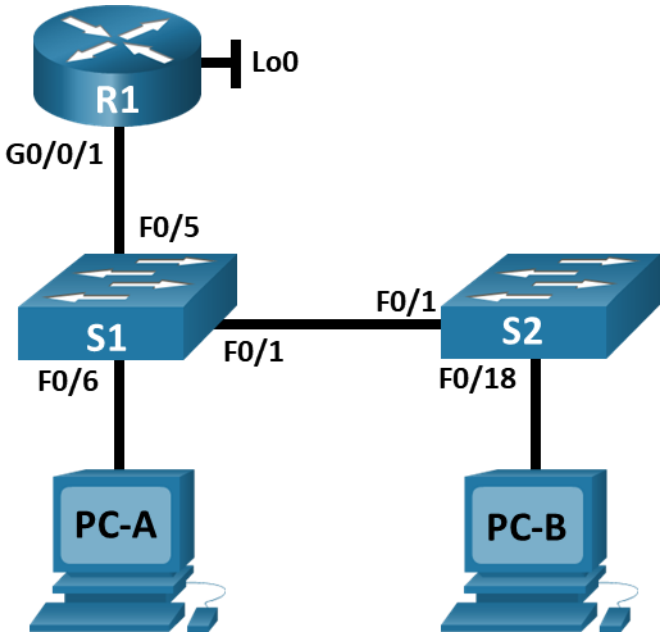
Lab - Switch Security Configuration

Topology



Addressing Table

Device	Interface / VLAN	IP Address	Subnet Mask
R1	G0/0/1	192.168.10.1	255.255.255.0
R1	Loopback 0	10.10.1.1	255.255.255.0
S1	VLAN 10	192.168.10.201	255.255.255.0
S2	VLAN 10	192.168.10.202	255.255.255.0
PC – A	NIC	DHCP	255.255.255.0
PC – B	NIC	DHCP	255.255.255.0

Objectives

Part 1: Configure the Network Devices.

- Cable the network.
- Configure R1.
- Configure and verify basic switch settings.

Part 2: Configure VLANs on Switches.

- Configure VLAN 10.
- Configure the SVI for VLAN 10.
- Configure VLAN 333 with the name Native on S1 and S2.
- Configure VLAN 999 with the name ParkingLot on S1 and S2.

Part 3: Configure Switch Security.

- Implement 802.1Q trunking.
- Configure access ports.
- Secure and disable unused switchports.
- Document and implement port security features.
- Verify end-to-end-connectivity.

Background / Scenario

This is a comprehensive lab to review previously covered Layer 2 security features.

Note: The routers used with CCNA hands-on labs are Cisco 4221 with Cisco IOS XE Release 16.9.3 (universalk9 image). The switches used in the labs are Cisco Catalyst 2960s with Cisco IOS Release 15.0(2) (lanbasek9 image). Other routers, 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. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers.

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

Required Resources

- 1 Router (Cisco 4221 with Cisco IOS XE Release 16.9.3 universal image or comparable)
- 2 Switches (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
- 2 PCs (Windows with a terminal emulation program, such as Tera Term)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

Instructions

Part 1: Configure the Network Devices.

Step 1: Cable the network.

a. Cable the network as shown in the topology.

b. Initialize the devices.

Step 2: Configure R1 (follow network configuration table).

Step 3: Configure and verify basic switch settings.

a. Configure the hostname for switches S1 and S2.

b. Prevent unwanted DNS lookups on both switches.

c. Configure interface descriptions for the ports that are in use in S1 and S2.

d. Set the default-gateway for the Management VLAN to 192.168.10.1 on both switches.

Part 2: Configure VLANs on Switches.

Step 1: Configure VLAN 10.

Add VLAN 10 to S1 and S2 and name the VLAN **Management.**

Step 2: Configure the SVI for VLAN 10.

Configure the IP address according to the Addressing Table for SVI for VLAN 10 on S1 and S2. Enable the SVI interfaces and provide a description for the interface.

Step 3: Configure VLAN 333 with the name Native on S1 and S2.

Step 4: Configure VLAN 999 with the name ParkingLot on S1 and S2.

Part 3: Configure Switch Security.

Step 1: Implement 802.1Q trunking.

a. On both switches, configure trunking on F0/1 to use VLAN 333 as the native VLAN.

b. Verify that trunking is configured on both switches.

```
S1# show interface trunk

Port        Mode             Encapsulation  Status        Native vlan
Fa0/1       on               802.1q         trunking      333

Port        Vlans allowed on trunk
Fa0/1       1-4094

Port        Vlans allowed and active in management domain
Fa0/1       1,10,333,999

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/1       1,10,333,999

S2# show interface trunk

Port        Mode             Encapsulation  Status        Native vlan
Fa0/1       on               802.1q         trunking      333

Port        Vlans allowed on trunk
Fa0/1       1-4094

Port        Vlans allowed and active in management domain
Fa0/1       1,10,333,999
```

```
Port        Vlans in spanning tree forwarding state and not pruned
Fa0/1       1,10,333,999
```

c. Disable DTP negotiation on F0/1 on S1 and S2.

d. Verify with the **show interfaces** command.

```
S1# show interfaces f0/1 switchport | include Negotiation
Negotiation of Trunking: Off

S2# show interfaces f0/1 switchport | include Negotiation
Negotiation of Trunking: Off
```

Step 2: Configure access ports.

a. On S1, configure F0/5 and F0/6 as access ports that are associated with VLAN 10.

b. On S2, configure F0/18 as an access port that is associated with VLAN 10.

Step 3: Secure and disable unused switchports.

a. On S1 and S2, move the unused ports from VLAN 1 to VLAN 999 and disable the unused ports.

b. Verify that unused ports are disabled and associated with VLAN 999 by issuing the **show** command.

```
S1# show interfaces status

Port      Name               Status       Vlan       Duplex  Speed Type
Fa0/1     Link to S2         connected    trunk      a-full  a-100 10/100BaseTX
Fa0/2                        disabled     999          auto   auto 10/100BaseTX
Fa0/3                        disabled     999          auto   auto 10/100BaseTX
Fa0/4                        disabled     999          auto   auto 10/100BaseTX
Fa0/5     Link to R1         connected    10         a-full  a-100 10/100BaseTX
Fa0/6     Link to PC-A       connected    10         a-full  a-100 10/100BaseTX
Fa0/7                        disabled     999          auto   auto 10/100BaseTX
Fa0/8                        disabled     999          auto   auto 10/100BaseTX
Fa0/9                        disabled     999          auto   auto 10/100BaseTX
Fa0/10                       disabled     999          auto   auto 10/100BaseTX
<output omitted>
S2# show interfaces status

Port      Name               Status       Vlan       Duplex  Speed Type
Fa0/1     Link to S1         connected    trunk      a-full  a-100 10/100BaseTX
Fa0/2                        disabled     999          auto   auto 10/100BaseTX
Fa0/3                        disabled     999          auto   auto 10/100BaseTX
<output omitted>
Fa0/14                       disabled     999          auto   auto 10/100BaseTX
Fa0/15                       disabled     999          auto   auto 10/100BaseTX
Fa0/16                       disabled     999          auto   auto 10/100BaseTX
Fa0/17                       disabled     999          auto   auto 10/100BaseTX
Fa0/18    Link to PC-B       connected    10         a-full  a-100 10/100BaseTX
Fa0/19                       disabled     999          auto   auto 10/100BaseTX
Fa0/20                       disabled     999          auto   auto 10/100BaseTX
Fa0/21                       disabled     999          auto   auto 10/100BaseTX
```

```
Fa0/22                  disabled      999         auto   auto 10/100BaseTX
Fa0/23                  disabled      999         auto   auto 10/100BaseTX
Fa0/24                  disabled      999         auto   auto 10/100BaseTX
Gi0/1                   disabled      999         auto   auto 10/100/1000BaseTX
Gi0/2                   disabled      999         auto   auto 10/100/1000BaseTX
```

Step 4: Document and implement port security features.

The interfaces F0/6 on S1 and F0/18 on S2 are configured as access ports. In this step, you will also configure port security on these two access ports.

a. On S1, issue the **show port-security interface f0/6** command to display the default port security settings for interface F0/6. Record your answers in the table below.

Default Port Security Configuration	
Feature	**Default Setting**
Port Security	
Maximum number of MAC addresses	
Violation Mode	
Aging Time	
Aging Type	
Secure Static Address Aging	
Sticky MAC Address	

b. On S1, enable port security on F0/6 with the following settings:

- Max number of MAC addresses: **3**
- Violation type: **restrict**
- Aging time: **60 min**
- Aging type: **inactivity**

c. Verify port security on S1 F0/6.

```
S1# show port-security interface f0/6
Port Security              : Enabled
Port Status                : Secure-up
Violation Mode             : Restrict
Aging Time                 : 60 mins
Aging Type                 : Inactivity
SecureStatic Address Aging : Disabled
Maximum MAC Addresses      : 3
Total MAC Addresses        : 1
Configured MAC Addresses   : 0
Sticky MAC Addresses       : 0
Last Source Address:Vlan   : 0022.5646.3411:10
```

```
Security Violation Count   : 0

S1# show port-security address
               Secure Mac Address Table
-----------------------------------------------------------------------------
Vlan    Mac Address       Type                          Ports   Remaining Age
                                                                    (mins)
----    -----------       ----                          -----   -------------
10    0022.5646.3411    SecureDynamic                 Fa0/6       60 (I)
-----------------------------------------------------------------------------
Total Addresses in System (excluding one mac per port)     : 0
Max Addresses limit in System (excluding one mac per port) : 8192
```

d. Enable port security for F0/18 on S2. Configure the port to add MAC addresses learned on the port automatically to the running configuration.

e. Configure the following port security settings on S2 F/18:

- Max number of MAC addresses: **2**
- Violation type: **Protect**
- Aging time: **60 min**

f. Verify port security on S2 F0/18.

```
S2# show port-security interface f0/18
Port Security              : Enabled
Port Status                : Secure-up
Violation Mode             : Protect
Aging Time                 : 60 mins
Aging Type                 : Absolute
SecureStatic Address Aging : Disabled
Maximum MAC Addresses      : 2
Total MAC Addresses        : 1
Configured MAC Addresses   : 0
Sticky MAC Addresses       : 0
Last Source Address:Vlan   : 0022.5646.3413:10
Security Violation Count   : 0

S2# show port-security address
               Secure Mac Address Table
-----------------------------------------------------------------------------
Vlan    Mac Address       Type                          Ports   Remaining Age
                                                                    (mins)
----    -----------       ----                          -----   -------------
10    0022.5646.3413    SecureSticky                  Fa0/18      -
-----------------------------------------------------------------------------
Total Addresses in System (excluding one mac per port)     : 0
Max Addresses limit in System (excluding one mac per port) : 8192
```

Step 5: Verify end-to-end connectivity.

Verify PING connectivity between all devices in the IP Addressing Table. If the pings fail, you may need to disable the firewall on the PC hosts.

Reflection Questions

1. In reference to Port Security on S2, why is there no timer value for the remaining age in minutes when sticky learning was configured?

2. In reference to Port Security, what is the difference between the absolute aging type and inactivity aging type?