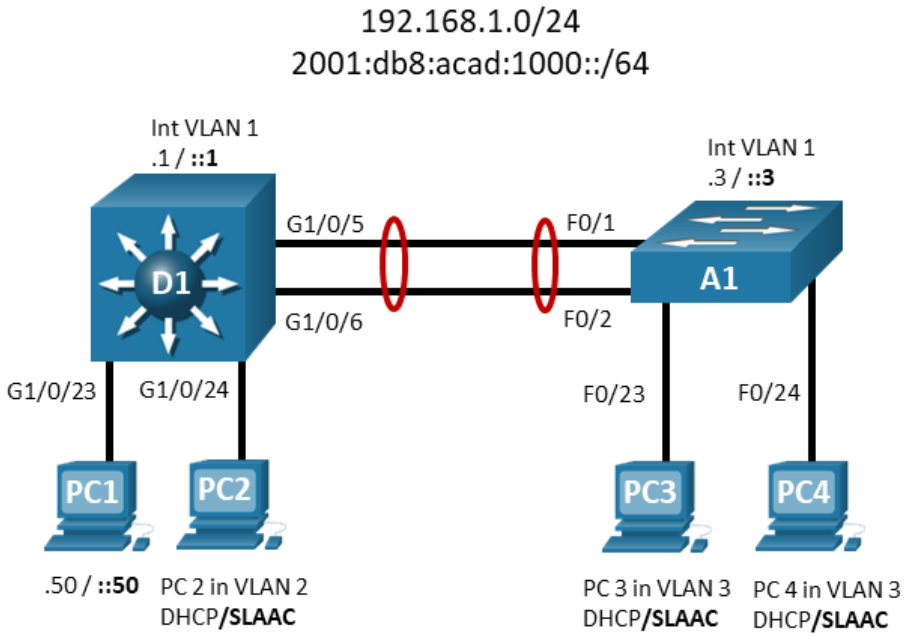
# Lab - Implement SPAN Technologies

## Topology




## Addressing Table

| Device | Interface | IP Address | IPv6 Address | IPv6 Link Local |
|---|---|---|---|---|
| D1 | VLAN 1 | 192.168.1.1/24 | 2001:db8:acad:1000::1/64 | fe80::d1:1 |
| | VLAN 2 | 192.168.2.1/24 | 2001:db8:acad:2000::1/64 | fe80::d1:2 |
| | VLAN 3 | 192.168.3.1/24 | 2001:db8:acad:3000::1/64 | fe80::d1:3 |
| A1 | VLAN 1 | 192.168.1.3/24 | 2001:db8:acad:1000::3/64 | fe80::a1:1 |
| PC1 | NIC | 192.168.1.50/24 | 2001:db8:acad:1000::50/64 | EUI-64 |
| PC2 | NIC (VLAN 2) | Assigned by DHCP | Assigned by SLAAC | EUI-64 |
| PC3 | NIC (VLAN 3) | Assigned by DHCP | Assigned by SLAAC | EUI-64 |
| PC4 | NIC (VLAN 3) | Assigned by DHCP | Assigned by SLAAC | EUI-64 |

## Objectives

**Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing**

**Part 2: Configure and Verify Local SPAN**

**Part 3: Configure and Verify RSPAN**

## Background / Scenario

The Switch Port Analyzer (SPAN) feature allows you to instruct a switch to send copies of packets seen on one port, multiple ports, or an entire VLAN, to another port on the same switch. The Remote SPAN (RSPAN) feature takes the SPAN feature beyond a single switch to a network, allowing you to remotely capture traffic on different switches in the network. This is extremely useful in campus networks where a sniffer may not be located at the desired traffic capture point. In addition, this allows you to permanently place a sniffer in the campus network to SPAN traffic as necessary or when troubleshooting situations arise.

**Note:** This lab is an exercise in configuring options available for SPAN and does not necessarily reflect network troubleshooting best practices.

**Note**: The switches used in the CCNP hands-on labs are Cisco Catalyst 3650s with Cisco IOS XE Release 16.9.4 (universalk9 image) and Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other switches and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs.

**Note**: Make sure that the switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

**Note:** The default Switch Database Manager (SDM) template on a Catalyst 2960 does not support IPv6. You must change the default SDM template to the dual-ipv4-and-ipv6 default template using the **sdm prefer dual-ipv4-and-ipv6 default** global configuration command. Changing the template will require a reboot.

## Required Resources

- 1 Switch (Cisco 3650 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable)
- 4 PCs (Choice of operating system with terminal emulation program and with a packet capture utility)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

## Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing

In Part 1, you will set up the network topology and configure basic settings and interface addressing on switches.

### Step 1: Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

### Step 2: Configure basic settings for each device.

a. Console into each device, enter global configuration mode, and apply the basic settings. The startup configurations for each device are provided below.

**Switch D1**

```
config t
hostname D1
no ip domain lookup
ip routing
ipv6 unicast-routing
banner motd # D1, Implement SPAN Technologies #
line con 0
```

```
 exec-timeout 0 0
 logging synchronous
 exit
line vty 0 4
 privilege level 15
 exec-timeout 0 0
 password cisco123
 login
 exit
vlan 2
 name SECOND_VLAN
 exit
vlan 3
 name THIRD_VLAN
 exit
interface vlan 1
 ip address 192.168.1.1 255.255.255.0
 ipv6 address fe80::d1:1 link-local
 ipv6 address 2001:db8:acad:1000::1/64
 no shutdown
 exit
interface vlan 2
 ip address 192.168.2.1 255.255.255.0
 ipv6 address fe80::d1:2 link-local
 ipv6 address 2001:db8:acad:2000::1/64
 no shutdown
 exit
interface vlan 3
 ip address 192.168.3.1 255.255.255.0
 ipv6 address fe80::d1:3 link-local
 ipv6 address 2001:db8:acad:3000::1/64
 no shutdown
 exit
interface range g1/0/23
 spanning-tree portfast
 switchport mode access
 no shutdown
 exit
interface range g1/0/24
 spanning-tree portfast
 switchport mode access
 switchport access vlan 2
 no shutdown
 exit
interface range g1/0/5-6
```

```
 switchport mode trunk
 channel-group 1 mode active
 no shutdown
 exit
interface range g1/0/1-4, g1/0/7-22, g1/1/1-4
 shutdown
 exit
ip dhcp pool SECOND_VLAN_POOL
 network 192.168.2.0 255.255.255.0
 default-router 192.168.2.1
 exit
ip dhcp pool THIRD_VLAN_POOL
 network 192.168.3.0 255.255.255.0
 default-router 192.168.3.1
 exit
end
```

**Switch A1**

```
config t
hostname A1
no ip domain lookup
ipv6 unicast-routing
banner motd # A1, Implement SPAN Technologies #
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
line vty 0 4
 privilege level 15
 exec-timeout 0 0
 password cisco123
 login
 exit
vlan 2
 name SECOND_VLAN
 exit
vlan 3
 name THIRD_VLAN
 exit
interface vlan 1
 ip address 192.168.1.3 255.255.255.0
 ipv6 address fe80::a1:1 link-local
 ipv6 address 2001:db8:acad:1000::3/64
 no shutdown
 exit
interface range f0/1-2
```

```
 switchport mode trunk
 channel-group 1 mode active
 no shutdown
 exit
interface range f0/23 - 24
 switchport mode access
 switchport access vlan 3
 spanning-tree portfast
 no shutdown
 exit
interface range f0/3-22, g0/1-2
 shutdown
 exit
end
```

b. Set the clock on each device to UTC time.

c. Save the running configuration to startup-config.

d. Configure IPv4 and IPv6 addresses on all hosts as shown in the addressing table.

e. Verify that the PCs can ping their default gateways and each other.

## Part 2: Configure and Verify Local SPAN

In this part you will configure and verify a local SPAN on D1, configuring it so that PC1 is able to capture traffic from PC2, even though it is in a different VLAN.

### Step 1: Configure Local SPAN.

a. Create a Local SPAN session with a source of g1/0/24 and a destination of g1/0/23. The monitor session number is locally significant only, so you can use any number IOS XE allows you to. Note that there is a limit to the number of sessions that can run simultaneously, and that the SPAN can consume significant resources.

```
D1(config)# monitor session 1 source interface g1/0/24
D1(config)# monitor session 1 destination interface g1/0/23
```

b. Verify the configuration by issuing the **show monitor session #** or **show monitor session local** command.

```
D1# show monitor session local
Session 1
---------
Type                   : Local Session
Source Ports           :
    Both               : Gi1/0/24
Destination Ports      : Gi1/0/23
    Encapsulation      : Native
          Ingress      : Disabled
```

### Step 2: Verify that the SPAN is operational.

a. On PC 1, open Wireshark and start capturing on the Ethernet interface. Add the capture filter **icmp**.

b. On PC 2, ping 192.168.1.1. Send 3 packets of 300 bytes.

On a Windows PC, the command is **ping -n 3 -l 300 192.168.1.1**

On a Linux PC, the command is **ping -s 300 -c 3 192.168.1.1**

c. On PC 1, stop the Wireshark capture and examine the output.

d. Remove the monitor session using the **no monitor session 1** command.

## Part 3: Configure and Verify RSPAN

In this part, you will configure and verify a Remote SPAN (RSPAN). RSPAN allows the source and destination ports to be on different switches. For this to work, it uses a VLAN configured only for remote-span functionality. The source port then places the transmitted or received data onto the remote-span VLAN. The remote-span VLAN is carried across trunks. The receiving switch takes the data sourced from the remote-span VLAN and sends it to the destination port that is running the protocol analyzer.

VLAN 500 will be created on D1 and A1 to be used as the remote-span VLAN. PC 1 will again take on the capture role, this time it will be interested in traffic coming from VLAN 2 on Switch A1.

### Step 1: Configure RSPAN VLAN.

a. Create the RSPAN VLAN on D1 and A1 using the **vlan 500** command from global configuration mode.

```
D1# config t
Enter configuration commands, one per line.  End with CNTL/Z.
D1(config)# vlan 500
D1(config-vlan)# name Remote_SPAN
D1(config-vlan)# remote-span
D1(config-vlan)# exit
```

b. Use the **show vlan remote-span** command to verify VLAN 500 is configured correctly and is designated as the remote-span vlan. Use the **show interface trunk** command to ensure the RSPAN VLAN is allowed on the trunks. The RSPAN VLAN should not be a DATA VLAN. Its purpose is strictly for carrying the monitored traffic across trunk links from one switch to another.

```
D1# show vlan remote-span

Remote SPAN VLANs
------------------------------------------------------------------------------
500

D1# show interface trunk

Port        Mode             Encapsulation  Status        Native vlan
Po1         on               802.1q         trunking      1

Port        Vlans allowed on trunk
Po1         1-4094

Port        Vlans allowed and active in management domain
Po1         1-3,500

Port        Vlans in spanning tree forwarding state and not pruned
Po1         1-3,500
```

c. Now configure the monitor session on A1 with a source interface of vlan 2 and a destination of remote vlan 500. Because the captured traffic must traverse the local switch to a remote switch, we must use the remote VLAN as the destination.

```
A1(config)# monitor session 2 source vlan 3
A1(config)# monitor session 2 destination remote vlan 500
%Note: ingoring the reflector port configuration
```

**Note**: The ignoring the reflector port message is an artifact of an older OS and can be safely ignored.

d. Verify the configuration using the **show monitor session 2** command.

```
A1# show monitor session 2
Session 2
---------
Type                    : Remote Source Session
Source VLANs            :
    Both                : 3
Dest RSPAN VLAN        : 500
```

e. Move to the D1 switch and configure it to collect the desired traffic. The source port on D1 will be the remote-span vlan 500 and the destination port will be the client connected to G1/0/23.

```
D1(config)# monitor session 2 source remote vlan 500
D1(config)# monitor session 2 destination interface g1/0/23
```

Note that the session numbers do not have to match at either end of the session.

f. Verify the configuration using the **show monitor session 2** command on D1.

```
D1# show monitor session 2
Session 2
---------
Type                    : Remote Destination Session
Source RSPAN VLAN       : 500
Destination Ports       : Gi1/0/23
    Encapsulation       : Native
          Ingress       : Disabled
```

### Step 2: Verify that the SPAN is operational.

a. On PC 1, open Wireshark and start capturing on the Ethernet interface.

b. On PC3 and PC4 (the hosts on A1), ping 192.168.1.1. Send 3 packets of 300 bytes.

On a Windows PC, the command is **ping -n 3 -l 300 192.168.1.1**

On a Linux PC, the command is **ping -s 300 -c 3 192.168.1.1**

c. On PC 1, stop the Wireshark capture and examine the output. You should see pings sourced from PC3 and PC4, along with responses to those pings.

d. Remove the monitor session using the **no monitor session 2** command on A1 and D1.