Report 3

Configure DHCP server

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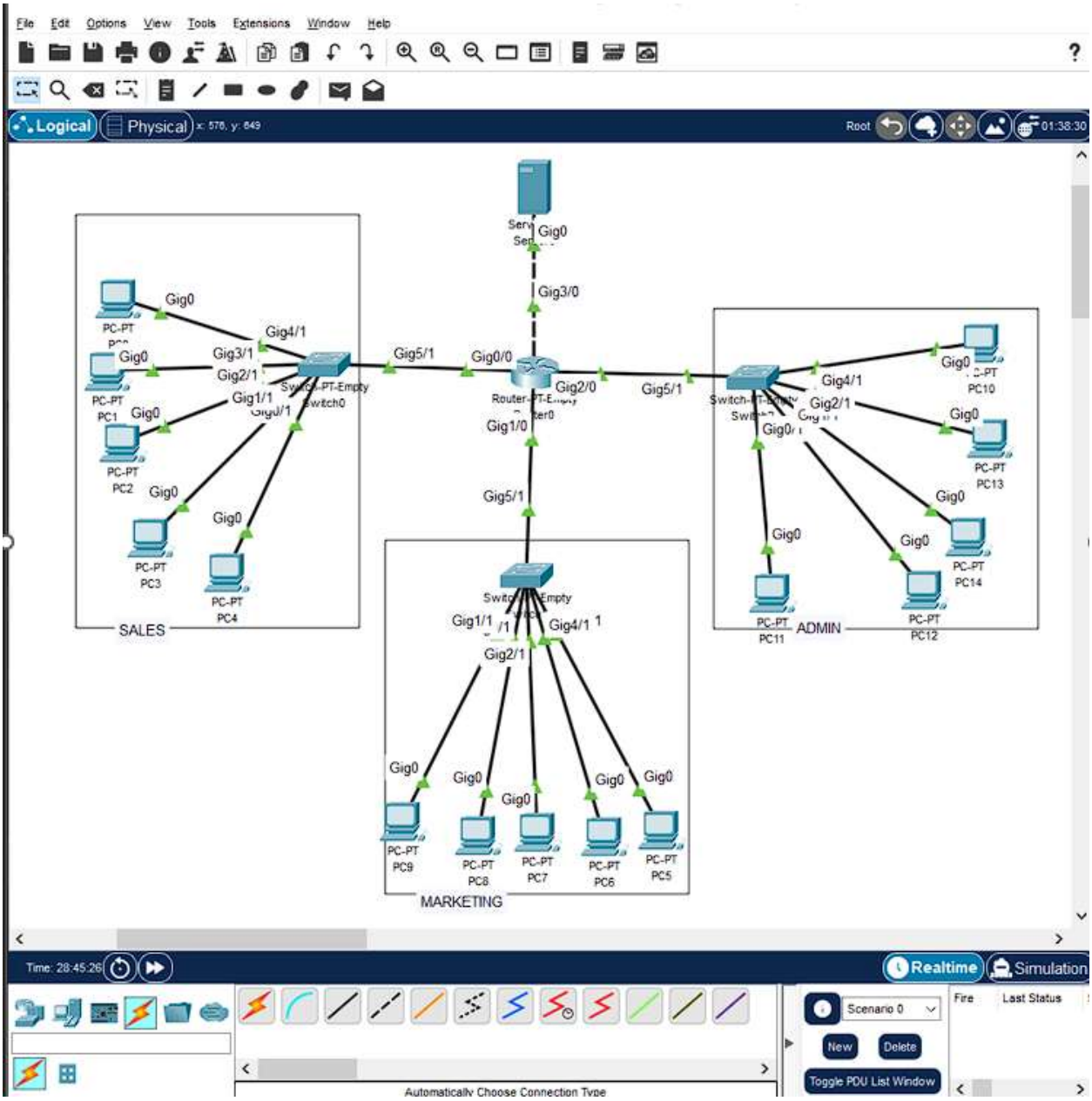
Introduction

The objective of this assignment is to configure a DHCP server such that it provides IP address to the PCs in the VLANs connected. In this assignment we have 3 VLANs (SALES, MARKETING and ADMIN) with 5 PCs in each VLANs. All the VLANs (switches) are connected to the server through a router. VLANs are important because VLANs divide its resources to its PCs in it as well as to other PCs if inter-VLAN routing is setup. It also provides improved security and improves network performance by reducing unnecessary broadcast traffic and helps control the traffic flow.

Network Topology Description:



From the Above diagram, it can be seen that, there are 3 switches being used, each assigned with a VLAN (SALES, MARKETING, ADMIN) and each switch are connected with 5 PCs. The router has 4 interfaces, 3 connected to the switches and one connected to a to a DHCP server. For all the connections, a 1 CGE cable is used. The router is used so that inter VLAN is possible. Inter VLAN is important because it helps PC from 1 VLAN connect and another and transfer data and share resource as well as provide proper security.

Switch Configurations

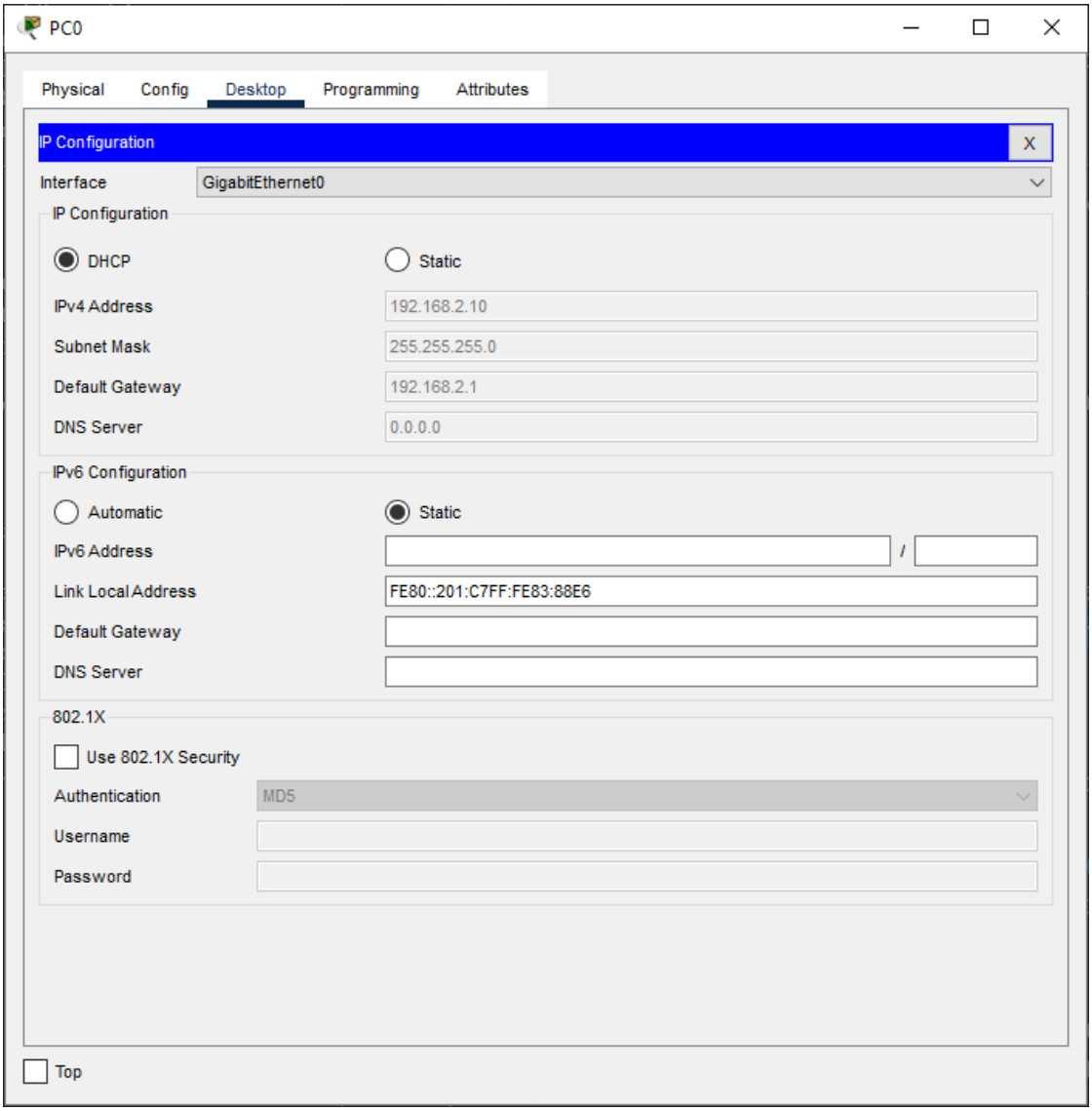
To configure all the three switches, first all three switches are set with their respective VLANs (VLAN 10 as SALES, VLAN 20 as MARKETING and VLAN 30 as ADMIN). Then 15 PCs are taken and 5 each PCs are connected to all the 3 switches through CGE cable (CGE module is replaced in both all the PCs and switches). Then all the connected PCs in each of the switches are joined to their respected VLANs. We can check if the PCs are in VLAN thorough “do show VLAN” command in each of the command line in the switches. The reason VLANs are created on switches are because they logically can segregate network traffic, by the IDs and prevent the PCs in the VLAN to communication to PCs outside of the server (unless routing is used). They also optimize the network by reducing traffic and does not allow unauthorized devices access the network as well its resources.

Router Configuration

When configuring the router, we first add 4 interfaces in it (here we are using CGE) and connect three of the interfaces to the switches (VLANs). The other cable is connected to the DHCP server. The interface facing the switch and the interface facing the server are giving IP addresses and subnet Masks. Then in the router we configure DHCP relay by specifying the ip address of the DHCP server on the router to all the other 3 interfaces connecting to the switches (VLANs). This will enable the server to be able to connect to the networks.

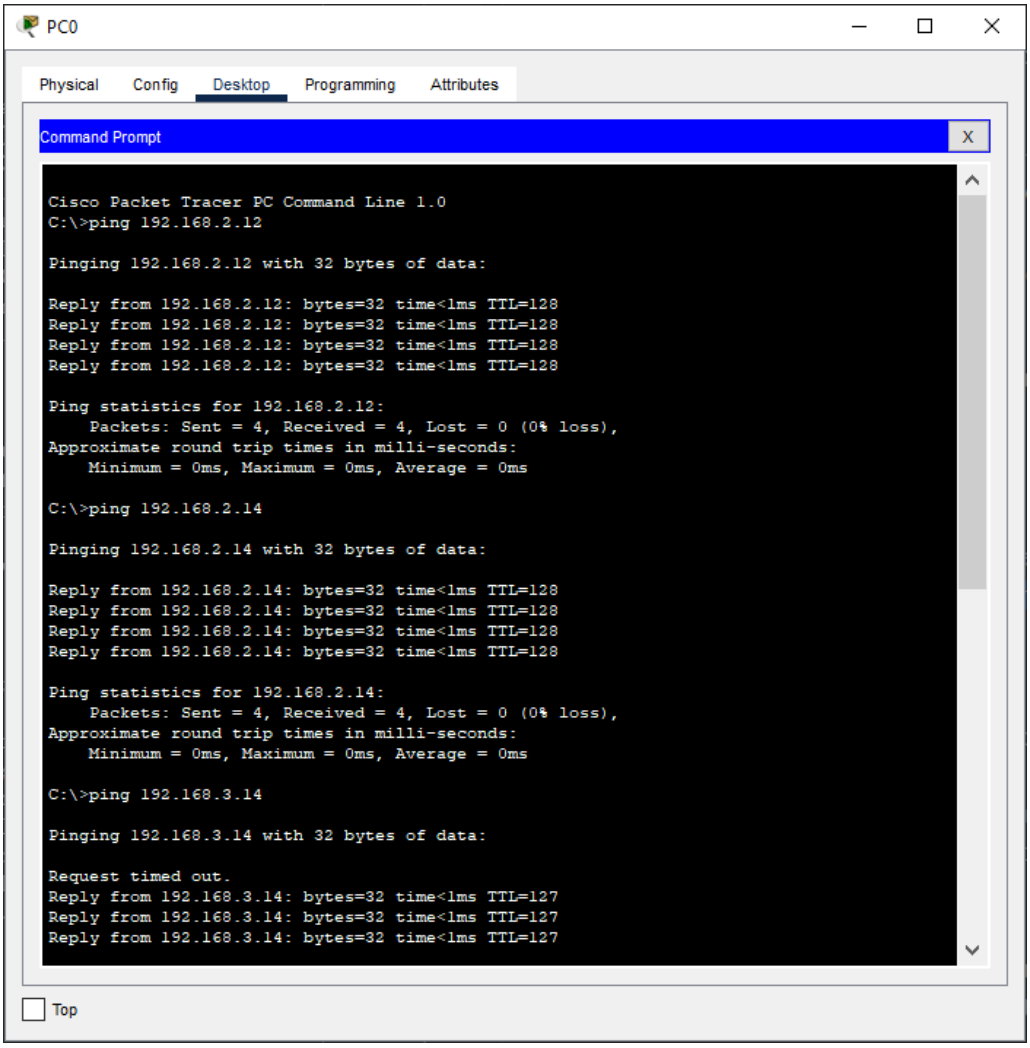
DHCP Server Configuration

The server is first modified with a 1CGE cable and is connected to the router through it. Then default gateway is set to the router’s IP address to pass information when it does not know where the destination of the devices is. Also, an IP address is given to the interface connected to it. Then to enable DHCP, we enable its service. After than we create 3 pool (SalesPool, MarketingPool and AdminPool) giving the starting IP range of the subnet (in my case, 192.168.2.10 for SALES, 192.168.3.10 for marketing and 192.168.4.10 for ADMIN) with default gateway being the IP address of interface connecting each switches. (In assignment I set 192.168.2.1 for SALES, 192.168.3.1 for marketing and 192.168.4.1 for ADMIN) with max number of user set as 5. Then the server sends IP to all the VLANs under the subnet provided and assigns IP to all the PCs automatically as shown in image below. Also all the PCs needs to be selected as DHCP in IP configuration instead of Static for it to work.

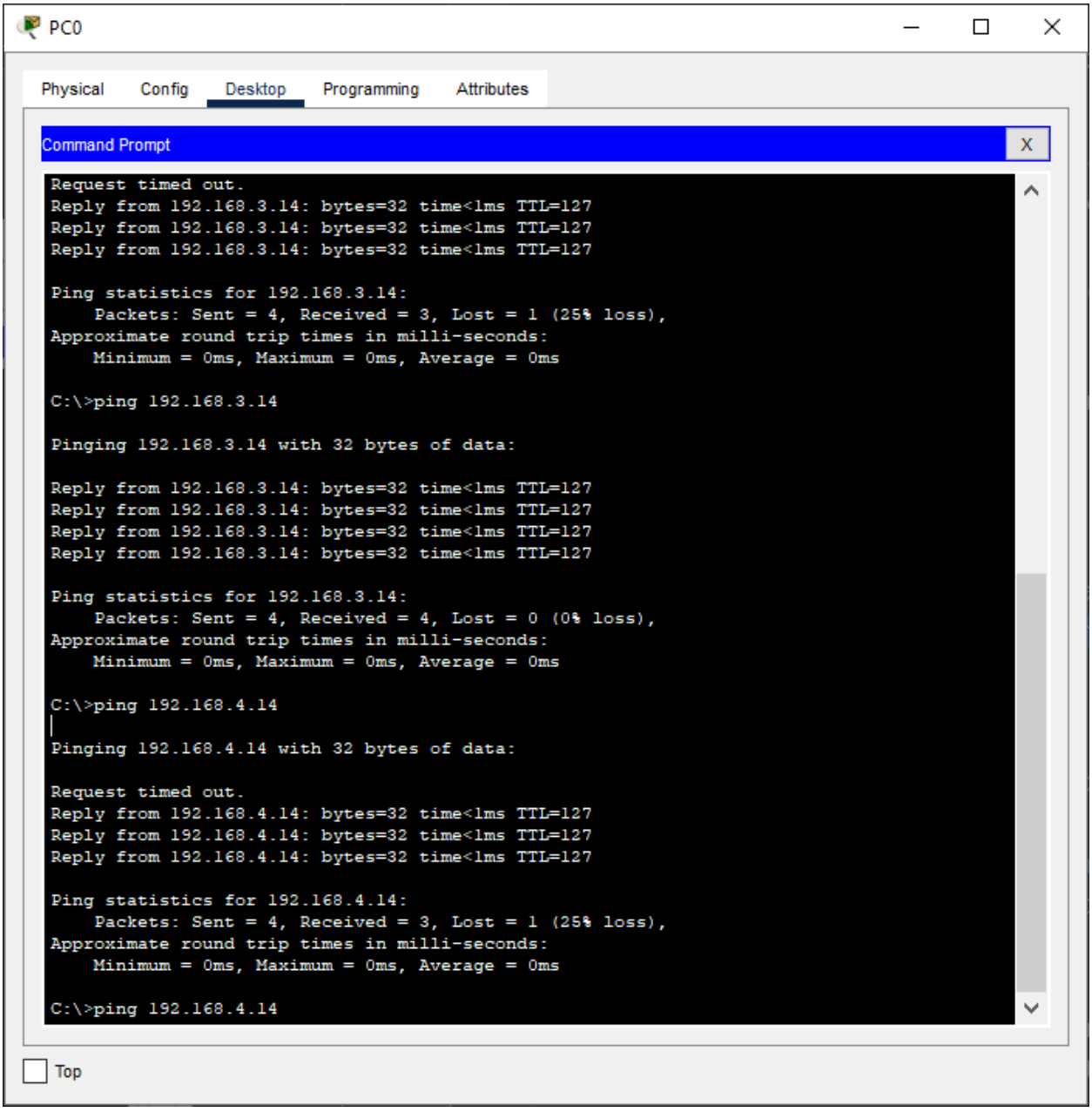

PC0
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
GigabitEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.2.10
Subnet Mask
255.255.255.0
Default Gateway
192.168.2.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::201:C7FF:FE83:88E6
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

Testing and Verification

Firstly, I tested if my VLANs were working correctly, so I tested if PCs in the same VLANs were connecteing with each other. So I pinged each other as shown in the image below. There was no problem I faced. In the image I Pinged from PC0 (192.168.2.10) to PC2 (192.168.2.12) and was able to ping with no packet loss. Then I pinged to 192.168.2.14 and was sucessfuly able to ping again.



Afte that, I tested if my inter-VLAN connection was working or not. So as show in the image below, I Pinged from VLAN SALES to VLAN MARKETING (from 192.168.2.10 to 192.168.3.14) and received a 25% packet loss, as 3 items were successfully received by the other computer but lost 1 data. So, I performed the same action to the same computer again and was able to send with no packet loss. I tested again by connecting to PC in VLAN ADMIN and again I saw 25% packet loss for the first ping, but saw no packet loss for the second ping, proving that there I high chance of losing some data if sending for the first time.



Conclusion

In conclusion, from this assignment we were able to get IP addresses set up automatically, through DHCP server to all the PCs in different VLANs saving huge amount of time. Also, through this, we were able to perform inter VLAN connected, as no static connection was required as in assignment 2. It is very important to keep monitoring network, as we saw that there is still chance of losing few data, specifically when sending it for the first time to a new device, so monitoring and maintenance of network is very important.