config-if)# ip ospf message-digest-key 1 md5
oracle
ES1-24p-2 SEFOS(config-if)# ip ospf authentication message-digest
ES1-24p-2 SEFOS(config-if)# ip ospf network point-to-point
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# interface vlan 60
ES1-24p-2 SEFOS(config-if)# ip ospf hello-interval 3
ES1-24p-2 SEFOS(config-if)# ip ospf dead-interval 12
ES1-24p-2 SEFOS(config-if)# ip ospf message-digest-key 1 md5
oracle
ES1-24p-2 SEFOS(config-if)# ip ospf authentication message-digest
ES1-24p-2 SEFOS(config-if)# ip ospf network point-to-point
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config)# end
```

9. **Save the configuration.**

```
ES1-24p-2 SEFOS# copy run start
Building configuration ...
[OK]
```

10. **Verify the status of the interfaces.**

```
ES1-24p-2 SEFOS# show interface description

Interface    Status   Protocol  Description
---------    ------   --------  -----------
Ex0/1        up       up        connected to eth1 nsn172-76
Ex0/2        down     down
...
Ex0/20       down     down
Ex0/21       up       up        connected to ToR72p-1 on port72
```

```
Ex0/22        up        up        connected to ToR72p-2 on port72
Ex0/23        up        up        connected to ToR72p-1 on port68
Ex0/24        up        up        connected to ToR72p-2 on port67
po14          up        up
po15          up        up
vlan1         down      down
vlan2005      up        up
vlan2006      up        up
vlan60        up        up
```

11. Verify the OSPF neighbors.

```
ES1-24p-2 SEFOS# show ip ospf neighbor
  Vrf  default
Neighbor-ID  Pri   State       DeadTime   Address         Interface
-----------  ---   -----       --------   -------         ---------
12.0.0.2     1     FULL/PTOP   34         192.168.204.10   vlan2006
12.0.0.1     1     FULL/PTOP   30         192.168.205.10   vlan2005
```

12. After IXIA sends 500 routes to the core switch, verify the number of routes on this `ToR72p-2` **switch.**

Some switches display OSPF routes learned as 1000 because they have multiple paths to reach a particular destination.

```
ES1-24p-2 SEFOS# show ip route summary

Route Source    Routes
connected         5
static            0
rip               0
bgp               0
ospf              1016
Total             1021
```

13. Verify the routes learned.

```
ES1-24p-2 SEFOS# show ip route

Codes: C - connected, S - static, R - rip, B - bgp, O - ospf

O 192.168.20.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
O 192.168.30.0/24 [2] via 192.168.205.10
O 192.168.40.0/24 [2] via 192.168.204.10
O 192.168.50.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
```

```
C 192.168.60.0/24 is directly connected, vlan60
O 192.168.100.0/24 [3] via 192.168.205.10
                   [3] via 192.168.204.10
O 192.168.101.0/24 [3] via 192.168.205.10
                   [3] via 192.168.204.10
O 192.168.150.0/24 [3] via 192.168.205.10
                   [3] via 192.168.204.10
O 192.168.151.0/24 [3] via 192.168.205.10
                   [3] via 192.168.204.10
O 192.168.201.0/24 [2] via 192.168.205.10
O 192.168.202.0/24 [2] via 192.168.204.10
O 192.168.203.0/24 [2] via 192.168.205.10
O 192.168.204.0/24 [2] via 192.168.204.10
C 192.168.205.0/24 is directly connected, vlan2005
C 192.168.206.0/24 is directly connected, vlan2006
O 45.45.45.0/24 [3] via 192.168.205.10
                [3] via 192.168.204.10
O 45.45.46.0/24 [3] via 192.168.205.10
                [3] via 192.168.204.10
O 45.45.47.0/24 [3] via 192.168.205.10
                [3] via 192.168.204.10
O 45.45.48.0/24 [3] via 192.168.205.10
                [3] via 192.168.204.10
O 45.45.49.0/24 [3] via 192.168.205.10
                [3] via 192.168.204.10
O 45.45.50.0/24 [3] via 192.168.205.10
                [3] via 192.168.204.10
O 45.45.51.0/24 [3] via 192.168.205.10
                [3] via 192.168.204.10
O 45.45.52.0/24 [3] via 192.168.205.10
                [3] via 192.168.204.10
...
```

Related Information

- "Configure Switch TOR72p-1 for L3 Routing Using OSPF" on page 126
- "Configure Switch TOR72p-2 for L3 Routing Using OSPF" on page 133
- "Configure Switch ES1-24p-1 for L3 Routing Using OSPF" on page 140
- "Verify the L3 OSPF Configuration" on page 153

▼ Verify the L3 OSPF Configuration

Note – All pings should be successful. Each switch has learned all routes to different networks in the topology through OSPF.

1. Verify the configuration on `Host-1`**.**

```
[Host-1 ~]# ifconfig

eth1      Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.20.20  Bcast:192.168.20.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:107 errors:0 dropped:0 overruns:0 frame:0
          TX packets:357 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:9530 (9.3 KiB)  TX bytes:41674 (40.6 KiB)

eth1.150  Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.150.20  Bcast:192.168.150.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:63 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:8046 (7.8 KiB)

eth1.151  Link encap:Ethernet  HWaddr 00:10:E0:22:0F:D9
          inet addr:192.168.151.20  Bcast:192.168.151.255
Mask:255.255.255.0
          inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:48 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 b)  TX bytes:6760 (6.6 KiB)
```

2. **Verify the configuration on** `Host-2`**.**

```
Host-2# ifconfig nxge1
index 41001000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,FIXEDMTU>
mtu 9000 nxge1: flags=
       inet 192.168.30.20 netmask ffffff00 broadcast 192.168.30.255
         ether 0:14:4f:6c:43:9
```

3. **Verify the configuration on** `Host-3`**.**

```
[Host-3 ~]# ifconfig
eth1  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
      inet addr:192.168.50.20  Bcast:192.168.50.255
Mask:255.255.255.0
      inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:240930477 errors:0 dropped:515783109 overruns:0
frame:0
      TX packets:13447642 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
     RX bytes:727267562 (693.5 MiB)  TX bytes:564925930 (538.7 MiB)

eth1.100  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
      inet addr:192.168.100.20  Bcast:192.168.100.255
Mask:255.255.255.0
      inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
      TX packets:66 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:0
      RX bytes:0 (0.0 b)  TX bytes:13336 (13.0 KiB)

eth1.101  Link encap:Ethernet  HWaddr 00:07:E9:04:D1:9F
      inet addr:192.168.101.20  Bcast:192.168.101.255
Mask:255.255.255.0
      inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
      TX packets:36 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:0
      RX bytes:0 (0.0 b)  TX bytes:5966 (5.8 KiB)
```

4. **Ping from** `Host-3` **to untagged and tagged interfaces on** `Host-1` **of the core switch.**

```
[Host-3 ~]# ping 192.168.20.20
[Host-3 ~]# ping 192.168.150.20
```

5. **Ping from** `Host-1` **to untagged and tagged interfaces on** `Host-3` **of** `ES1-24p-1`**.**

```
[Host-1 ~]# ping 192.168.50.20
[Host-1 ~]# ping 192.168.100.20
```

6. **Ping from** `Host-1` **to an untagged interface on** `Host-2` **of** `ToR72p-1`**.**

```
[Host-1 ~]# ping 192.168.30.20
```

Related Information

- "Configure Switch TOR72p-1 for L3 Routing Using OSPF" on page 126
- "Configure Switch TOR72p-2 for L3 Routing Using OSPF" on page 133
- "Configure Switch ES1-24p-1 for L3 Routing Using OSPF" on page 140
- "Configure Switch ES1-24p-2 for L3 Routing Using OSPF" on page 146

Glossary

10

10GbE 10 Gigabit Ethernet.

A

ACL Access control list.

G

GARP Generic Attribute Registration Protocol.

GMRP GARP Multicast Registration Protocol.

GVRP GARP VLAN Registration Protocol.

L

LA Link Aggregation protocol.

L2 Layer 2, (Data Link [MAC]) of the OSI model TCP/IP stack.

L3 Layer 3, (Network) of the OSI model TCP/IP stack.

LLA Logical Link Aggregation protocol.

LR Long-range. A long-range SFP+ optical tranceiver module.

LR-M Long-range multi-mode. A long range multi-mode SFP+ optical tranceiver module.

N

NEM Network express module.

O

Oracle ILOM Oracle Integrated Lights Out Manager. ILOM provides advanced server processor hardware and software to manage and monitor servers.

OSPF Open Shortest Path First protocol.

P

PVRST Per-VLAN Rapid Spanning Tree protocol.

Q

QSFP Quad small form-factor, pluggable. A transceiver specification for 4x 10GbE modules.

R

RIP Routing Information Protocol.

RSTP Rapid Spanning tree protocol.

S

SEFOS Sun Ethernet Fabric Operating System. A full-featured fabric and switch management software package for configuring and monitoring the switches network infrastructure.

SEL System event log. The switch includes a number of replaceable component sensors that generate entries in the SEL when the sensor crosses a threshold. Many of these readings are used to adjust the fan speeds and perform other actions, such as illuminatiing LEDs and powering off the switch.

SFP+ Small form-factor, pluggable. A transceiver module specification for several physical layer technologies. In this document, SFP+ refers to Gigabit Ethernet, or 10GE, modules.

SR Short range. A short range SFP+ optical tranceiver module.

SP Service processor.

STP Spanning-Tree Protocol.

T

TOR Top of rack. The Sun Network 10GbE Switch 72p is a TOR switch.

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V