Networking 1: Final Course Work

Section:
UP-FB1-BSIT2-01

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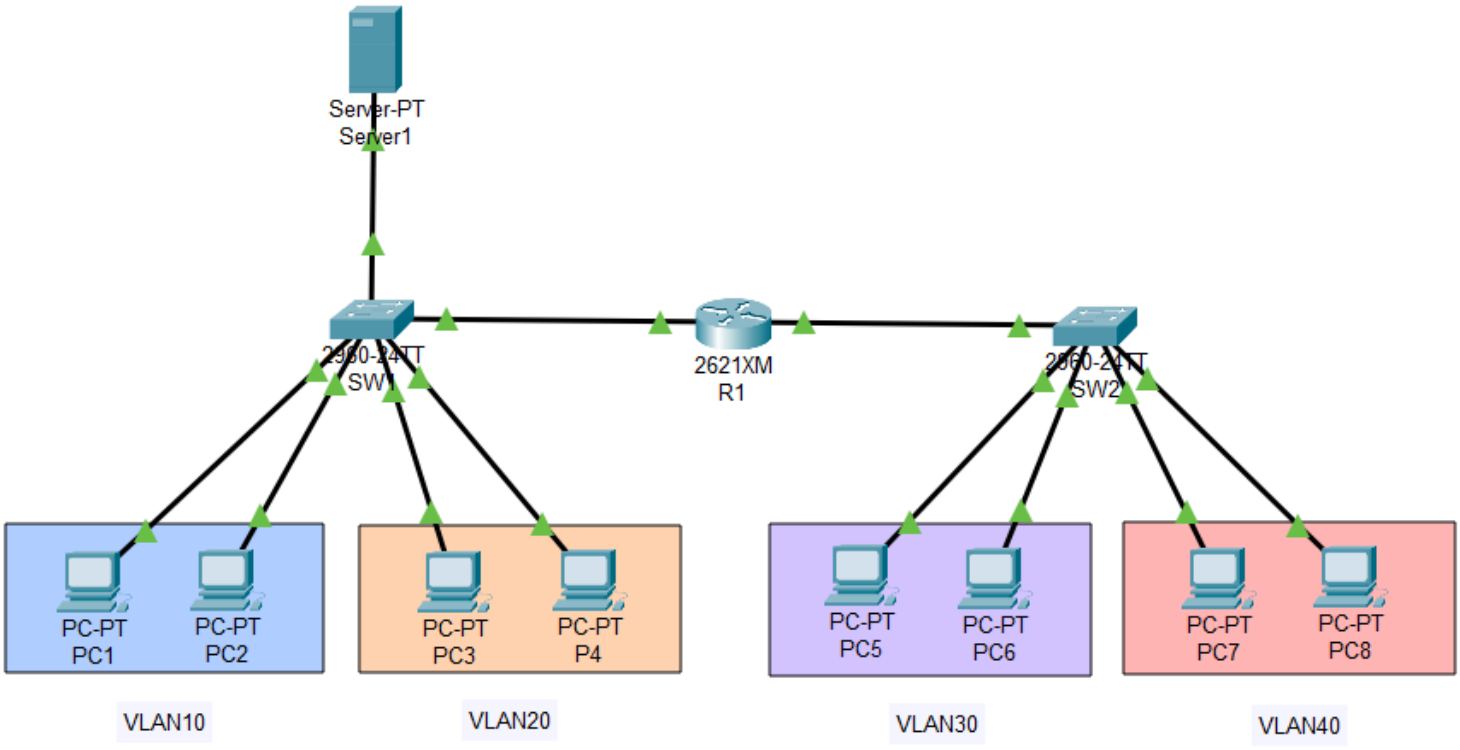
Introduction (Introduction of networking project)

Networking 1 Final Course Work aims to assess the student's knowledge on this subject through creating a small office/home network. The small network is composed of assigning eight personal computers to 4 VLANs, requesting DHCP from a server, and securing the devices.

Topology Diagram (Picture/Screenshot of Topology)



Addressing Table (IP address used)

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	GigabitEthernet0/0.10	192.168.10.1	255.255.255.0	-
	GigabitEthernet0/0.20	192.168.20.1	255.255.255.0	-
	GigabitEthernet0/1.30	192.168.30.1	255.255.255.0	-
	GigabitEthernet0/1.40	192.168.40.1	255.255.255.0	-
	GigabitEthernet0/0	No IP assigned	Not applicable	Not applicable
	GigabitEthernet0/1	No IP assigned	Not applicable	Not applicable
Server	FastEthernet0	192.168.10.2	255.255.255.0	192.168.10.1
SW1	VLAN 10	No IP assigned	Not applicable	192.168.10.1
	VLAN 20	No IP assigned	Not applicable	192.168.10.1
SW2	VLAN 30	No IP assigned	Not applicable	192.168.10.1
	VLAN 40	No IP assigned	Not applicable	192.168.10.1
PC1	FastEthernet0	DHCP from VLAN10	255.255.255.0	192.168.10.1
PC2	FastEthernet0	DHCP from VLAN10	255.255.255.0	192.168.10.1
PC3	FastEthernet0	DHCP from VLAN20	255.255.255.0	192.168.20.1
PC4	FastEthernet0	DHCP from VLAN20	255.255.255.0	192.168.20.1
PC5	FastEthernet0	DHCP from VLAN30	255.255.255.0	192.168.30.1
PC6	FastEthernet0	DHCP from VLAN30	255.255.255.0	192.168.30.1
PC7	FastEthernet0	DHCP from VLAN40	255.255.255.0	192.168.40.1
PC8	FastEthernet0	DHCP from VLAN40	255.255.255.0	192.168.40.1

Topology Configurations (Show all of the configurations)

SW1

// Changing hostname

```
enable
config terminal
hostname SW1
```

// Create VLANs

```
vlan 10
 name VLAN10
exit
vlan 20
 name VLAN20
exit
```

// Assigning VLANs to interfaces

```
interface range fa0/1 - 2
 switchport mode access
 switchport access vlan 10
exit

interface range fa0/3 - 4
 switchport mode access
 switchport access vlan 20
exit
```

// Configure VLAN 10 to access server

```
interface fa0/23
 switchport mode access
 switchport access vlan 10
```

// Configure connection to the router as trunk port

```
interface f0/24
 switchport mode trunk
 switchport trunk allowed vlan 10,20
exit
```

// Secure device settings

```
enable secret deaniel1
line console 0
 password aquino1
 login
exit
line vty 0 4
 password aquino1
 login
exit
```

// Configure SSH

```
ip domain-name office.local
crypto key generate rsa
1024
username admin secret sshdeaniel
line vty 0 4
 transport input ssh
 login local

end
```

SW2

// Changing hostname

```
enable
config terminal
hostname SW2
```

// Create VLANs

```
vlan 30
 name VLAN30
exit
vlan 40
 name VLAN40
exit
```

// Assigning VLANs to interfaces

```
interface range fa0/1 - 2
 switchport mode access
```

```
 switchport access vlan 30
exit

interface range fa0/3 - 4
 switchport mode access
 switchport access vlan 40
exit
```

// Configure connection to the router as trunk port

```
interface f0/24
 switchport mode trunk
 switchport trunk allowed vlan 30,40
exit
```

// Secure device settings

```
enable secret aaron2
line console 0
 password villariaza2
 login
exit
line vty 0 4
 password villariaza2
 login
exit
```

// Configure SSH

```
ip domain-name office.local
crypto key generate rsa
1024
username admin secret sshdeaniel
line vty 0 4
 transport input ssh
 login local

end
```

R1

// Set hostname

```
enable
config terminal
hostname R1
```

// Configure subinterfaces in the router

```
interface f0/0.10
 encapsulation dot1Q 10
 ip address 192.168.10.1 255.255.255.0
 no shutdown
exit

interface f0/0.20
 encapsulation dot1Q 20
 ip address 192.168.20.1 255.255.255.0
 no shutdown
exit

interface f0/1.30
 encapsulation dot1Q 30
 ip address 192.168.30.1 255.255.255.0
 no shutdown
exit

interface f0/1.40
 encapsulation dot1Q 40
 ip address 192.168.40.1 255.255.255.0
 no shutdown
exit

interface f0/0
 no shutdown
exit

interface f0/1
 no shutdown
exit
```

// Configure helper address for DHCP relay

```
interface f0/0.20
 ip helper-address 192.168.10.2
```

```
exit

interface f0/1.30
 ip helper-address 192.168.10.2
exit

interface f0/1.40
 ip helper-address 192.168.10.2
exit
```

// Prevent PCs from reaching VLAN10 and 20

```
access-list 101 deny ip 192.168.10.0 0.0.0.255 192.168.30.0
0.0.0.255
access-list 101 deny ip 192.168.10.0 0.0.0.255 192.168.40.0
0.0.0.255
access-list 101 deny ip 192.168.20.0 0.0.0.255 192.168.30.0
0.0.0.255
access-list 101 deny ip 192.168.20.0 0.0.0.255 192.168.40.0
0.0.0.255
access-list permit ip any any

interface f0/0.10
ip access-group 101 in
exit

interface f0/0.20
ip access-group 101 in
exit
```

// Prevent PCs from reaching VLAN10 and 20

```
access-list 102 deny ip 192.168.30.0 0.0.0.255 192.168.10.0
0.0.0.255
access-list 102 deny ip 192.168.30.0 0.0.0.255 192.168.20.0
0.0.0.255
access-list 102 deny ip 192.168.40.0 0.0.0.255 192.168.10.0
0.0.0.255
access-list 102 deny ip 192.168.40.0 0.0.0.255 192.168.20.0
0.0.0.255

interface f0/1.30
ip access-group 102 in
```

```
exit

interface f0/1.40
ip access-group 102 in
exit
```

// Configure SSH

```
ip domain-name office.local
crypto key generate rsa
1024
username admin secret sshdeaniel
line vty 0 4
 transport input ssh
 login local

end
```

Server1

//Configure IP

```
Static
IPv4 Address: 192.168.10.2
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.10.1
DNS Server: 192.168.10.2
```

// Configure VLAN Pool

```
Interface FastEthernet0
Service: On
```

// VLAN 10 pool

```
Pool Name: serverPool
Default Gateway: 192.168.10.1
DNS Server: 192.168.10.2
Start IP Address: 192.168.10.10
Subnet Mask: 255.255.255.0
Maximum Number of Users: 246
```

// VLAN 20 pool

```
Pool Name: VLAN20
Default Gateway: 192.168.20.1
DNS Server: 192.168.10.2
Start IP Address: 192.168.20.3
Subnet Mask: 255.255.255.0
Maximum Number of Users: 246
```

// VLAN 30 pool

```
Pool Name: VLAN30
Default Gateway: 192.168.30.1
DNS Server: 192.168.10.2
Start IP Address: 192.168.30.3
Subnet Mask: 255.255.255.0
Maximum Number of Users: 246
```

// VLAN 40 pool

```
Pool Name: VLAN40
Default Gateway: 192.168.40.1
DNS Server: 192.168.10.2
Start IP Address: 192.168.40.3
Subnet Mask: 255.255.255.0
Maximum Number of Users: 246
```

// Configure DNS

```
DNS Service: On
Name: office.local
Type: A Record
Address: 192.168.10.2
```

Troubleshooting methods (Show what troubleshooting methods you used and explain what it does and how you used them)

1. `ping`
   - To show connectivity between different devices
2. `show interfaces trunk`
   - To verify trunk vlan interfaces
3. `show ip int brief`
   - To check the status and IP of interfaces.
4. `show interface status`

- To check the status and VLAN of interfaces.

5. `show ip ssh`
    - Shows if ssh is enabled, its version, authentication timeout, and how many authentication retries you get.
6. `tracert`
    - tracert shows the path a packet takes when pinging a remote device
7. `show running-config | include ip domain-name`
    - Shows the domain-name of the server.
8. `show running-config | include username`
    - shows the ssh configurations.
9. `ping 127.0.0.1`
    - pings the loopback address.

Encountered Problems (Explain here what problems you have encountered on your topology when first making it and share it in this section)

1. VLAN10 and VLAN20 able to ping VLAN30 and VLAN40 PCs
    - Based on our research, a firewall is applied on the router, affecting only the VLAN30 and 40. This means that VLAN10 and 20 can still reach VLAN30 and 40.
2. Server can't provide DHCP if connected through the router.
    - Initially, the team was planning to have a hierarchical topology, the one where the server is up top, then router, switches, and the PCs. Servers need to have VLANs connected in order to assign DHCP. But we were not able to directly assign a VLAN interface from the router.
3. Server unable to give DHCP to PCs
    - Must be assigned to an interface.
4. PC5 - PC8 tracert returns its own IP address
    - We did not configure the VLAN30 and 40 to deny access coming from VLAN10 and 20. This resulted in the packets to be returned to the sender.