CCNA3 Case Study v.1.00 Fall2021

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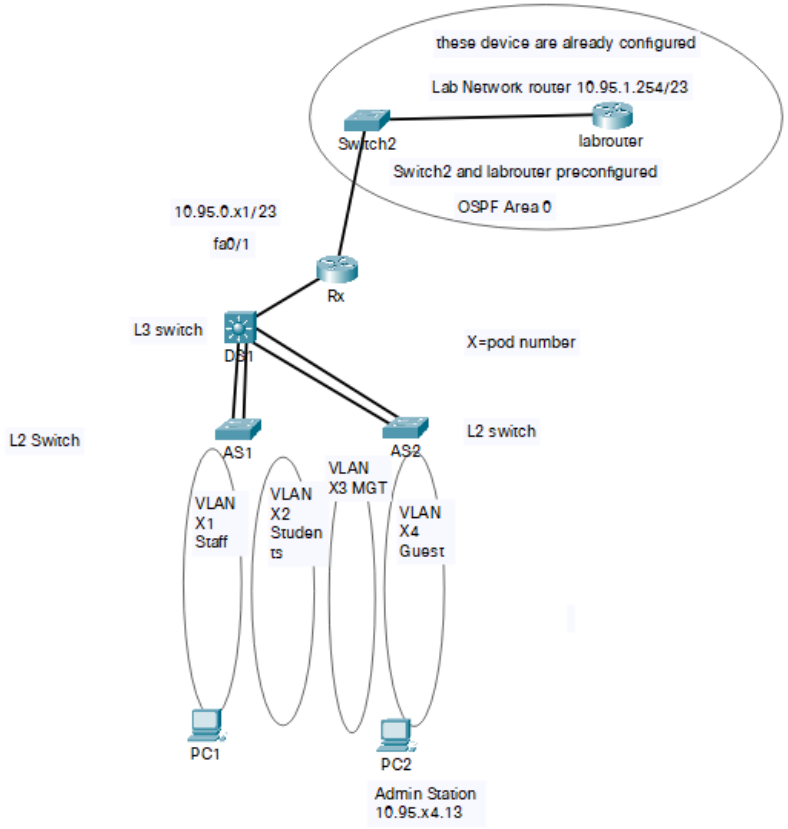

Creating VLANs

AS1(config)# vlan 121
AS1(config-vlan)# name Staff
AS1(config-vlan)# exit
AS1(config)# vlan 122
AS1(config-vlan)# name Students
AS1(config-vlan)# exit
AS1(config)# vlan 123
AS1(config-vlan)# name Management
AS1(config-vlan)# exit
AS1(config)# vlan 124
AS1(config-vlan)# name Guest
AS1(config-vlan)# exit

AS2(config)# vlan 121
AS2(config-vlan)# name Staff
AS2(config-vlan)# exit
AS2(config)# vlan 122
AS2(config-vlan)# name Students
AS2(config-vlan)# exit
AS2(config)# vlan 123
AS2(config-vlan)# name Management
AS2(config-vlan)# exit
AS2(config)# vlan 124
AS2(config-vlan)# name Guest
AS2(config-vlan)# exit

DS1(config)# vlan 121
DS1(config-vlan)# name Staff
DS1(config-vlan)# exit
DS1(config)# vlan 122
DS1(config-vlan)# name Students
DS1(config-vlan)# exit

DS1(config)# vlan 123
DS1(config-vlan)# name Management
DS1(config-vlan)# exit
DS1(config)# vlan 124
DS1(config-vlan)# name Guest
DS1(config-vlan)# exit

Configuring trunking and access ports

AS1(config)# int range f0/3-10
AS1(config-if-range)# switchport mode access
AS1(config-if-range)# switchport access vlan 121
AS1(config-if-range)# exit
AS1(config)# int range f0/11-15
AS1(config-if-range)# switchport mode access
AS1(config-if-range)# switchport access vlan 122
AS1(config-if-range)# exit
AS1(config)# int range f0/16-18
AS1(config-if-range)# switchport mode access
AS1(config-if-range)# switchport access vlan 123
AS1(config-if-range)# exit
AS1(config)# int range f0/19-23
AS1(config-if-range)# switchport mode access
AS1(config-if-range)# switchport access vlan 124
AS1(config-if-range)# exit
AS1(config)# int range f0/1-2
AS1(config-if-range)# switchport nonegotiate
AS1(config-if-range)# exit

DS1(config)# int f0/1
DS1(config-if)# no switchport
DS1(config-if)# ip add 10.95.119.2 255.255.254.0
DS1(config-if)# no shut
DS1(config-if)# exit

AS2(config)# int range f0/3-10
AS2(config-if-range)# switchport mode access
AS2(config-if-range)# switchport access vlan 121
AS2(config-if-range)# exit
AS2(config)# int range f0/11-15
AS2(config-if-range)# switchport mode access
AS2(config-if-range)# switchport access vlan 122
AS2(config-if-range)# exit
AS2(config)# int range f0/16-18
AS2(config-if-range)# switchport mode access
AS2(config-if-range)# switchport access vlan 123
AS2(config-if-range)# exit
AS2(config)# int range f0/19-23
AS2(config-if-range)# switchport mode access
AS2(config-if-range)# switchport access vlan 124
AS2(config-if-range)# exit
AS2(config)# int range f0/1-2
AS2(config-if-range)# switchport nonegotiate
AS2(config-if-range)# exit

Configuring EtherChannels

AS1(config)# int range f0/1-2
AS1(config-if-range)# channel-group 1 mode desirable
AS1(config-if-range)# exit
AS1(config)# int port-channel 1
AS1(config-if)# switchport mode trunk
AS1(config-if)# switchport trunk allowed vlan 121,122,123,124
AS1(config-if)# exit

AS2(config)# int range f0/1-2
AS2(config-if-range)# channel-group 2 mode desirable
AS2(config-if-range)# exit
AS2(config)# int port-channel 2
AS2(config-if)# switchport mode trunk
AS2(config-if)# switchport trunk allowed vlan 121,122,123,124
AS2(config-if)# exit

DS1(config)# int range f0/2-3
DS1(config-if-range)# channel-group 1 mode desirable
DS1(config-if-range)# exit
DS1(config)# int port-channel 1
DS1(config-if)# switchport mode trunk
DS1(config-if)# switchport trunk allowed vlan 121,122,123,124
DS1(config-if)# exit

DS1(config)# int range f0/4-5
DS1(config-if-range)# channel-group 2 mode desirable
DS1(config-if-range)# exit
DS1(config)# int port-channel 2
DS1(config-if)# switchport mode trunk
DS1(config-if)# switchport trunk allowed vlan 121,122,123,124
DS1(config-if)# exit

Creating DHCP server

AS1(config)# ip dhcp excluded-address 10.95.121.1 10.95.121.32
AS1(config)# ip dhcp excluded-address 10.95.122.1 10.95.122.32
AS1(config)# ip dhcp excluded-address 10.95.123.1 10.95.123.32
AS1(config)# ip dhcp excluded-address 10.95.124.1 10.95.124.32
AS1(config)# ip dhcp pool vPool121
AS1(dhcp-config)# network 10.95.121.0 255.255.255.0
AS1(dhcp-config)# default-router 10.95.121.1
AS1(dhcp-config)# exit
AS1(config)# ip dhcp pool vPool122
AS1(dhcp-config)# network 10.95.92.0 255.255.255.0
AS1(dhcp-config)# default-router 10.95.92.1
AS1(dhcp-config)# exit
AS1(config)# ip dhcp pool vPool123
AS1(dhcp-config)# network 10.95.123.0 255.255.255.0
AS1(dhcp-config)# default-router 10.95.123.1
AS1(dhcp-config)# exit
AS1(config)# ip dhcp pool vPool124
AS1(dhcp-config)# network 10.95.124.0 255.255.255.0
AS1(dhcp-config)# default-router 10.95.124.1
AS1(dhcp-config)# exit

AS2(config)# ip dhcp excluded-address 10.95.121.1 10.95.121.32
AS2(config)# ip dhcp excluded-address 10.95.122.1 10.95.122.32
AS2(config)# ip dhcp excluded-address 10.95.123.1 10.95.123.32
AS2(config)# ip dhcp excluded-address 10.95.124.1 10.95.124.32
AS2(config)# ip dhcp pool vPool121
AS2(dhcp-config)# network 10.95.121.0 255.255.255.0
AS2(dhcp-config)# default-router 10.95.121.1
AS2(dhcp-config)# exit
AS2(config)# ip dhcp pool vPool122
AS2(dhcp-config)# network 10.95.92.0 255.255.255.0
AS2(dhcp-config)# default-router 10.95.92.1
AS2(dhcp-config)# exit
AS2(config)# ip dhcp pool vPool123
AS2(dhcp-config)# network 10.95.123.0 255.255.255.0
AS2(dhcp-config)# default-router 10.95.123.1
AS2(dhcp-config)# exit
AS2(config)# ip dhcp pool vPool124
AS2(dhcp-config)# network 10.95.124.0 255.255.255.0
AS2(dhcp-config)# default-router 10.95.124.1
AS2(dhcp-config)# exit

DS1(config)# ip dhcp excluded-address 10.95.121.1 10.95.121.32
DS1(config)# ip dhcp excluded-address 10.95.122.1 10.95.122.32
DS1(config)# ip dhcp excluded-address 10.95.123.1 10.95.123.32
DS1(config)# ip dhcp excluded-address 10.95.124.1 10.95.124.32
DS1(config)# ip dhcp pool vPool121
DS1(dhcp-config)# network 10.95.121.0 255.255.255.0
DS1(dhcp-config)# default-router 10.95.121.1
DS1(dhcp-config)# exit
DS1(config)# ip dhcp pool vPool122
DS1(dhcp-config)# network 10.95.92.0 255.255.255.0
DS1(dhcp-config)# default-router 10.95.92.1
DS1(dhcp-config)# exit
DS1(config)# ip dhcp pool vPool123
DS1(dhcp-config)# network 10.95.123.0 255.255.255.0
DS1(dhcp-config)# default-router 10.95.123.1
DS1(dhcp-config)# exit
DS1(config)# ip dhcp pool vPool124
DS1(dhcp-config)# network 10.95.124.0 255.255.255.0
DS1(dhcp-config)# default-router 10.95.124.1
DS1(dhcp-config)# exit

Enabling routing between the VLANs

DS1(config)# int vlan 121
DS1(config-if)# ip add 10.95.121.1 255.255.255.0
DS1(config-if)# no shut
DS1(config-if)# exit
DS1(config)# int vlan 122
DS1(config-if)# ip add 10.95.122.1 255.255.255.0
DS1(config-if)# no shut
DS1(config-if)# exit
DS1(config)# int vlan 123
DS1(config-if)# ip add 10.95.123.1 255.255.255.0
DS1(config-if)# no shut
DS1(config-if)# exit
DS1(config)# int vlan 124
DS1(config-if)# ip add 10.95.124.1 255.255.255.0
DS1(config-if)# no shut
DS1(config-if)# exit
DS1(config)# ip default-gateway 10.95.0.121

R12(config)# ip routing

Configuring Single-Area OSPF

R12(config)# int f0/1
R12(config-if)# ip address 10.95.0.121 255.255.254.0
R12(config-if)# exit
R12(config)# router ospf 1
R12(config-router)# network 10.95.0.121 255.255.254.0 area 0
R12(config-router)# exit
R12(config)# int f0/0
R12(config-if)# ip address 10.95.0.119 255.255.254.0
R12(config-if)# exit
R12(config)# router ospf 1
R12(config-router)# network 10.95.0.119 255.255.254.0 area 0
R12(config-router)# exit

Configuring SSH

AS1(config)# ip domain-name acme
AS1(config)# crypto key generate rsa
Bits used: 1024
AS1(config)# line vty 0 4
AS1(config-line)# transport input ssh
AS1(config-line)# login local
AS1(config-line)# exit
AS1(config)# ip ssh version 2
AS1(config)# username cisco password ciscoeigrp

AS2(config)# ip domain-name acme
AS2(config)# crypto key generate rsa
Bits used: 1024
AS2(config)# line vty 0 4
AS2(config-line)# transport input ssh
AS2(config-line)# login local
AS2(config-line)# exit
AS2(config)# ip ssh version 2
AS2(config)# username cisco password ciscoeigrp

DS1(config)# ip domain-name acme
DS1(config)# crypto key generate rsa
Bits used: 1024
DS1(config)# line vty 0 4
DS1(config-line)# transport input ssh
DS1(config-line)# login local
DS1(config-line)# exit
DS1(config)# ip ssh version 2
DS1(config)# username cisco password ciscoeigrp

Implementing Port Security

AS1(config)# int range f0/1-2
AS1(config-if-range)# switchport port-security
AS1(config-if-range)# switchport port-security violation shutdown
AS1(config-if-range)# exit

AS2(config)# int range f0/1-2
AS2(config-if-range)# switchport port-security
AS2(config-if-range)# switchport port-security violation shutdown
AS2(config-if-range)# exit

Implementing PortFast and BPDU guard

AS1(config)# spanning-tree mode pvst
AS1(config)# spanning-tree vlan 121-124
AS1(config)# int range f0/3-23
AS1(config-if-range)# spanning-tree portfast
AS1(config-if-range)# exit
AS1(config)# spanning-tree portfast bpduguard default
AS1(config)# int range f0/3-23
AS1(config-if-range)# switchport port-security maximum 2
AS1(config-if-range)# exit

AS2(config)# spanning-tree mode pvst
AS2(config)# spanning-tree vlan 121-124
AS2(config)# int range f0/3-23
AS2(config-if-range)# spanning-tree portfast
AS2(config-if-range)# exit
AS2(config)# spanning-tree portfast bpduguard default
AS2(config)# int range f0/3-23
AS2(config-if-range)# switchport port-security maximum 2
AS2(config-if-range)# exit

DS1(config)# spanning-tree mode pvst
DS1(config)# spanning-tree vlan 91-94

Configuring NTP

R12(config)# ntp server 10.94.1.3
R12(config)# ntp server 10.94.4.254

DS1(config)# ntp server 10.95.0.121

Limiting remote management connections

AS1(config)# ip access-list standard MGT
AS1(config-std-nacl)# remark Management
AS1(config-std-nacl)# permit 10.95.124.0 0.0.0.255
AS1(config-std-nacl)# exit
AS1(config)# line vty 0 4
AS1(config-line)# access-class MGT in
AS1(config-line)# exit

AS2(config)# ip access-list standard MGT
AS2(config-std-nacl)# remark Management
AS2(config-std-nacl)# permit 10.95.124.0 0.0.0.255
AS2(config-std-nacl)# exit
AS2(config)# line vty 0 4
AS2(config-line)# access-class MGT in
AS2(config-line)# exit

DS1(config)# ip access-list standard MGT
DS1(config-std-nacl)# remark Management
DS1(config-std-nacl)# permit 10.95.124.0 0.0.0.255
DS1(config-std-nacl)# exit
DS1(config)# line vty 0 4
DS1(config-line)# access-class MGT in
DS1(config-line)# exit

Overview

Testing was performed with traditional show commands. The internet connection was tested by connecting a computer to the network. During testing, it was found that when the computer was connected to AS1 or AS2, the computer found the IP address but was still unable to connect to the internet. It may have been a routing problem and the problem could not be fixed despite attempts.

It was also noted that the NTP configuration was not working properly. This was successfully solved, but only partially. The R12 did show the current time and date, but on the DS1 they were incorrect. In addition, it was found that the OSPF was not properly configured. It turned out that the other interface had been forgotten to configure.

Questions

1. How many links will DS1 see in spanning-tree?
   5

2. Where there any requirements in this Case Study that you were unable to fulfill?
   When testing the internet connection, the PC got an IP address but could not connect to the internet. Also, the NTP server did not work properly.

3. How could you improve security and performance of the network in your implementation of case study?
   It is advisable to implement a username and password on the devices. For unused ports, it may be desirable to create their own VLAN. The IEEE 802.1X protocol could also be used.

   In addition, it would be advisable to use other security features such as:
   - **Network Access Control (NAC) that includes authentication, authorization, and accounting (AAA) services.**
   - **The next generation firewall (NGFW) which includes the typical functions of traditional firewalls such as packet filtering, network- and port-address translation (NAT), stateful inspection, and virtual private network (VPN) support.**
   - **The email security appliance (ESA) which filters spam and suspicious emails.**

4. How much time did this Case Study take?
   8 hours.