## Oracle<sup>®</sup> Ethernet Switches

L2 and L3 Deployment Best Practices



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## Using This Documention

This guide describes how to configure common usage topologies.

These instructions are for enterprise network and system administrators.

- "Related Documentation" on page viii
- "CLI Command Modes" on page viii
- "Feedback" on page ix
- "Support and Accessibility" on page ix

## **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<br>Switched NEM 24p 10GbE         | http://www.oracle.com/goto/SB6K-24p-10GbE/docs    |
| Oracle Integrated Lights Out<br>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<br>with read-only rights (privilege<br>level 1).                | SEFOS>            | Use the logout or exit<br>command to return to the Oracle<br>ILOM prompt.   |
| Privileged<br>EXEC         | Access SEFOS from Oracle ILOM<br>with full administrative rights<br>(privilege level 15).     | SEFOS#            | Use the logout or exit<br>command to return to the Oracle<br>ILOM prompt.   |
| Global<br>Configuration    | From User EXEC mode, use the configure terminal command.                                      | SEFOS(config)#    | Use the end command to return to Privileged EXEC mode.  |
| Interface<br>Configuration | From Global Configuration mode, use the interface <i>interface-type interface-id</i> command. | SEFOS(config-if)# | Use the exit command to return<br>to Global Configuration mode, or<br>use the end command to return to<br>Privileged EXEC mode. |

## Feedback

Provide feedback on this documentation at:

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

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

## Switches Overview

These topics describe the switches used in this guide.

- "Oracle Switch ES1-24" on page 2
- "Sun Network 10GbE Switch 72p" on page 3
- "Sun Blade 6000 Ethernet Switched NEM 24p 10GbE" on page 4

- "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
- "Configuring an L2 PVRST and LLA Based Topology With Active/Active Bond on the Servers" on page 63
- "L3 RIP and OSPF Configuration Overview" on page 95
- "L3 RIP and OSPF Configuration Overview" on page 95
- "Configuring L3 Routing Based Topology Using RIP" on page 97

## 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

- "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

- "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

- "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).

- "L2 and L3 Configuration Task Overview" on page 8
- "L2 and L3 Topology" on page 9
- "L2 and L3 VLAN Best Practices" on page 10
- "Adding VLANs" on page 11

- "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
- "Configuring an L2 PVRST and LLA Based Topology With Active/Active Bond on the Servers" on page 63
- "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

## 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<br>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<br>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<br>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"<br>on page 125                                     |

- "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.

- "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" on page 13
- "L2 PVRST Configuration Task Overview" on page 14

## 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) are not 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<br>"Configure Switch ToR72p-2 for L2 PVRST" on page 23<br>"Configure Switch ES1-24p-1 for L2 PVRST" on page 29<br>"Configure Switch ES1-24p-2 for L2 PVRST" on page 34<br>"Verify the L2 PVRST Configuration" on page 38  |
| Configure L2 PVRST<br>Active/Standby on the servers.    | <ul> <li>"Prepare Switch ToR72p-1 for L2 PVRST Active/Standby on the Servers" on page 46</li> <li>"Prepare Switch ToR72p-2 for L2 PVRST Active/Standby on the Servers" on page 46</li> <li>"Configure Switch ES1-24p-1 for L2 PVRST Active/Standby on the Servers" on page 47</li> <li>"Configure Switch ES1-24p-2 for L2 PVRST Active/Standby on the Servers" on page 52</li> <li>"Verify the L2 PVRST Active/Standby Configuration on the Servers" on page 56</li> </ul>                    |
| Configure L2 PVRST LLA<br>Active/Active on the servers. | <ul> <li>"Configure Switch ES1-24p-1 for L2 PVRST LLA Active/Active on the Servers" on page 64</li> <li>"Configure Switch ES1-24p-2 for L2 PVRST LLA Active/Active on the Servers" on page 71</li> <li>"Configure Switch ToR72p-1 for L2 PVRST LLA Active/Active on the Servers" on page 77</li> <li>"Configure Switch ToR72p-2 for L2 PVRST LLA Active/Active on the Servers" on page 83</li> <li>"Verify the L2 PVRST LLA Active/Active Configuration on the Servers" on page 89</li> </ul> |

- "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.

- "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

#### **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 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
- "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 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)# 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-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)# no shutdown

ToR72p-1 SEFOS(config-if)# no shutdown

ToR72p-1 SEFOS(config-if)# exit

ToR72p-1 SEFOS(config-if)# exit

ToR72p-1 SEFOS(config-if)# exit
```

#### 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)# interface port-channel 12
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)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config-if)# exit
```

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 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 303 brg-priority 40960
ToR72p-1 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
```

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 SEI | FOS# <b>show</b> | 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
                           00:21:28:77:d2:1d
                Address
                           0
                Cost
                           0
                Port
             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
                                   Cost
                                            Prio
                      State
                                                   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 Cost Prio Name Role State 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



**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-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)# interface port-channel 15
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
```

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)# 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)# exit

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-vlan)# exit

ToR72p-2 SEFOS(config-vlan)# exit
```

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)# switchport mode trunk

ToR72p-2 SEFOS(config-if)# switchport mode trunk

ToR72p-2 SEFOS(config-if)# exit

ToR72p-2 SEFOS(config-if)# exit

ToR72p-2 SEFOS(config-if)# exit
```

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 nxgel 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)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
```

```
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)# no shutdown
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
```

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 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 303 brg-priority 40960
ToR72p-2 SEFOS(config)# spanning-tree vlan 1 brg-priority 40960
```

#### 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
                Priority 16584
Bridge Id
                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 State Cost Prio Type Role Name \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_\_ Ex0/66 Designated Forwarding 2000 128 P2P poll Designated Forwarding 19900 128 P2P po13 Root Forwarding 1900 128 P2P Designated Forwarding 1900 128 P2P po15 . . . 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 Role State Cost Prio Name Type \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_ \_ \_ \_ \_\_\_\_ Ex0/66 Designated Forwarding 2000 128 P2P Root Forwarding 19900 po11 128 P2P po13 Designated Forwarding 1900 128 P2P po15 Designated Forwarding 1900 128 P2P

- "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-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-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)# 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)# 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 SE | FOS# <b>show</b> | 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 |
| pol2         | 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 State Cost Prio Name Role Type \_ \_ \_ \_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ Ex0/1 Designated Forwarding 20000 128 P2P RootForwarding1900128P2PDesignatedForwarding1900128P2P po12 po13 . . . Spanning-tree for VLAN 302 Root Id Prioritv 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 \_ \_ \_ \_ \_\_\_\_ \_\_\_\_ \_ \_ \_ \_ \_\_\_\_ \_\_\_\_ Designated Forwarding 20000 Ex0/1 128 P2P po12 Root Forwarding 1900 128 P2P po13 Alternate Discarding 1900 128 P2P

- "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-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-if)# exit
ES1-24p-2 SEFOS(config-if)# exit
```

#### 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)# 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-if)# exit
ES1-24p-2 SEFOS(config-if)# exit
```

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 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
                           00:21:28:77:d2:1d
                Address
                           1900
                Cost
                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
                     State
Name
        Role
                                  Cost
                                            Prio
                                                   Type
____
        ____
                      ____
                                   ____
                                            ____
                                                   ____
Ex0/1
        Designated Forwarding 20000
                                           128
                                                   P2P
po14
        Root
                     Forwarding 1900
                                            128
                                                   P2P
                                  1900 128
po15
        Designated Forwarding
                                                   P2P
. . .
Spanning-tree for VLAN 302
Root Id
                          4096
               Priority
                           00:17:df:18:9d:2e
                Address
                           21800
                Cost
                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
```

|       | Dynam      | ic Path Cost | is Disable | ed     |             |
|-------|------------|--------------|------------|--------|-------------|
|       | Dynam      | ic Path Cost | Lag-Speed  | Change | is Disabled |
| Name  | Role       | State        | Cost       | Prio   | Туре        |
|       |            |              |            |        |             |
| 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  |    |
| <pre>inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link</pre> |    |
| 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)  | 0  |
| eth1 200 Link encap.Ethernet HWaddr 00.07.E9.04.D1.9E         |    |
| inet addr:192 168 20 20 Bcast:192 168 20 255                  |    |
| Mack. 255 255 255 0   |    |
| inet6 addr. fa80207.e9ff.fe01.d19f/61 Scope.Link              |    |
| $\frac{1}{10000000000000000000000000000000000$                |    |
| DY packate. 0 errorg. 0 dropped. 0 everypa. 0 frame. 0        |    |
| RX packets:0 errors:0 dropped:0 overruns:0 frame:0            |    |
| TX packets:3/ 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                                       |
|          | 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  |
|          | <pre>inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link</pre> |
|          | 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  |
|          | <pre>inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link</pre> |
|          | 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              |
|          | KX packets:U errors:U dropped:U overruns:O frame:O            |
|          | 'TX packets:59 errors:0 dropped:1 overruns:0 carrier:0        |
|          | collisions:U txqueuelen:U                                     |
|          | 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  |
|          | <pre>inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link</pre> |
|          | 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  |
|          | <pre>inet6 addr: fe80::207:e9ff:fe04:d19f/64 Scope:Link</pre> |
|          | 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  |
|         | <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |
|         | 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                                       |
|          | Mask:255.255.255.0  |
|          | <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |
|          | 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                                       |
|          | Mask:255.255.255.0  |
|          | <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |
|          | 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                                       |
|          | Mask:255.255.255.0  |
|          | <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |
|          | UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1              |
| F        | X 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  |
|          | <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |
|          | 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

- "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.

- "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

- "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 and LLA Based Topology With Active/Active Bond on the Servers" on page 63
- "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

## 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.

- "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-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-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-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)# interface port-channel 100

ES1-24p-1 SEFOS(config-if)# no shutdown

ES1-24p-1 SEFOS(config-if)# exit

ES1-24p-1 SEFOS(config-if)# exit

ES1-24p-1 SEFOS(config-if)# exit

ES1-24p-1 SEFOS(config-if)# exit

ES1-24p-1 SEFOS(config-if)# exit
```

#### 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)# 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-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)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# switchport mode trunk
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config-if)# exit
```

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-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 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 \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ Designated Forwarding 2000 128 Ex0/2 P2P po12 Forwarding 1900 128 P2P Root po13 Designated Forwarding 1900 128 P2P Alternate Discarding 1900 128 P2P 001og . . . Spanning-tree for VLAN 302 Root Id Priority 4096 Address 00:17:df:18:9d:2e Cost 21800 po12 Port 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 \_ \_ \_ \_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ Ex0/2Designated Forwarding 2000 128 P2P po12 Root Forwarding 1900 128 P2P po13 Alternate Discarding 1900 128 P2P po100 Alternate Discarding 1900 128 P2P

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

#### 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)# switchport mode trunk
```

```
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 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
                          1900
               Cost
               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
        ____
                     ____
                                  ____
_ _ _ _
                                          ____
                                                 ____
        Designated Forwarding 2000
Ex0/2
                                          128
                                                 P2P
                     Forwarding 1900
        Root
po14
                                          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 pol4
           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
____
       ____
                   ____
                               ____
                                       ____
                                              ____
        Designated Forwarding 2000
Ex0/2
                                      128
                                             P2P
        Root Forwarding 1900
                                      128
                                             P2P
po14
po15
        Alternate Discarding 1900
                                        128
                                             P2P
        Designated Forwarding 1900 128 P2P
po100
```

#### **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
. . .
```

#### 2. Check the configuration on Host-2.

```
[Host-2 ~] # ifconfig -a
nxgel: 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  |
| <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |
| 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  |
| <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |
|   |

```
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
...
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
```

- "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

- "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-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-if)# exit
```

#### 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-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)# switchport mode trunk

ES1-24p-1 SEFOS(config-if)# switchport mode trunk

ES1-24p-1 SEFOS(config-if)# exit

ES1-24p-1 SEFOS(config-if)# exit

ES1-24p-1 SEFOS(config-if)# exit

ES1-24p-1 SEFOS(config-if)# switchport mode trunk

ES1-24p-1 SEFOS(config-if)# switchport mode trunk

ES1-24p-1 SEFOS(config-if)# exit

ES1-24p-1 SEFOS(config-if)# exit

ES1-24p-1 SEFOS(config-if)# exit
```

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-lla)# exit
```

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 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 301 cost 1500
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 302 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)# spanning-tree vlan 1 cost 1500
```

#### 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# sh | ow interf | face description                      |
|-----------|-----------|-----------|---------------------------------------|
| Interface | Status    | Protoc    | col Description                       |
|           |           |           |                                       |
| Ex0/1     | down      | down      |                                       |
| Ex0/2     | up        | up        | connected to ethl 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 \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ Forwarding 100 po131 Root 128 P2P po132 Designated Forwarding 1900 128 P2P po100 Designated Forwarding 100 128 P2P Designated Forwarding 1900 128 P2P po101 . . . 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 po132 Alternate Discarding 1900 128 P2P 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-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)# interface port-channel 134

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)# no shutdown
```

```
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)# interface port-channel 134

ES1-24p-2 SEFOS(config-if)# switchport mode trunk

ES1-24p-2 SEFOS(config-if)# switchport mode trunk

ES1-24p-2 SEFOS(config-if)# exit

ES1-24p-2 SEFOS(config-if)# switchport mode trunk

ES1-24p-2 SEFOS(config-if)# switchport mode trunk

ES1-24p-2 SEFOS(config-if)# switchport mode trunk

ES1-24p-2 SEFOS(config-if)# exit

ES1-24p-2 SEFOS(config-if)# exit

ES1-24p-2 SEFOS(config-if)# exit

ES1-24p-2 SEFOS(config-if)# switchport mode trunk

ES1-24p-2 SEFOS(config-if)# switchport mode trunk

ES1-24p-2 SEFOS(config-if)# exit

ES1-24p-2 SEFOS(config-if)# exit

ES1-24p-2 SEFOS(config-if)# exit
```

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-if)# exit

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)# no shutdown

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

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

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-lla)# exit
```

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 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 301 cost 3000
ES1-24p-1 SEFOS(config-if)# spanning-tree vlan 302 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
                          po100
               Port
            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
_ _ _ _
        _ _ _ _
                     ____
                                  ____
                                          _ _ _ _
                                                 ____
        Alternate Discarding 1900
                                          128
                                                 P2P
po133
po134
      Designated Forwarding 1900
                                         128
                                                P2P
                   Forwarding 100
                                         128
                                                P2P
po100
        Root
        Designated Forwarding 1900 128
                                                 P2P
po101
Spanning-tree for VLAN 302
Root Id
               Prioritv
                          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 State Cost Prio Name Role Type \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ Alternate Discarding 1900 128 P2P po133 po134 Root Forwarding 100 128 P2P po100 Designated Forwarding 100 128 P2P 101og 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)# interface port-channel 131

ToR72p-1 SEFOS(config-if)# no shutdown

ToR72p-1 SEFOS(config-if)# exit

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)# no shutdown

ToR72p-1 SEFOS(config-if)# no shutdown

ToR72p-1 SEFOS(config-if)# exit

ToR72p-1 SEFOS(config-if)# exit

ToR72p-1 SEFOS(config-if)# exit
```

#### 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)# 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)# interface port-channel 133
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# switchport mode trunk
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config-if)# exit
```

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 nxgel 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-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-if)# description "connected to Core switch
on g1/4"
ToR72p-1 SEFOS(config-if)# speed 1000
ToR72p-1 SEFOS(config-if)# speed 1000
ToR72p-1 SEFOS(config-if)# description "connected to Core switch
on g1/4"
ToR72p-1 SEFOS(config-if)# channel-group 10 mode active
ToR72p-1 SEFOS(config-if)# oshutdown
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-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
ToR72p-1 SEFOS(config-if)# no shutdown
ToR72p-1 SEFOS(config-if)# exit
```

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(confiq) # 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 nxgel 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
                           00:21:28:77:d2:1d
                Address
                           0
                Cost
                           0
                Port
             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
____
         _ _ _ _
                      ____
                                   ____
                                            _ _ _ _
                                                   _____
        Designated Forwarding 2000
Ex0/66
                                            128
                                                   P2P
po10
        Designated Forwarding 19900
                                           128
                                                   P2P
po131
         Designated
                      Forwarding
                                  100
                                            128
                                                   P2P
         Designated
                                  1900
                                            128
                                                   P2P
po133
                      Forwarding
. . .
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 Designated Forwarding 1900 po133 128 P2P

- "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)# interface port-channel 134

ToR72p-2 SEFOS(config-if)# no shutdown

ToR72p-2 SEFOS(config-if)# exit

ToR72p-2 SEFOS(config-if)# exit

ToR72p-2 SEFOS(config-if)# exit

ToR72p-2 SEFOS(config-if)# exit
```

#### 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)# interface port-channel 134
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# switchport mode trunk
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
```

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 nxgel 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-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)# no shutdown
ToR72p-2 SEFOS(config-if)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
```

#### 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 Prioritv 8392 Address 00:21:28:77:d2:1d 2000 Cost 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 Designated Forwarding 19900 128 P2P po11 Alternate Discarding 1900 128 P2P po132 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 Forwarding 19900 128 P2P po11 Root Designated Forwarding 1900 128 P2P po132 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 ~]# <b>ifconfig</b>                                   |
|---|
| bond0 Link encap:Ethernet HWaddr 00:10:E0:21:EE:07            |
| inet addr:192.168.99.25 Bcast:192.168.99.255                  |
| Mask:255.255.0  |
| <pre>inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link</pre> |
| 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:255.255.0  |
| <pre>inet6 addr: fe80::210:e0ff:fe21:ee07/64 Scope:Link</pre> |
|   |

```
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
. . .
et.h1
        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:1862731898           | 35 |  |  |  |  |
| (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  |    |  |  |  |  |
| <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |    |  |  |  |  |
|   |    |  |  |  |  |
| eth3.301 Link encap:Ethernet HWaddr 00:10:E0:1F:BD:E3         |    |  |  |  |  |
| inet addr:192.168.31.10 Bcast:192.168.31.255                  |    |  |  |  |  |
| Mask:255.255.0  |    |  |  |  |  |
| <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |    |  |  |  |  |
|   |    |  |  |  |  |
| eth3.302 Link encap:Ethernet HWaddr 00:10:E0:1F:BD:E3         |    |  |  |  |  |
| inet addr:192.168.32.10 Bcast:192.168.32.255                  |    |  |  |  |  |
| Mask:255.255.0  |    |  |  |  |  |
| <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |    |  |  |  |  |
|   |    |  |  |  |  |
| 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  |    |  |  |  |  |
| <pre>inet6 addr: fe80::210:e0ff:fe1f:bde3/64 Scope:Link</pre> |    |  |  |  |  |
|   |    |  |  |  |  |

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 fffff00 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
```

- "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" on page 95
- "L3 RIP and OSPF Configuration Task Overview" on page 96

## 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.

- "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"<br>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                      |

- "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.

- "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

- "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
- "Configuring an L2 PVRST and LLA Based Topology With Active/Active Bond on the Servers" on page 63
- "L3 RIP and OSPF Configuration Overview" on page 95
- "Configuring L3 Routing Based Topology Using OSPF" on page 125

# ▼ 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)# 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-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)# no shutdown

ToR72p-1 SEFOS(config-if)# exit

ToR72p-1 SEFOS(config-if)# exit

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

ToR72p-1 SEFOS(config-if)# exit

ToR72p-1 SEFOS(config-if)# exit

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-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)# network 192.168.30.10
```

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 SEF | 'OS# <b>show</b> | 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-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)# no shutdown
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config-if)# exit
```

### 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-if)# exit
TOR72p-2 SEFOS(config)# interface port-channel 15
TOR72p-2 SEFOS(config-if)# switchport pvid 2006
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-if)# exit
TOR72p-2 SEFOS(config-if)# exit
```

### 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-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)# network 192.168.40.10
```

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-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)# ip rip receive version 2
```

### 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 nxgel 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   |  |
| poll                                       | 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-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-if)# exit
ES1-24p-1 SEFOS(config-if)# exit
```

### 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)# spanning-tree disable
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config-if)# exit
```

### 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-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)# network 192.168.101.10
ES1-24p-1 SEFOS(config-router)# network 192.168.101.10
```

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)# 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)# ip rip receive version 2

ES1-24p-1 SEFOS(config-if)# ip rip receive version 2

ES1-24p-1 SEFOS(config-if)# ip rip send version 2

ES1-24p-1 SEFOS(config-if)# exit

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)# ip rip receive version 2
ES1-24p-1 SEFOS(config-if)# ip rip receive version 2
```

### 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     |             | מט        | 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 summaryRoute SourceRoutesconnected5static0rip511bgp0ospf0Total516
```

### **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)# switchport pvid 2006
ES1-24p-2 SEFOS(config-if)# spanning-tree disable
ES1-24p-2 SEFOS(config-if)# spanning-tree disable
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config-if)# exit
```

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)# 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-if)# ip rip send version 2

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-if)# exit
```

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 iproutesummaryRoute SourceRoutesconnected3static0rip513bgp0ospf0Total516
```

### **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 txgueuelen: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
          Link encap:Ethernet HWaddr 00:07:E9:04:D1:9F
eth1
          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.

- "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**

- "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
- "Configuring an L2 PVRST and LLA Based Topology With Active/Active Bond on the Servers" on page 63
- "L3 RIP and OSPF Configuration Overview" on page 95
- "Configuring L3 Routing Based Topology Using RIP" on page 97

# 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)# 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-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)# no shutdown

ToR72p-1 SEFOS(config-if)# no shutdown

ToR72p-1 SEFOS(config-if)# exit

ToR72p-1 SEFOS(config-if)# exit

ToR72p-1 SEFOS(config-if)# exit
```

### 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)# spanning-tree disable

ToR72p-1 SEFOS(config-if)# exit

ToR72p-1 SEFOS(config-if)# exit

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-if)# exit
```

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)# network 192.168.30.10 area 0.0.0.0
```

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 SEF | 'OS# £ | show ip ospf | neighbor |                |           |
|--------------|--------|--------------|----------|----------------|-----------|
| Vrf defaul   | +      |              |          |                |           |
| 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
0 192.168.20.0/24 [2] via 192.168.201.20
C 192.168.30.0/24 is directly connected, vlan30
0 192.168.40.0/24 [3] via 192.168.203.20
              [3] via 192.168.205.20
              [3] via 192.168.201.20
0 192.168.50.0/24 [2] via 192.168.203.20
0 192.168.60.0/24 [2] via 192.168.205.20
0 192.168.100.0/24 [2] via 192.168.203.20
0 192.168.101.0/24 [2] via 192.168.203.20
0 192.168.150.0/24 [2] via 192.168.201.20
0 192.168.151.0/24 [2] via 192.168.201.20
C 192.168.201.0/24 is directly connected, vlan2001
0 192.168.202.0/24 [2] via 192.168.201.20
C 192.168.203.0/24 is directly connected, vlan2003
0 192.168.204.0/24 [2] via 192.168.203.20
C 192.168.205.0/24 is directly connected, vlan2005
0 192.168.206.0/24 [2] via 192.168.205.20
0 45.45.45.0/24 [2] via 192.168.201.20
0 45.45.46.0/24 [2] via 192.168.201.20
0 45.45.47.0/24 [2] via 192.168.201.20
0 45.45.48.0/24 [2] via 192.168.201.20
0 45.45.49.0/24 [2] via 192.168.201.20
0 45.45.50.0/24 [2] via 192.168.201.20
0 45.45.51.0/24 [2] via 192.168.201.20
0 45.45.52.0/24 [2] via 192.168.201.20
0 45.45.53.0/24 [2] via 192.168.201.20
0 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-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)# no shutdown
TOR72p-2 SEFOS(config-if)# no shutdown
TOR72p-2 SEFOS(config-if)# exit
TOR72p-2 SEFOS(config-if)# exit
```

### 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)# spanning-tree disable
TOR72p-2 SEFOS(config-if)# exit
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)# no shutdown
ToR72p-2 SEFOS(config-if)# exit
ToR72p-2 SEFOS(config-if)# exit
```

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)# network 192.168.40.10 area 0.0.0.0
```

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 SEF | 'OS# <b>\$</b> | show ip ospf | neighbor |                |           |
|--------------|----------------|--------------|----------|----------------|-----------|
| Vrf defaul   | t              |              |          |                |           |
| 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
0 192.168.20.0/24 [2] via 192.168.202.20
0 192.168.30.0/24 [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
0 192.168.50.0/24 [2] via 192.168.204.20
0 192.168.60.0/24 [2] via 192.168.206.20
0 192.168.100.0/24 [2] via 192.168.204.20
0 192.168.101.0/24 [2] via 192.168.204.20
0 192.168.150.0/24 [2] via 192.168.202.20
0 192.168.151.0/24 [2] via 192.168.202.20
0 192.168.201.0/24 [2] via 192.168.202.20
C 192.168.202.0/24 is directly connected, vlan2002
0 192.168.203.0/24 [2] via 192.168.204.20
C 192.168.204.0/24 is directly connected, vlan2004
0 192.168.205.0/24 [2] via 192.168.206.20
C 192.168.206.0/24 is directly connected, vlan2006
0 45.45.45.0/24 [2] via 192.168.202.20
0 45.45.46.0/24 [2] via 192.168.202.20
0 45.45.47.0/24 [2] via 192.168.202.20
0 45.45.48.0/24 [2] via 192.168.202.20
0 45.45.49.0/24 [2] via 192.168.202.20
0 45.45.50.0/24 [2] via 192.168.202.20
0 45.45.51.0/24 [2] via 192.168.202.20
0 45.45.52.0/24 [2] via 192.168.202.20
0 45.45.53.0/24 [2] via 192.168.202.20
0 45.45.54.0/24 [2] via 192.168.202.20
0 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-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)# 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)# switchport pvid 2004
ES1-24p-1 SEFOS(config-if)# spanning-tree disable
ES1-24p-1 SEFOS(config-if)# exit
ES1-24p-1 SEFOS(config-if)# exit
```

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-if)# exit
```

```
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)# network 192.168.101.10
```

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-if)# exit

ES1-24p-1 SEFOS(config-if)# 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 osp | f neighbor |                |           |
|-----------------|---------------|------------|----------------|-----------|
| Vrf default     |               |            |                |           |
| Neighbor-ID Pr  | i 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 summaryRoute SourceRoutesconnected5static0rip0bgp0ospf1016Total1021
```

### 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
0 192.168.60.0/24 [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
0 192.168.150.0/24 [3] via 192.168.203.10
              [3] via 192.168.206.10
0 192.168.151.0/24 [3] via 192.168.203.10
              [3] via 192.168.206.10
0 192.168.201.0/24 [2] via 192.168.203.10
0 192.168.202.0/24 [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
0 192.168.205.0/24 [2] via 192.168.203.10
0 192.168.206.0/24 [2] via 192.168.206.10
0 45.45.45.0/24 [3] via 192.168.203.10
              [3] via 192.168.206.10
0 45.45.46.0/24 [3] via 192.168.203.10
              [3] via 192.168.206.10
0 45.45.47.0/24 [3] via 192.168.203.10
              [3] via 192.168.206.10
0 45.45.48.0/24 [3] via 192.168.203.10
              [3] via 192.168.206.10
0 45.45.49.0/24 [3] via 192.168.203.10
              [3] via 192.168.206.10
0 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-if)# exit

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

#### 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)# vlan active

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

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

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

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

```
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)# spanning-tree disable
ES1-24p-2 SEFOS(config-if)# spanning-tree disable
ES1-24p-2 SEFOS(config-if)# exit
ES1-24p-2 SEFOS(config-if)# exit
```

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

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)# network 192.168.60.10 area 0.0.0.0
```

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 ...
```

#### 10. Verify the status of the interfaces.

| ES1-24p-2 SE | FOS# 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 S | EFOS# | show ip ospi | f neighbor | •              |           |
|-------------|-------|--------------|------------|----------------|-----------|
| Vrf defa    | ult   |              |            |                |           |
| 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 summar | У |
|-----------------|------------------------|---|
| 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

0 192.168.20.0/24 [3] via 192.168.205.10

[3] via 192.168.204.10

0 192.168.30.0/24 [2] via 192.168.205.10

0 192.168.40.0/24 [2] via 192.168.204.10

0 192.168.50.0/24 [3] via 192.168.205.10

[3] via 192.168.204.10
```

```
C 192.168.60.0/24 is directly connected, vlan60
0 192.168.100.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 192.168.101.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 192.168.150.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 192.168.151.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 192.168.201.0/24 [2] via 192.168.205.10
0 192.168.202.0/24 [2] via 192.168.204.10
0 192.168.203.0/24 [2] via 192.168.205.10
0 192.168.204.0/24 [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
0 45.45.45.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 45.45.46.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 45.45.47.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 45.45.48.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 45.45.49.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 45.45.50.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 45.45.51.0/24 [3] via 192.168.205.10
              [3] via 192.168.204.10
0 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  |
|           | <pre>inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link</pre> |
|           | 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  |
|           | <pre>inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link</pre> |
|           | 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  |
|           | <pre>inet6 addr: fe80::210:e0ff:fe22:fd9/64 Scope:Link</pre> |
|           | 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 nxgel
index 41001000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,FIXEDMTU>
mtu 9000 nxgel: 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.  |  |
| 0           |  |  |
| 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.   |  |
|             |  |  |
| Р           |  |  |
| 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 illuminating 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.
- Т

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

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