EE3009 Lab 2-2

5.2.2.9 – Configuring Switch Security Features Topology – PT (Sem B 2020/2021)



1. Addressing Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Device | Interface | IP Address | Subnet Mask | Default Gateway |
| R1 | G0/0/1 | 192.168.2.1 | 255.255.255.0 | N/A |
| S1 | VLAN 99 | 192.168.2.11 | 255.255.255.0 | 192.168.2.1 |
| PC-A | NIC | 192.168.2.3 | 255.255.255.0 | 192.168.2.1 |

1. Objectives

Part 1: Set up the Topology and Initialize Devices

Part 2: Configure Basic Device Settings and Verify Connectivity

Part 3: Configure and Verify SSH Access on S1

* Configure SSH access.
* Modify SSH parameters.
* Verify the SSH configuration.

Part 4: Configure and Verify Security Features on S1

* Configure and verify general security features.
* Configure and verify port security.

1. Background / Scenario

It is quite common to lock down access and install strong security features on PCs and servers. It is important that your network infrastructure devices, such as switches and routers, are also configured with security features.

In this lab, you will follow some best practices for configuring security features on LAN switches. You will only allow SSH and secure HTTPS sessions. You will also configure and verify port security to lock out any device with a MAC address not recognized by the switch.

1. Set Up the Topology and Initialize Devices

Cable the network as shown in the topology.

1. Configure Basic Device Settings and Verify Connectivity

In Part 2, you will configure basic settings on the router, switch, and PC. Refer to the Topology and Addressing Table at the beginning of this lab for device names and address information.

* 1. Configure an IP address on PC-A.

Refer to the Addressing Table for the IP Address information.

* 1. Configure basic settings on R1.
     1. Enter the enable mode of R1 by typing

Router> enable

Router#

* + 1. Type config t to enter global configuration mode.

Router# config t

Router(config)#

* + 1. Copy the following basic configuration and paste it to running-configuration on R1.

hostname R1

service password-encryption

line con 0

password conpass

login

logging synchronous

line vty 0 4

password vtypass

login

interface g0/0/1

ip address 192.168.2.1 255.255.255.0

no shutdown

end

* + 1. Save the running configuration to startup configuration.
  1. Configure basic settings on S1.
     1. Enter the enable mode of S1 by typing

Switch> enable

Switch#

* + 1. Type config t to enter global configuration mode.
    2. Copy the following basic configuration and paste it to running-configuration on S1.

hostname S1

service password-encryption

enable secret class

line con 0

password conpass

login

logging synchronous

line vty 0 15

password vtypass

login

exit

* + 1. Create VLAN 99 on the switch and name it **Management**.

S1(config)# **vlan 99**

S1(config-vlan)# **name Management**

S1(config-vlan)# **exit**

S1(config)#

* + 1. Configure the VLAN 99 management interface IP address, as shown in the Addressing Table, and enable the interface.

S1(config)# **interface vlan 99**

S1(config-if)# **ip address 192.168.2.11 255.255.255.0**

S1(config-if)# **no shutdown**

S1(config-if)# **end**

S1#

* + 1. Issue the **show vlan** command on S1. What is the status of VLAN 99? \_\_active\_\_\_\_\_\_\_
    2. Issue the **show ip interface brief** command on S1. What is the status for management interface VLAN 99?

\_\_\_\_\_\_\_\_\_status up and protocol down\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Assign ports F0/5 and F0/6 to VLAN 99 on the switch.

S1# **config t**

S1(config)# **interface f0/5**

S1(config-if)# **switchport mode access**

S1(config-if)# **switchport access vlan 99**

S1(config-if)# **interface f0/6**

S1(config-if)# **switchport mode access**

S1(config-if)# **switchport access vlan 99**

S1(config-if)# **end**

* + 1. Save the running configuration to startup configuration.
  1. Verify connectivity between devices.
     1. From PC-A, ping the default gateway address on R1. Were your pings successful? \_\_\_yes\_\_\_\_\_\_\_\_
     2. From PC-A, ping the management address of S1. Were your pings successful? \_yes\_\_\_\_\_\_\_
     3. From S1, ping the default gateway address on R1. Were your pings successful? \_\_\_yes\_\_\_\_\_\_\_\_

1. Configure and Verify SSH Access on S1
   1. Configure SSH access on S1.
      1. Enable SSH on S1. From global configuration mode, create a domain name of **CCNA-Lab.com**.

S1(config)# **ip domain-name CCNA-Lab.com**

* + 1. Create a local user database entry for use when connecting to the switch via SSH. The user should have administrative level access.

**Note**: The password used here is NOT a strong password. It is merely being used for lab purposes.

S1(config)# **username admin privilege 15 secret adminpass**

* + 1. Configure the transport input for the vty lines to allow SSH connections only, and use the local database for authentication.

S1(config)# **line vty 0 15**

S1(config-line)# **transport input ssh**

S1(config-line)# **login local**

S1(config-line)# **exit**

* + 1. Generate an RSA crypto key using a modulus of 1024 bits.

S1(config)# **crypto key generate rsa general-keys modulus 1024**

The name for the keys will be: S1.CCNA-Lab.com

% The key modulus size is 1024 bits

% Generating 1024 bit RSA keys, keys will be non-exportable...

[OK] (elapsed time was 3 seconds)

S1(config)#

S1(config)# **end**

* + 1. Verify the SSH configuration.

S1# **show ip ssh**

What version of SSH is the switch using? \_\_\_1.99\_\_\_\_\_\_\_\_\_\_\_

How many authentication attempts does SSH allow? \_\_\_\_\_\_3\_\_\_\_\_\_\_\_\_

What is the default timeout setting for SSH? \_\_\_\_\_120\_\_seconds\_\_\_\_\_\_\_\_\_

* 1. Modify the SSH configuration on S1.

Modify the default SSH configuration.

S1# **config t**

S1(config)# **ip ssh time-out 75**

S1(config)# **ip ssh authentication-retries 2**

How many authentication attempts does SSH allow? \_\_\_\_\_\_\_2\_\_\_\_\_\_\_\_\_\_

What is the timeout setting for SSH? \_\_\_\_\_75 seconds\_\_\_\_\_\_\_\_\_\_ Verify the SSH configuration on S1.

* + 1. On PC-A , open an SSH connection to S1. The ip address is 192.168.2.11 and the username is **admin** and **adminpass** is the password.

Was the connection successful? \_\_\_\_\_\_yes\_\_\_\_\_\_\_\_\_\_\_\_\_

What prompt was displayed on S1? Why?

\_showing prompt at exec mode, because privilege 15 option was entered in the config\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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* + 1. Type **exit** to end the SSH session on S1.

1. Configure and Verify Security Features on S1

In Part 4, you will shut down unused ports, turn off certain services running on the switch, and configure port security based on MAC addresses. Switches can be subject to MAC address table overflow attacks, MAC spoofing attacks, and unauthorized connections to switch ports. You will configure port security to limit the number of MAC addresses that can be learned on a switch port and disable the port if that number is exceeded.

* 1. Configure general security features on S1.
     1. Issue a **show ip interface brief** command on S1. What physical ports are up?

\_\_\_\_\_\_\_\_fa 0/5, 0./6\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. Shut down all unused physical ports on the switch. Use the **interface range** command.

S1(config)# **interface range f0/1 – 4**

S1(config-if-range)# **shutdown**

S1(config-if-range)# **interface range f0/7 – 24**

S1(config-if-range)# **shutdown**

S1(config-if-range)# **interface range g0/1 – 2**

S1(config-if-range)# **shutdown**

S1(config-if-range)# **end**

S1#

* + 1. Issue the **show ip interface brief** command on S1. What is the status of ports F0/1 to F0/4?

\_\_administratively down for 1-3 but just down for 4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Configure and verify port security on S1.
     1. Record the R1 G0/0/1 MAC address. From the R1 CLI, use the **show interface g0/0/1** command and record the MAC address of the interface.

R1# **show interface g0/0/1**

GigabitEthernet0/0/1 is up, line protocol is up

Hardware is CN Gigabit Ethernet, address is 00E0.B097.0802 (bia 00E0.B097.0802)

What is the MAC address of the R1 G0/0/1 interface?

\_\_\_\_\_00e0.b097.0802\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. From the S1 CLI, issue a **show mac address-table** command from privileged EXEC mode. Find the dynamic entries for ports F0/5 and F0/6. Record them below.

F0/5 MAC address: \_\_00e0.b097.0802\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

F0/6 MAC address: \_\_0090.2b45.23e2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. Configure basic port security.

**Note**: This procedure would normally be performed on all access ports on the switch. F0/5 is shown here as an example.

* + - 1. From the S1 CLI, enter interface configuration mode for the port that connects to R1.

S1(config)# **interface f0/5**

* + - 1. Shut down the port.

S1(config-if)# **shutdown**

**Note**: Entering the **switchport port-security** command sets the maximum MAC addresses to 1 and the violation action to shutdown. The **switchport port-security maximum** and **switchport port-security violation** commands can be used to change the default behavior.

* + - 1. S1(config-if)# switchport port-security

S1(config-if)# switchport port-security maximum 1

S1(config-if)# switchport port-security violation shutdown

* + - 1. Configure a static entry for the MAC address of R1 G0/0/1 interface recorded in Step 2a.

S1(config-if)# switchport port-security mac-address xxxx.xxxx.xxxx

(xxxx.xxxx.xxxx is the actual MAC address of the router G0/0/1 interface)

**Note**: Optionally, you can use the **switchport port-security mac-address sticky** command to add all the secure MAC addresses that are dynamically learned on a port (up to the maximum set) to the switch running configuration.

* + - 1. Enable the switch port.

S1(config-if)# **no shutdown**

S1(config-if)# **end**

* + 1. Verify port security on S1 F0/5 by issuing a **show port-security interface** command.

S1# **show port-security interface f0/5**

Port Security : Enabled

Port Status : Secure-up

Violation Mode : Shutdown

Aging Time : 0 mins

Aging Type : Absolute

SecureStatic Address Aging : Disabled

Maximum MAC Addresses : 1

Total MAC Addresses : 1

Configured MAC Addresses : 1

Sticky MAC Addresses : 0

Last Source Address:Vlan : 0000.0000.0000:0

Security Violation Count : 0

What is the port status of F0/5?

\_\_\_\_\_\_secure-up\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. From R1 command prompt, ping PC-A to verify connectivity.

R1# **ping 192.168.2.3**

* + 1. You will now violate security by changing the MAC address on the router interface. Enter interface configuration mode for G0/0/1 and shut it down.

R1# **config t**

R1(config)# **interface g0/0/1**

R1(config-if)# **shutdown**

* + 1. Configure a new MAC address for the interface, using **aaaa.bbbb.cccc** as the address.

R1(config-if)# **mac-address aaaa.bbbb.cccc**

* + 1. Enable the G0/0/1 interface on R1.

R1(config-if)# **no shutdown**

* + 1. From R1 privileged EXEC mode, ping PC-A. Was the ping successful? Why or why not?

\_\_\_no because the port on s1 is shutdown from a security violation that occured\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. On the switch, verify port security with the following commands.

S1# **show port-security**

Secure Port MaxSecureAddr CurrentAddr SecurityViolation Security Action

(Count) (Count) (Count)

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

Fa0/5 1 1 1 Shutdown

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

Total Addresses in System (excluding one mac per port) :0

Max Addresses limit in System (excluding one mac per port) :8192

S1# **show port-security interface f0/5**

Port Security : Enabled

Port Status : Secure-shutdown

Violation Mode : Shutdown

Aging Time : 0 mins

Aging Type : Absolute

SecureStatic Address Aging : Disabled

Maximum MAC Addresses : 1

Total MAC Addresses : 1

Configured MAC Addresses : 1

Sticky MAC Addresses : 0

Last Source Address:Vlan : aaaa.bbbb.cccc:99

Security Violation Count : 1

S1# **show interface f0/5**

FastEthernet0/5 is down, line protocol is down (err-disabled)

Hardware is Fast Ethernet, address is 0cd9.96e2.3d05 (bia 0cd9.96e2.3d05)

MTU 1500 bytes, BW 10000 Kbit/sec, DLY 1000 usec,

reliability 255/255, txload 1/255, rxload 1/255

<output omitted>

S1# **show port-security address**

Secure Mac Address Table

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

Vlan Mac Address Type Ports Remaining Age

(mins)

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

99 30f7.0da3.1821 SecureConfigured Fa0/5 -

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

Total Addresses in System (excluding one mac per port) :0

Max Addresses limit in System (excluding one mac per port) :8192

* + 1. On the router, shut down the G0/0/1 interface, remove the hard-coded MAC address from the router, and re-enable the G0/0/1 interface.

R1(config-if)# **shutdown**

R1(config-if)# **no mac-address aaaa.bbbb.cccc**

R1(config-if)# **no shutdown**

R1(config-if)# **end**

* + 1. From R1, ping PC-A again at 192.168.2.3. Was the ping successful? \_\_\_\_no\_\_\_\_\_\_
    2. On the switch, issue the **show interface f0/5** command to determine the cause of ping failure. Record your findings.

\_\_\_\_it is in an err-disabled status\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. Clear the S1 F0/5 error disabled status.

S1# **config t**

S1(config)# **interface f0/5**

S1(config-if)# **shutdown**

S1(config-if)# **no shutdown**

**Note**: There may be a delay while the port states converge.

* + 1. Issue the **show interface f0/5** command on S1 to verify F0/5 is no longer in error disabled mode.

S1# **show interface f0/5**

FastEthernet0/5 is up, line protocol is up (connected)

Hardware is Fast Ethernet, address is 0023.5d59.9185 (bia 0023.5d59.9185)

MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,

reliability 255/255, txload 1/255, rxload 1/255

* + 1. From the R1 command prompt, ping PC-A again. The ping should be successful.

If not, troubleshoot.

**☞** Save your Packet Tracer file and upload to Canvas.